

SPORTS IDENTITY, PERFORMANCE, AND EFFICIENCY IN WOMEN'S HANDBALL. CASE STUDIES: VIPERS KRISTIANSAND (NORWAY), CSM BUCUREŞTI (ROMANIA), AND GYŐRI AUDI ETO KC (HUNGARY)

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ABSTRACT. – Sports Identity, Performance, and Efficiency in Women's Handball. Case Studies: Vipers Kristiansand (Norway), CSM Bucureşti (Romania), and Győri Audi ETO KC (Hungary). This study examines the sports identity, performance, and management efficiency of three leading European women's handball teams: Vipers Kristiansand (Norway), CSM Bucureşti (Romania), and Győri Audi ETO KC (Hungary), during the 2018–2023 period. By analyzing their distinct strategies and outcomes, the research highlights how these teams achieved varying degrees of success through different approaches to recruitment, identity building, and operational management. Vipers Kristiansand demonstrated a clear identity centered on developing young, locally nurtured talent. The team maintained a stable coaching staff and fostered cohesion, which contributed to significant international achievements, including three Champions League titles. Despite these successes, financial mismanagement culminated in the team's bankruptcy in 2024, raising questions about long-term sustainability. CSM Bucureşti, on the other hand, adopted an expensive strategy, investing heavily in internationally renowned players. While this approach ensured domestic dominance, a lack of managerial continuity and frequent roster changes diluted its sports identity and led to underwhelming results in European competitions. The club's inefficiency highlights the challenges of balancing

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high investment with tangible outcomes. Győri Audi ETO KC achieved balanced success, blending national talent with select international players to create a competitive and cohesive team. With a stable management structure and consistent performances in the Champions League, the Hungarian team exemplified how national pride and international aspirations can coexist effectively, culminating in a Champions League victory in 2019 and consistent Final Four appearances. The findings reveal that strong sports identity, effective management, and strategic performance planning are key to achieving sustained success in elite women's handball. The study offers valuable lessons for sports organizations across team sports, emphasizing that financial investment alone is insufficient without clear strategic alignment and operational efficiency.

Keywords: *sports identity, women's handball, management efficiency, performance metrics*

1. INTRODUCTION

In recent years, women's handball has become a major force in European sports, drawing in passionate fans, sponsors, and significant media attention. Unlike many other sports where female participation has lagged, women's handball is immensely popular across Europe, with national leagues playing a central role in countries like Norway, Romania, and Hungary. For these nations, handball is more than just a game; it's a symbol of national pride, sustained by major investments in talent development and elite competition. The European Handball Federation (EHF) ('EHF Competition Archive', n.d.) has been instrumental in promoting this sport, particularly through the EHF Champions League, where top teams compete on the continent's biggest stage. Among these elite clubs, Vipers Kristiansand from Norway ('Vipers Kristiansand', n.d.), CSM Bucureşti from Romania ('CSM Bucureşti (women's handball)', n.d.), and Győri Audi ETO KC from Hungary ('Győri Audi ETO KC woman handball team', n.d.) have emerged as leading contenders, dominating both their national leagues and international tournaments.

The success of these teams is not only due to athletic talent but also to their unique approaches to sports identity, performance measurement, and management efficiency (Wagner, Finkenzeller, Würth, & von Duvillard, 2014). Each of these teams has carefully constructed a distinct identity, utilized data-driven performance metrics, and adopted strategic management practices to build and maintain their competitive edge. This study examines the period from 2018 to 2023, exploring how Vipers Kristiansand, CSM Bucureşti, and Győri Audi ETO KC balance these elements to achieve success. By focusing on these top European women's handball clubs, the research addresses a gap in sports studies, where most analyses have historically centered on men's teams, and aims to shed light on the unique dynamics of women's team sports.

Sports identity forms the foundation of a team's culture, cohesion, and public image. It encompasses the shared characteristics, values, and symbols that a team projects to its players, fans, and the broader community (Wagner et al., 2014). For elite women's handball teams, a strong identity is crucial for standing out in a crowded sports landscape and for fostering unity among players from diverse backgrounds (Prisacaru, 2011). Vipers Kristiansand, for example, emphasizes local, young talent, mirroring Norway's commitment to developing homegrown players. In contrast, CSM Bucureşti has taken a cosmopolitan approach, assembling a multinational roster that reflects Romania's ambitions on the global stage. Meanwhile, Győri Audi ETO KC has built an identity around a mix of Hungarian players and carefully selected international stars, achieving a balance between national pride and international competitiveness (Lock & Heere, 2017).

A cohesive sports identity not only strengthens internal team bonds but also plays a key role in recruitment. Athletes are often drawn to teams that align with their personal values and career goals. Vipers' focus on nurturing local talent, for instance, appeals to young Norwegian players who seek growth opportunities within a supportive environment. In contrast, CSM's international orientation attracts established players looking to join a high-profile team that values diversity and global recognition. Thus, a team's identity influences not just its internal dynamics but also its appeal to top-tier talent, impacting recruitment and retention (Lock & Heere, 2017).

Performance metrics, meanwhile, serve as essential tools for assessing and enhancing success. In women's handball, these metrics include scoring averages, defensive statistics, individual contributions, and team-level achievements like win-loss records and tournament titles (Gutiérrez & Ruiz, 2013). For elite teams in competitions like the EHF Champions League, performance metrics provide insights not only into past achievements but also into areas for improvement and strategic refinement. Coaches and managers use these statistics to evaluate specific aspects of performance, such as defensive success or shooting accuracy, and to make data-driven decisions about training, recruitment, and player development.

Metrics also reflect how effectively a team's identity translates into tangible results. For example, Vipers Kristiansand's focus on defense and teamwork might show up in metrics related to blocks and opponent scoring efficiency, while CSM Bucureşti's emphasis on offensive impact could be evident in scoring efficiency and high-impact plays from its international stars. By aligning performance goals with the team's identity, management creates a shared purpose that motivates players to excel in areas aligned with the team's values. Additionally, performance

data can be used predictively: if a team consistently underperforms in high-stress games, management might intervene with specialized training or mental conditioning to help players perform better under pressure.

Management efficiency is another crucial component of long-term success, especially in women's sports, where resources are often limited (Hemmestad & Jones, 2019). Efficient management encompasses recruitment strategies, financial planning, staff stability, and fostering a positive team culture. Each of the case study teams has taken a unique approach to maximize resources while staying true to its identity and competitive goals. Recruitment, for example, is not simply about acquiring talent; it's about finding players who align with the team's values and playing style. Vipers Kristiansand's strategy of focusing on young, local players not only supports a Norwegian identity but also lowers recruitment costs and strengthens community support (Hemmestad & Jones, 2019). On the other hand, CSM București's international recruitment approach elevates the team's profile, though it requires higher financial investment. Győri Audi ETO KC strikes a balance, combining Hungarian talent with a few international stars to maintain both local appeal and competitive strength.

Staff stability is also a vital aspect of management efficiency. Teams with consistent coaching and administrative staff are better positioned to develop long-term strategies and implement complex tactical systems. Frequent changes in leadership can disrupt team cohesion and lower performance as players struggle to adapt to new styles and expectations (Varzaru & Cojocaru, 2016). Financial management is equally important, as it dictates the quality of facilities, training resources, and support staff available to players. While Vipers achieves efficiency through its focus on player development rather than costly transfers, CSM's higher investment in top talent requires careful budget management to sustain the team's ambitions. A supportive organizational culture further enhances management efficiency, reducing burnout and improving player retention by creating an environment where athletes feel valued and motivated (Prieto, Gómez, Volossovitch, & Sampaio, 2016).

This study focuses on three leading European women's handball teams—Vipers Kristiansand, CSM București, and Győri Audi ETO KC—selected for their distinctive approaches to sports identity, performance, and management. Each team exemplifies a different philosophy in elite handball, making them ideal case studies for examining the interplay between these elements. Vipers Kristiansand emphasizes local talent development, aligning with Norway's focus on community and sustainability. CSM București's international approach highlights how a globally oriented identity can elevate a team's competitive profile, while Győri Audi ETO KC's balanced strategy combines national pride with international aspirations, appealing to both local and European audiences.

The main goal of this study is to analyze how sports identity, performance metrics, and management efficiency contribute to the success of elite women's handball teams in Europe. By examining Vipers Kristiansand, CSM Bucureşti, and Győri Audi ETO KC, the research aims to reveal how different strategies impact performance outcomes. Beyond handball, these insights may provide valuable lessons for sports management in other team-based sports.

2. AIM, OBJECTIVES AND METHODOLOGY

The aim of this study is to explore the interplay between sports identity, performance metrics, and management efficiency in achieving high-level success in European women's handball. By analyzing the case studies of Vipers Kristiansand, CSM Bucureşti, and Győri Audi ETO KC during the 2018–2023 period, the research seeks to identify the key factors and strategies that contribute to their varying degrees of success (European Handball Federation, n.d.; EHF Competition Archive, n.d.; Handball Base, n.d.; International Handball Federation IHF, n.d.; Sofascore, n.d.).

The specific objectives of the study are:

- To analyze the *sports identity* of each team, considering player recruitment strategies, age, height, and fame at the time of joining the clubs, as well as the influence of coaches.

- To evaluate the *performance metrics*, both individual and collective, achieved by each team during the analyzed period, in domestic and international competitions.

- To assess the *efficiency of management*, focusing on player retention, infrastructure quality, audience engagement, and financial strategies.

- To *compare and contrast the strategies* adopted by the three teams and their outcomes to derive lessons applicable across women's team sports.

The methodology employed a comparative case study approach, focusing on the three elite teams. Quantitative data, such as the number of medals won, player turnover rates, and individual achievements, were combined with qualitative analysis of management strategies and team identities. Sources included official team statistics, European Handball Federation (EHF) reports, media coverage, and scholarly literature (Balint Elena, 2020; Gutiérrez & Ruiz, 2013; Hemmestad & Jones, 2019; Lock & Heere, 2017; Shilbury, Popi Sotiriadou, & Christine Green, 2008; Varzaru & Cojocaru, 2016; Varzaru Cristina & Manescu Cătălin Octavian, 2023). Descriptive statistics, along with statistical and graphical tools, were used to highlight correlations between identity, performance, and management practices, providing a comprehensive understanding of how these elements interact to influence success (Sotiriadou, Brouwers, & Le, 2014).

3. RESULTS

European women's handball has been dominated in recent years by a few teams whose sports performances are remarkable, both nationally and in international competitions. Among the most prestigious women's handball teams, based on their success in national and European competitions (or reaching the advanced stages of European tournaments), the following stand out: Brest Bretagne Handball and Metz Handball (France), Győry Audi ETO KC and FTC–Rail Cargo Hungaria (Hungary), Team Esbjerg, Handball Club Odense, Viborg HK, and Herning Håndbold (Denmark), Vipers Kristiansand and Larvik HK (Norway), CSM Bucureşti and CS Rapid Bucureşti (Romania), Krim Mercator Ljubljana (Slovenia), SG BBM Bietigheim (Germany), RK Podravka Koprivnica (Croatia), ŽRK Budućnost T-Mobile (Montenegro), and Handball Club Rostov-Don (Russian Federation—this team, like all other Russian sports teams, has been excluded from European competitions over the past three years due to the Russian Federation's military invasion of Ukraine).

Among these, teams with outstanding performances during the analyzed period (2018–2023) include *Vipers Kristiansand* (Norwegian champions in 2019, 2020, 2021, 2022, and 2023; winners of the Norwegian Cup in 2019, 2020, 2021, and 2023; winners of the Champions League in 2021, 2022, and 2023; and third place in the Champions League in 2019), *Győry Audi ETO KC* (Hungarian champions in 2019, 2022, and 2023; runners-up in the Hungarian championship in 2021; winners of the Hungarian Cup in 2019 and 2021; runners-up in the Hungarian Cup in 2022 and 2023; winners of the Champions League in 2019 and 2024; runners-up in the Champions League in 2022; semifinalists in the Champions League in 2021; and third place in the Champions League in 2023), and *CSM Bucureşti* (Romanian champions in 2021 and 2023; runners-up in the Romanian championship in 2019 and 2022; winners of the Romanian Cup in 2019 and 2022; runners-up in the Romanian Cup in 2021; winners of the Romanian Supercup in 2019 and 2022; runners-up in the Romanian Supercup in 2020 and 2021; and consistent participants in the advanced stages of the Champions League, a competition they won in 2016). The performances of these three European women's handball teams justify their selection as case studies for this material, aimed at explaining their undeniable achievements on both national and European levels. Despite their differing approaches to managing sports competitions and achieving success (Figure 1), their results stand out as exemplary.

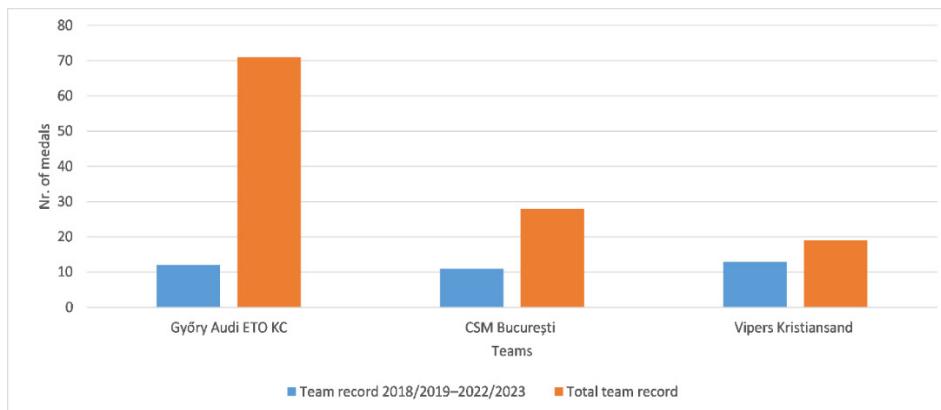


Fig. 1. The Achievements (Number of Medals Won) of Vipers Kristiansand, Győry Audi ETO KC, and CSM Bucureşti Between 2018–2023 and in Total.

If we refer strictly to the data presented in Figure 1, we could assert that the most successful team among the three analyzed is Győry Audi ETO KC, with a total of 71 medals throughout its history (12 of which were earned during the analyzed period, 2018–2023). In second place is CSM Bucureşti, with a total of 28 national and European medals (11 medals earned during 2018–2023). Lastly, Vipers Kristiansand ranks third, with only 19 medals overall (13 of which were earned in the analyzed period).

This approach, however, is simplistic and has limited relevance to our topic, as the Norwegian team Vipers Kristiansand has won the most medals (13) and the most prestigious ones during the analyzed period, securing three European titles (2021, 2022, and 2023) in the most prestigious European competition, the EHF Champions League ('Vipers Kristiansand', n.d.).

Hungarian team Győry Audi ETO KC is in second place with 12 medals, some of which are of European significance, including winning the EHF Champions League in 2019, finishing second in 2022, and taking third place in 2023. Its achievements are further reinforced by winning the EHF Champions League in the current competition year (2024) ('Győri Audi ETO KC woman handball team', n.d.; 'Győri ETO KC', n.d.).

Finally, the Romanian team CSM Bucureşti ('CSM Bucureşti (women's handball)', n.d.) ranks third in this regard, lacking any notable European performance during the analyzed period. Despite consistently reaching the advanced stages of the EHF Champions League every competition year, its last major European achievement was winning the prestigious trophy in 2016.

Therefore, we can conclude that Vipers Kristiansand has shown the most significant progress in recent years in terms of efficiency, performance, and sports management, with its performance indicators reaching superior levels.

The Hungarian team, Győry Audi ETO KC, has maintained relatively high sporting standards, while the Romanian team, CSM București, has been the least efficient in this regard during the analyzed period.

Starting from this observation, our comparative analysis considers three main indicators: sports identity, sports performance, and management efficiency, for the period 2018–2023, in the case of the three women's handball teams. We aim to argue and justify the fact that sports success (both nationally and internationally) is directly related to these three important factors. Each factor's quantification is based on a series of relevant elements from our perspective.

Thus, we analyze sports identity based on the following indicators (Lock & Heere, 2017):

1. The number of players recruited during 2018–2023 and their origin (from countries with strong women's handball traditions or from countries less familiar with the sport);
2. The players' age at the time of joining the club;
3. The players' height;
4. The players' fame (their global recognition and market value at that time);
5. The origin and fame of the coaches.

Sports performance is assessed through the analysis of the following indicators (Balint Elena, 2020):

1. The players' performance (medals won) with previous teams;
2. Individual achievements prior to joining one of the three analyzed clubs (individual medals won before their transfer);
3. Team and individual performances (of players and coaches) with the analyzed teams during 2018–2023.

Management efficiency is determined by the performance management strategies (Parent & Chappelet, 2017) adopted by the administrative staff of the three clubs. From our perspective, this is based on additional indicators, such as:

1. The duration of players' stays at the analyzed club (player and coach turnover rate);
2. The quality of the club's infrastructure;
3. The capacity of the sports hall where the team competes and the number of spectators attending events hosted on home ground;
4. The budget allocated for investments or the salaries of players and coaches (the latter two indicators are subject to strict confidentiality clauses, which may limit the accuracy of the information).

The three indicators mentioned above will be analyzed comparatively for the three teams considered as case studies and for the analyzed period (2018–2023), in order to highlight different approaches regarding actions and involvement on multiple levels, all aimed at a common goal: achieving sports performance, both nationally and especially at the European level.

Thus, the sports identity of the three teams is analyzed from the perspective of the following relevant indicators: the number of players and their country of origin, their age at the time of joining the club, the players' height and fame, as well as the country of origin and fame of the coaches.

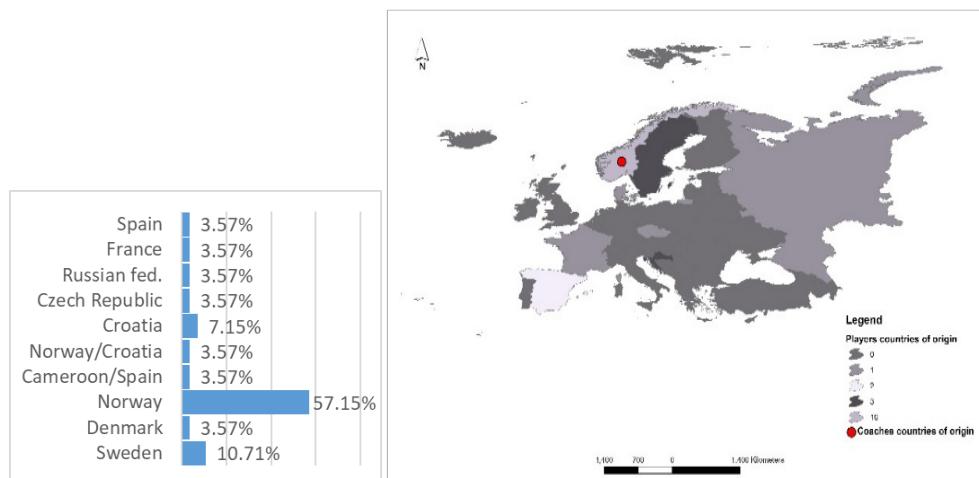


Fig. 2. Vipers Kristiansand: Players' Distribution by Country of Origin (2018–2023)

Fig. 3. Vipers Kristiansand: Origins of Players and Head Coaches (2018–2023).

The most efficient team (among the three analyzed), from the perspective of the number of players utilized during the analyzed period (2018–2023), is Vipers Kristiansand (Norway), with only 28 players. This demonstrates stability and complete trust in its roster (Figure 2). All players belonging to the team are from Europe (with only one player holding dual nationality, Cameroonian-Spanish), and more than half (57.15%) are from the home country, which is the leading global force in women's handball. Additionally, youth and junior clubs in Norway are numerous and very well-organized.

The European countries best represented in the analyzed team are Sweden (10.71%) and Croatia (7.15%), while players from other countries account for 3.57% of the total each, namely Spain, France, the Russian Federation, Czechia, Norway/Croatia, Cameroon/Spain, and Denmark.

The analyzed team is the most selective (compared to the other two) regarding the number of players recruited, focusing primarily on players from the domestic league, which is exceptionally strong on the European stage. Additionally, Vipers Kristiansand's philosophy emphasizes using young players from the domestic league who can develop alongside foreign players with proven records at national, European, and world levels.

The Romanian team, CSM București, utilized the highest number of players during the analyzed period, a total of 54, compared to the other two teams, yet achieved the weakest international results. From this perspective, it can be stated that it is the least efficient team, as its player recruitment policy has not been successful in achieving international performance.

Notably, it has the lowest share of domestic players (46.29% of the total) and has recruited foreign players from a greater number of countries, although all these countries are European and well-regarded globally in women's handball (Figures 4 and 5).

While the previous team shows a clear preference for recruiting players from the Nordic and Western regions of Europe, CSM București does not exhibit such specific regional targeting. Instead, players are brought in from all European countries with well-developed handball programs.

Notably, Montenegro accounts for 9.25% of the total players, followed by France, Norway, and Sweden (each with 7.40%), the Netherlands (5.55%), and Serbia (3.70%). The remaining players, each representing smaller shares of 1.85%, come from Norway/Sweden (dual citizenship), Spain/Portugal (dual citizenship), Spain, Slovenia, Croatia, Bulgaria/Slovakia (dual citizenship), and the Russian Federation.

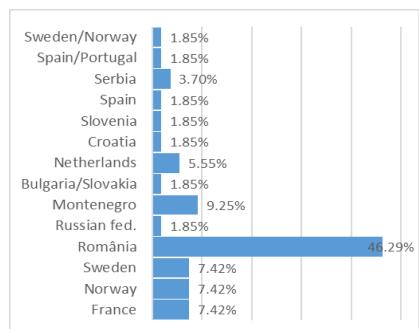


Fig. 4. CSM București. Players' Distribution by Country of Origin (2018–2023).

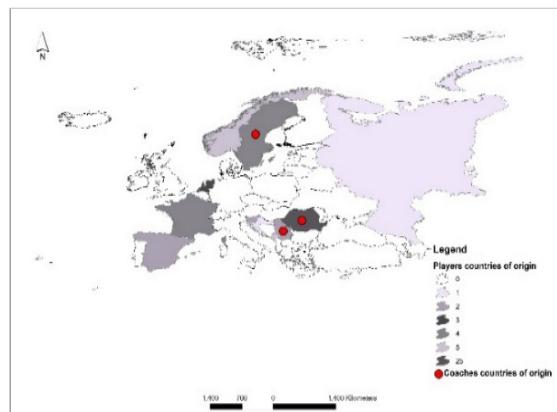


Fig. 5. CSM București. Origins of Players and Head Coaches (2018–2023).

The main source of players for the team is Hungary, which is perfectly natural for a team representing the country, especially considering the notable performances of Hungarian club teams and national teams in this sport over recent decades. During the analyzed period, 41.88% of the players came from Hungary. The remaining European players originated from countries where handball is recognized as a national or highly important sport, with remarkable results achieved by teams from those nations. Specifically, 13.96% of Győry Audi ETO KC players came from Norway (a multiple world, European, and Olympic champion in women's handball), 9.31% from France (whose international results in this sport are nearly comparable to Norway's), 6.98% from Denmark (another country with outstanding international handball performance), and 4.65% each from Montenegro, the Netherlands, and Sweden (all with tradition and significant achievements on the international stage).

The Hungarian team, Győry Audi ETO KC, utilized 43 players during the analyzed period, originating from 13 countries, 11 of which are European and two non-European (Figures 6 and 7).

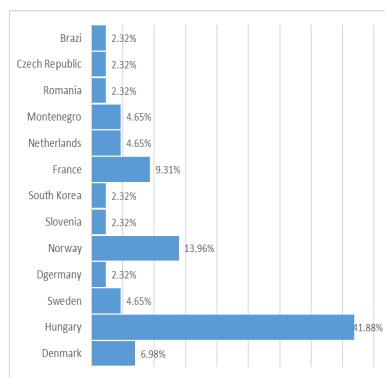


Fig. 6. Győry Audi ETO KC. Players' Distribution by Country of Origin (2018-2023).

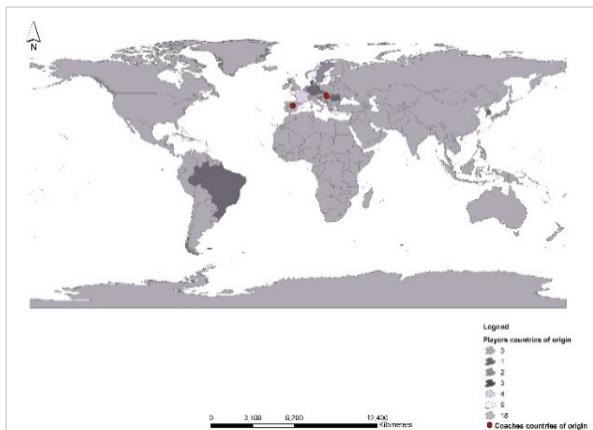


Fig. 7. Győry Audi ETO KC. Origins of Players and Head Coaches (2018-2023).

With shares of 2.32% each, players came from the Czech Republic, Romania, Slovenia, and Germany (countries also known for strong club teams, long-standing traditions, and notable international results in women's handball). The only non-European players came from two countries, Brazil and South Korea, which, alongside the European countries mentioned above, rank highly on the

global hierarchy in terms of tradition and international results in this sport. Thus, it can be deduced that the Hungarian team has a very rigorous selection pool, favoring players from countries with certified traditions and international results in women's handball, both at the club and national team levels.

Based on this first indicator defining sports identity, namely the number of players recruited during 2018–2023 and their country of origin, a ranking of the three analyzed teams can be established. Thus, Vipers Kristiansand (Norway) ranks first, as it utilized the fewest players (28/5 seasons), most of whom were from its home country, and achieved the most notable performances in European competitions. The second place is held by the Hungarian team, Győry Audi ETO KC, which, despite recruiting a large number of players (43/5 seasons), achieved significant performances at the European level (maintaining a positive trajectory as the Champions League winner in 2024). Lastly, CSM București is undoubtedly ranked last, as it relied on the highest number of players (54/5 seasons), sourced from across Europe's handball-strong countries, yet achieved the weakest performances in European competitions.

Another indicator we considered for analyzing the sports identity of the three European women's handball teams is the age of the players at the time of joining the club, which is relevant for determining the identity of the analyzed handball clubs from this perspective (whether they prefer young, promising players or experienced, established ones). We believe this indicator is more expressive when analyzed in correlation with two other performance-related indicators:

The performances of the players prior to joining one of the three clubs (the number of medals won with their previous teams).

The players' individual achievements before joining one of the analyzed clubs (the number of individual medals won prior to their transfer).

For Vipers Kristiansand, the average age of players at the time of joining the club was 24.82 years, which is relatively young for top-level performance. Most players who signed with the club, specifically 15 (53.58% of the total), were aged between 20–25 years, 6 players (21.43%) were 30 years or older, 4 players (14.28%) were aged 26–30, and 3 players (10.71%) were under 20 years old.

Despite this, the subsequent performances achieved by the team (2018–2023) were remarkable and superior to the other two analyzed teams, demonstrating that the club's management decisions were correct and well-inspired.

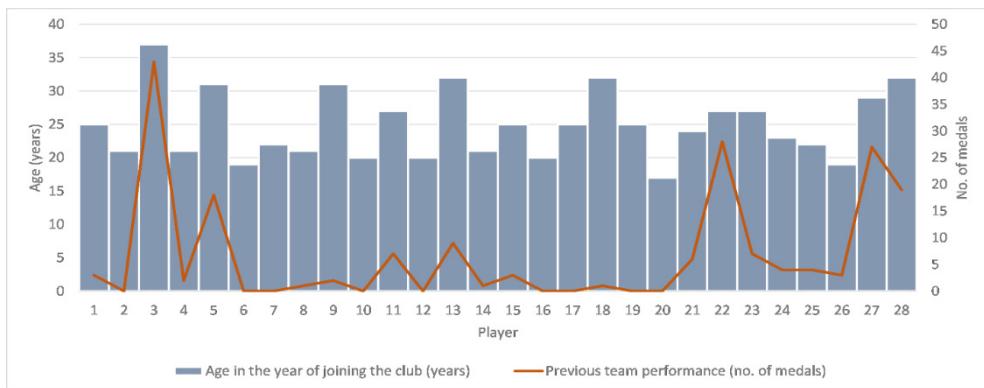


Fig. 8. Vipers Kristiansand: Players' Age at the Time of Joining the Club and the Number of Medals Won with Previous Teams.

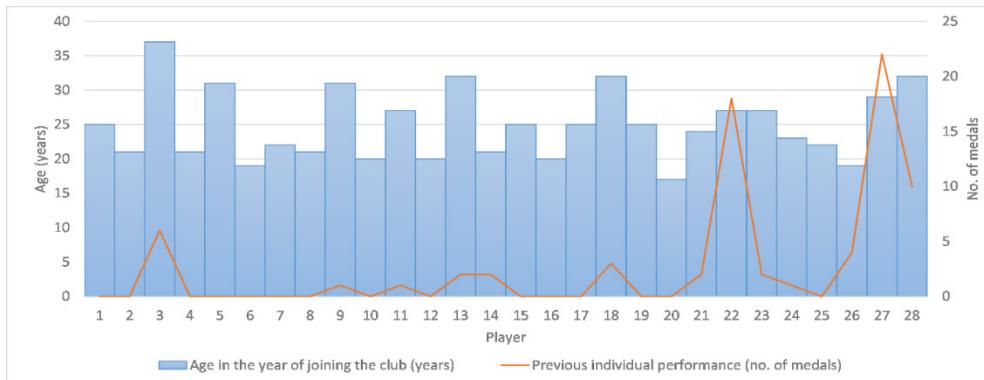


Fig. 9. Vipers Kristiansand: Players' Age at the Time of Joining the Club and the Number of Individual Medals Won Prior.

The players who were part of Vipers Kristiansand during 2018–2023 had an average of 6.71 medals per player at the time of joining the club (achieved with their previous teams), with a total of 188 medals won with prior teams—the lowest number of such medals among the three analyzed teams (fig. 8). In other words, Vipers Kristiansand primarily recruited young and promising players who did not have an impressive track record at the time of joining the club. This observation is further supported by the number of individual medals earned before joining, which totalled 74, lower than for the other two analyzed teams (Figure 9).

Thus, during the analyzed period (2018–2023), Vipers Kristiansand recruited young players, most of whom were aged between 20–25 years and had previous performances (both team and individual) that were inferior to those of the other two analyzed teams. However, during the same period, the Norwegian team achieved the most significant European performances, allowing us to rank it first from this perspective as well.

A completely different approach from that of Vipers Kristiansand is observed in the case of the Romanian team CSM București, which, during the 2018–2023 period, recruited much more accomplished players (with more medals won both with their previous teams and individually). However, despite this, the team's international performances during the analyzed period are the weakest compared to the other two analyzed teams, even though it was the most successful team in Romania's domestic handball competitions.

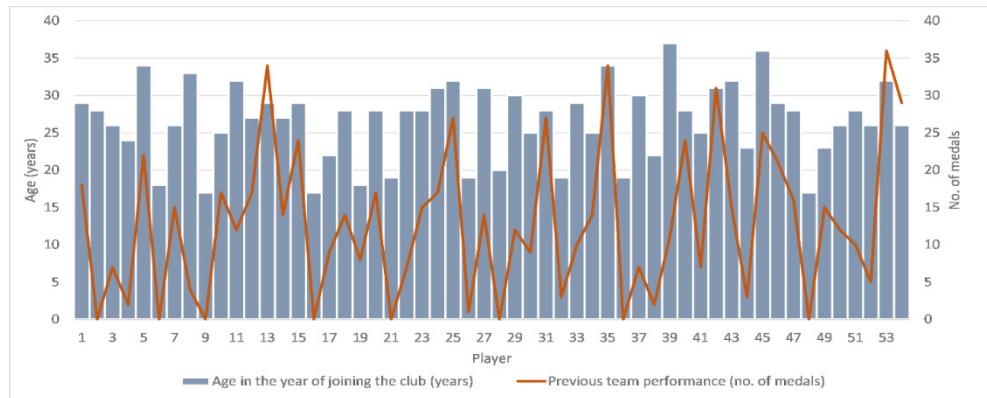


Fig. 10. CSM Bucuresti: Players' Age at the Time of Joining the Club and the Number of Medals Won with Previous Teams.

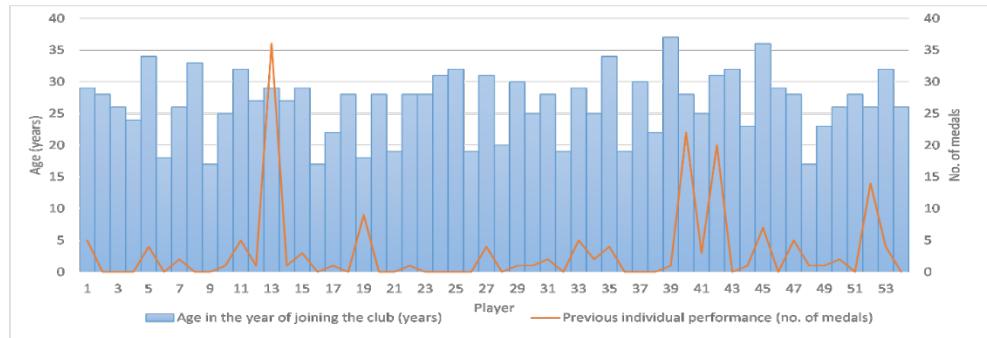


Fig. 11. CSM Bucuresti: Players' Age at the Time of Joining the Club and the Number of Individual Medals Won Prior.

The average age of players at the time of joining CSM București (2018) was 26.54 years, approximately two years older than the average age of players at Vipers Kristiansand and about 1.5 years older than those at Győry Audi ETO KC. The average age range of 25–30 years is considered by specialists to be the most suitable for achieving high-level sports performances, as players are at their peak physical condition. Of the 54 players who played for CSM București during the 2018–2023 period, the majority were aged between 26–30 years (22 players, or 40.74% of the total) at the time of joining. A total of 12 players (22.22%) were over 30 years old, another 11 players (20.37%) were aged 20–25, and 9 players (16.67%) were under 20 years old. In other words, the managers of CSM București preferred to transfer mature and well-known players in the world of European and international women's handball, with significant prior achievements, both individually and with their previous teams (e.g., Cristina Georgiana Neagu, Grâce Zaadi Deuna, Amanda Kurtović, Nora Mørk, Andrea Lekić, etc.).

The majority of players had an impressive track record at the time of signing contracts with CSM București. Collectively, they held 693 medals won with their previous teams and 169 individual medals (Figures 10 and 11). A total of 30 players had won more than 10 medals each with their previous teams, while 4 players had earned over 10 individual medals prior to joining. CSM București invested significant sums in transferring a large number of players and paying their salaries, aiming to achieve notable performances in European competitions such as the Champions League. However, the results achieved on the international stage were disappointing. While CSM București has been and continues to be the most successful team domestically (multiple-time Romanian champion and winner of the Romanian Cup and Supercup in women's handball), its European results have been insignificant. This highlights an inefficient, if not flawed, management approach. Based on the analysis of these correlated indicators, CSM București must be placed last among the analyzed teams for the 2018–2023 period.

Based on the values of these analyzed correlated indicators—namely the age of players and their previous performances (both team and individual)—the Győry Audi ETO KC team occupies an intermediate position among the three analyzed teams for the 2018–2023 period. The average age of the 43 players who were part of this club during 2018–2023 was 25.04 years, lower than the average age of CSM București players and higher than that of Vipers Kristiansand players. The majority of players at the time of signing with this team—18 players (41.87% of the total)—were aged between 26–30 years. Next was the under-20 age group, which included 11 players (25.58%), followed by the over-30 age group (8 players, 18.60%) and the 20–25 age group, with 6 players (13.95%). From the perspective of player selection correlated with their age at the time of

joining the club, Győry Audi ETO KC seems to have adhered most closely to the conventions common in team sports, with the most balanced age group proportions among all three teams analyzed in this study.

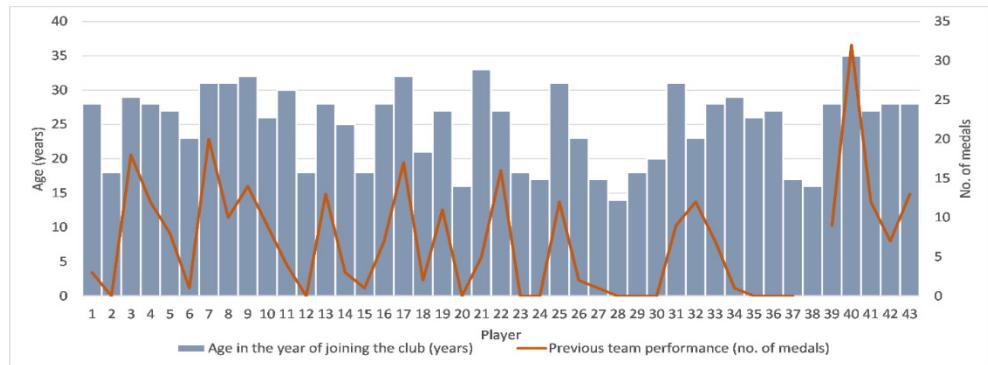


Fig. 12. Győry Audi ETO KC: Players' Age at the Time of Joining the Club and the Number of Medals Won with Previous Teams.

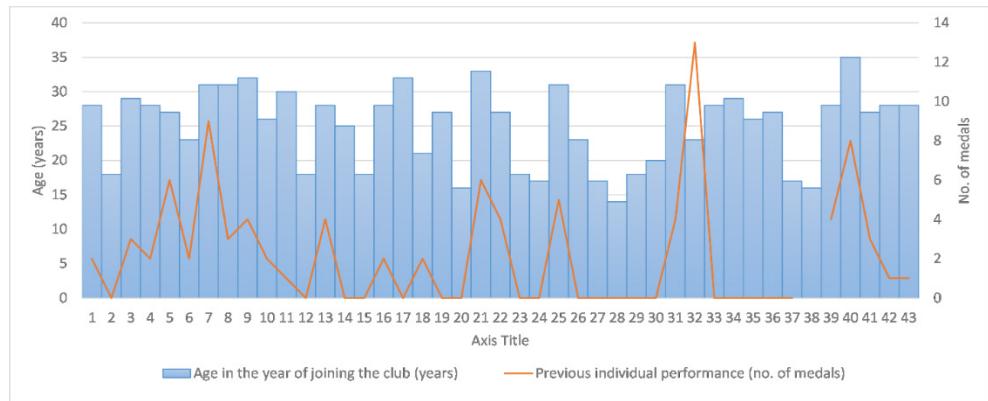


Fig. 13. Győry Audi ETO KC: Players' Age at the Time of Joining the Club and the Number of Individual Medals Won Prior

The players who joined Győry Audi ETO KC by 2018 collectively held a total of 291 medals won with their previous teams and 91 individual medals earned prior to joining (fig. 12 and 13). From this perspective, the team ranks in the middle—behind CSM Bucureşti but ahead of Vipers Kristiansand. With these players, Győry Audi ETO KC achieved notable performances in both domestic and international competitions during the 2018–2023 period, surpassing CSM Bucureşti in terms of overall achievements but falling behind Vipers Kristiansand regarding performances in European women's handball competitions. Most of

the recruited players excelled primarily with their previous teams (14 players had won at least 10 medals each with their former teams) rather than individually, as only one player, Eduarda Idalina Amorim Taleska, had more than 10 individual medals prior to joining.

Therefore, based on the correlated indicators analyzed above (the age of players at the time of joining the club and their prior team and individual achievements), the most effective identity model is that of Vipers Kristiansand. During the 2018–2023 period, the team primarily recruited young, promising players with few prior achievements, with whom it won the most prestigious European women's handball trophies in these competitive seasons (2018–2023). The team with the most ambiguous identity and the least performance was CSM Bucureşti, which brought in a large number of players (without a well-defined player profile) from many European countries, renowned in European and global sports (both at the team and individual levels). However, with these players, the team failed to achieve any noteworthy European success, with its only accomplishments being in domestic competitions. In second place is the Hungarian team Győry Audi ETO KC, which, for the analyzed period, recorded reasonable European performances and significant domestic achievements, with players less established than those of CSM Bucureşti but more experienced than those of Vipers Kristiansand. However, this team excelled in 2024, once again winning the most important European women's handball competition, the Champions League.

Another relevant indicator for achieving sports performance, considered as such by most sports analysts, is the height of athletes, as competitions are becoming increasingly athletic. In other words, there is a direct connection between athletes' height and sports performance, although no optimal height has been identified for success in women's handball or any other individual or team sport.

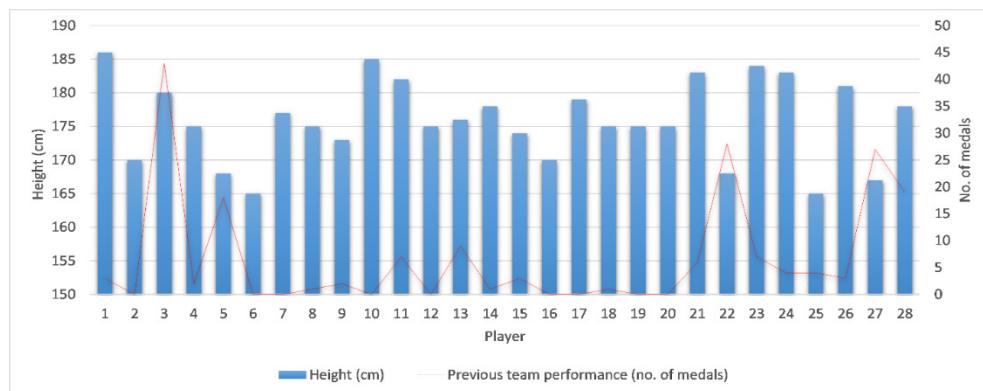


Fig. 14. Vipers Kristiansand: Players' Height at the Time of Joining the Club and the Number of Medals Won with Previous Teams.

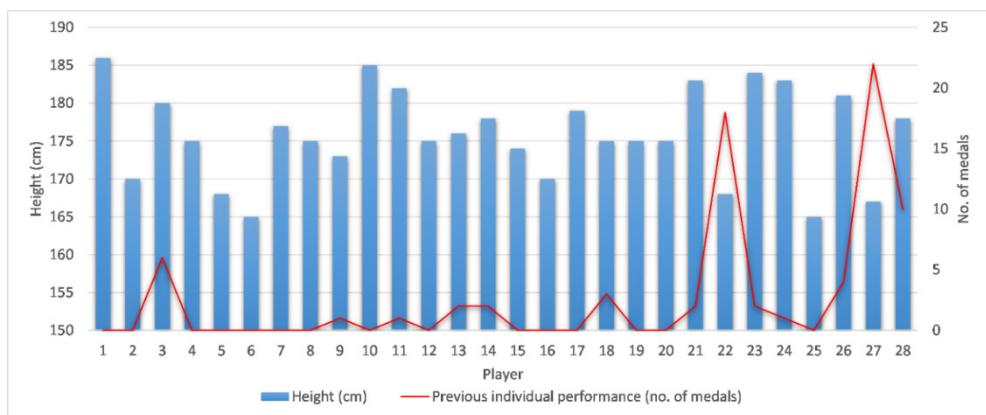


Fig. 15. Vipers Kristiansand: Players' Height at the Time of Joining the Club and the Number of Individual Medals Won Prior.

The players who competed for Vipers Kristiansand during the 2018–2023 period had an average height of 175.78 cm, the lowest among the analyzed teams. Despite this, the team achieved the most significant international performances. The largest group of players (16 players, or 57.14%) fell within the height range of 170–180 cm. This was followed by players measuring 181–190 cm (7 players, or 25.00% of the total), and those under 170 cm (5 players, or 17.86%). None of the players in the team during this period exceeded 190 cm in height. Thus, we can deduce a sports identity for Vipers Kristiansand from this perspective as well, favoring medium-height players who possess exceptional motor abilities.

A possible correlation between players' height and team and individual sports performance (Figures 14 and 15) shows that the most successful players prior to joining this club (with the highest number of team and individual medals) were those whose height ranged between 160–180 cm.

In conclusion, Vipers Kristiansand has a well-defined sports identity, focusing on recruiting young, medium-height players with moderate prior achievements but exceptional athletic potential and a strong drive for continued success.

The analysis of the same indicator for the other two teams, namely CSM București and Győri Audi ETO KC, reveals approximately similar coordinates. The conclusion is that, from the perspective of the players' height, correlated with previous team and individual performances, these three clubs display a comparable sporting identity, while still showing a few minor differences.

For CSM București, during the analyzed period, the average height of the 54 players was 176.92 cm, with the dominant group being players measuring 170–180 cm (24 players, or 44.44%). Notably, there was only one player taller

than 190 cm, the Romanian pivot Crina Elena Pintea (192 cm), who played for the club during two different periods within the analyzed timeframe.

As in the previous case (referring to Vipers Kristiansand), the most successful players of CSM Bucureşti (with the highest number of team and individual medals earned prior to joining the club) were those in the height range of 170–180 cm (Figures 16 and 17).

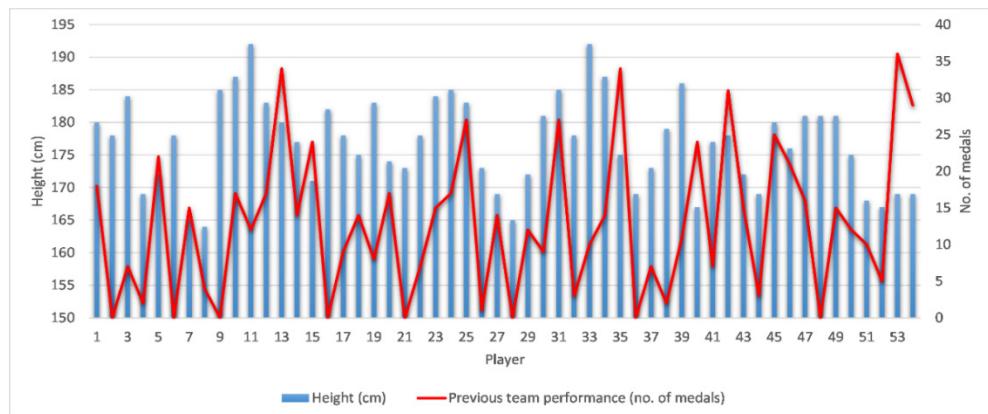


Fig. 16. CSM Bucureşti: Players' Height at the Time of Joining the Club and the Number of Medals Won with Previous Teams

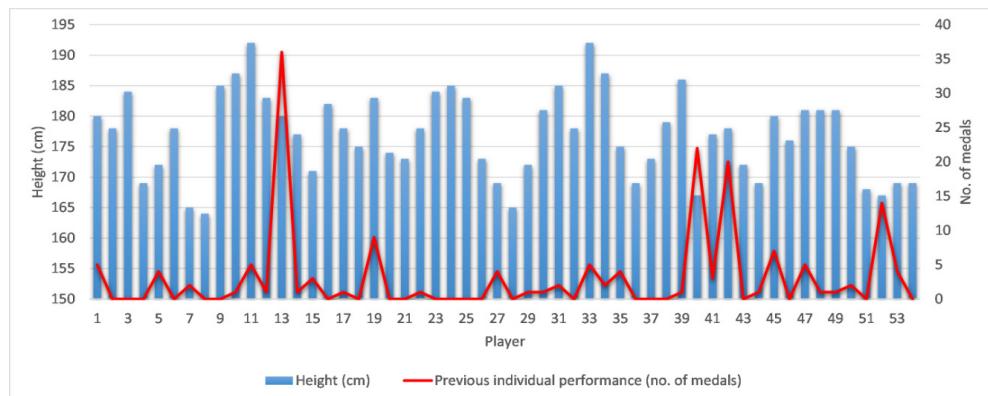


Fig. 17. CSM Bucureşti: Players' Height at the Time of Joining the Club and the Number of Individual Medals Won Prior.

The analysis of Győry Audi ETO KC from the perspective of the same indicator confirms the trend observed in the previous teams, although the average height of the 43 players who competed during 2018–2023 was higher, at

177.95 cm, compared to the others. Players in the 170–180 cm height range dominated, totaling 23 players (53.49% of the total), followed by those in the 181–190 cm range, with 11 players (25.58%). The same player, Crina Elena Pintea, was the exception, standing at 192 cm, and played for this team during two separate periods within the analyzed timeframe.

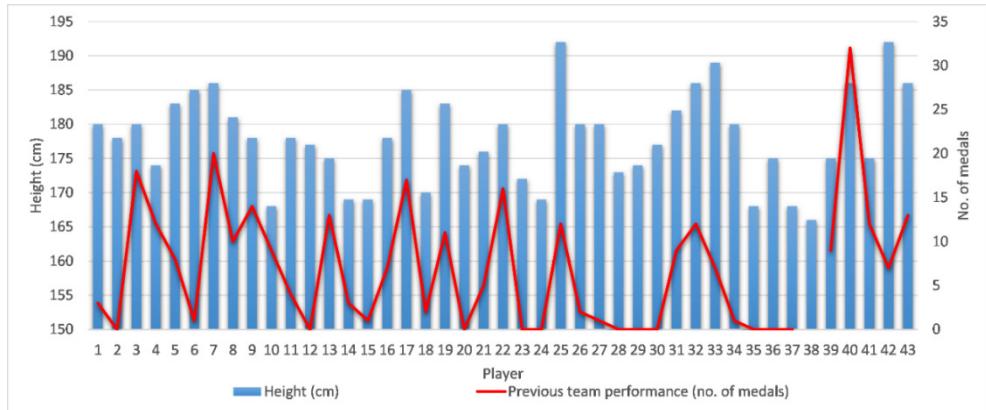


Fig. 18. Győry Audi ETO KC: Players' Height at the Time of Joining the Club and the Number of Medals Won with Previous Teams.

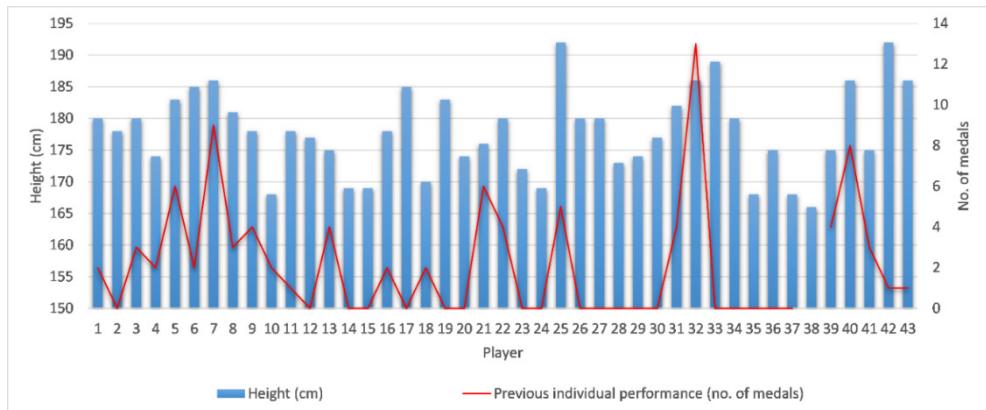


Fig. 19. Győry Audi ETO KC: Players' Height at the Time of Joining the Club and the Number of Individual Medals Won Prior

As with the previous teams, the most successful players, prior to joining this club, were those with a height in the 170–180 cm range (Figures 18 and 19).

Based on this indicator, no specific sports identity can be attributed to any of the teams, as they are similar in terms of the numerical dominance of medium-height players (170–180 cm) and the fact that these players held the most medals at the time of joining one of the three clubs.

The fame of the players at the time of joining one of the three analyzed clubs constitutes another indicator of sports identity and how each club approaches this aspect. Fame primarily results from the overlap of two other indicators: the number of individual medals and the number of team trophies won throughout a player's sports career. The difference lies in managerial policies, with some clubs favoring young players while others opt for established and renowned athletes. Naturally, a club's player acquisition policy is also influenced by the size of its budget allocated for transfers. In this study, to identify differences in this regard, we will consider only the number of individual medals won by the players of the three clubs before joining. Players who had won at least five individual medals prior to joining one of the analyzed clubs are classified as famous players.

The Vipers Kristiansand club collaborated with 28 players during the 2018–2023 period, who collectively totaled 74 individual medals prior to joining, averaging 2.64 individual medals per player. Among these, the majority (15 players, or 53.57% of the total) had no prior individual medals but were considered high-potential players—a fact later proven correct by their subsequent team and individual performances. In addition to these young, relatively unknown players, Vipers Kristiansand also recruited 4 renowned and established players during this period, who together held 56 individual medals: Katrine Lunde with 6 individual medals, Anna Viktorovna Vyakhireva with 18, Nora Mørk with 22, and Isabelle Theresse Gulldén with 10. Thus, Vipers Kristiansand adopted the most efficient model, building the team primarily with young, unknown players with high potential while acquiring only 4 established players with more than 5 individual medals, considered the top performers in their positions. This model is deemed the most effective compared to the other two analyzed, both in terms of financial investment and subsequent sports performances.

The CSM București team also demonstrates, in this regard, the most costly and inefficient model. During the 2018–2023 period, the team recruited 54 players who collectively held 169 individual medals prior to joining (an average of 3.13 medals per player). Among these players, 9 had more than 5 individual medals, being considered highly accomplished in their respective positions and in individual performance. Both theoretically and practically, this is the team that invested the largest budget in bringing in renowned and established players. However, its international achievements during 2018–2023 were at best modest. Famous players such as Laura Glauser (5 individual medals), Crina

Elena Pintea (5 medals), Cristina Georgiana Neagu (36 medals), Alicia Gogîrlă (9 medals), Nora Mørk (22 medals), Andrea Lekić (20 medals), Paula Claudia Ungureanu (7 medals), Sabina Detloff Rosengren Jacobsen (5 medals), and Nathalie Mari Hagman (14 medals) should have guaranteed notable international successes. Yet, of the three teams analyzed, CSM București performed the least. It seems that the lack of success cannot be attributed to the quality and notoriety of the players, although some appeared complacent and lacking the drive to perform during their time with the team.

The Győry Audi ETO KC team once again occupies an intermediate position compared to the other two teams from the perspective of this indicator. During the 2018–2023 period, the team recruited 43 players who collectively held a total of 91 individual medals prior to joining. The majority (20 players, or 46.51% of the total) had no prior individual medals. Another six players had at least five individual medals, serving as role models for younger players with potential. The model adopted by the Hungarian team Győry Audi ETO KC is closer to that of Vipers Kristiansand, although its international performances during the analyzed period were below those of the Norwegian team. The most renowned and established players who collaborated with Győry Audi ETO KC during 2018–2023 include Kari Brattset Dale (6 individual medals), Ana Gros (9 medals), Sandra Toft (6 medals), Crina Elena Pintea (5 medals), Eduarda Idalina Amorim Taleska (13 medals), and Katarina Bulatović (8 individual medals).

In conclusion, based on the indicator of player notoriety (celebrity), derived from their market value at that time and the number of individual and team medals earned prior to 2018, the most efficient model is that of the Norwegian team Vipers Kristiansand. This team recruited few renowned players, who performed exceptionally well alongside the majority of young, high-potential players. At the opposite end is the Romanian team CSM București, which spent considerable sums of public money to fund contracts for numerous famous players who achieved almost no international success. In the middle, in terms of efficiency, is the Hungarian team Győry Audi ETO KC.

From the perspective of the coaches who worked with these three analyzed teams, we can again observe distinct identity elements, which led to differing sports results. The most consistent club was, once again, Vipers Kristiansand, which collaborated with a single coach during the 2018–2023 period, namely the Norwegian Ole Gustav Gjekstad. He was younger, less well-known (at the time of joining the club), and had fewer international achievements compared to some of his counterparts from the other two analyzed teams. With this sole coach, Vipers Kristiansand achieved the most significant international results during the analyzed period compared to the other two competitors. At the opposite end, once again, was CSM București, which worked with four coaches

during the same period: Karl Magnus Johansson (July–October 2018), Dragan Djukić (2018–2019 competitive season), Tomas Ryde (a few months in 2019), and Adrian Vasile (2019–2023). Managerial inconsistency is likely the primary reason for this team's lack of success in European competitions. While Vipers Kristiansand maintained a clear identity policy (a single coach over a long period, Norwegian, and familiar with Norwegian women's handball), CSM Bucureşti showed impatience with its coaches, frequently changing them and, consequently, the playing concept and system, depending on their mentality and experience. As a result, the team's sports identity became diluted, and its results in European competitions were nonexistent. Positioned between these two distinct identity policies was the approach adopted by Győry Audi ETO KC, which worked with two coaches during the analyzed period: Ambros Martín (two terms) and Gábor Danyi. The results achieved indicate that this team delivered average performances in European competitions.

Therefore, from the perspective of the sports identity indicator, constructed by assembling the sub-indicators analyzed above, it can be stated that Vipers Kristiansand had the most consistent identity policy during the analyzed period. The team worked with the fewest players and coaches (among the three analyzed) and achieved the most significant European performances. The team with the most diluted and unclear identity was the Romanian CSM Bucureşti, which had the highest number of recruited players and coaches, resulting in a lack of high-level performance on the European stage. In the middle, from the perspective of this composite indicator, lies the Hungarian team Győry Audi ETO KC, exhibiting a moderate identity and achieving average results in European competitions compared to the other two teams.

In our view, *sports performance* is based on the prior achievements (both team and individual) of the players who joined the three clubs during the 2018–2023 period, as well as the results obtained during this competitive interval. The prior achievements have already been analyzed in combination with certain indicators defining sports identity. Therefore, we will now focus solely on the sports performances (domestic and international) achieved by the three teams during the analyzed period, as well as the individual performances of their players, which are the most relevant indicators for the objectives of this study.

During the 2018–2023 period, Vipers Kristiansand won a total of 13 domestic and international competitions, as follows: five times Norwegian champions (2019, 2020, 2021, 2022, and 2023), four times winners of the Norwegian Cup (2019, 2020, 2021, and 2023), three times winners of the Champions League, the most prestigious European club competition (2021, 2022, and 2023), and one third-place finish in the Champions League (2019).

Individually, the players of this team won a total of 175 medals (of national and international significance) during the 2018–2023 period, resulting in an average of 6.25 medals per player.

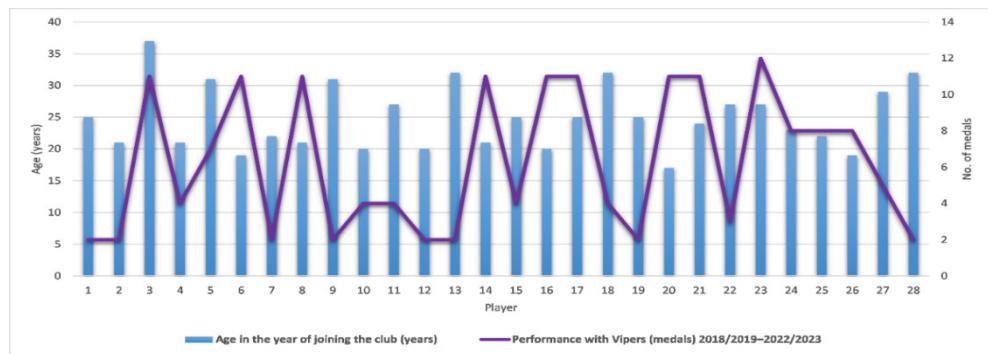


Fig. 20. Vipers Kristiansand: Number of Individual Medals Won During 2018–2023

Most players (15) won a maximum of 5 individual medals, 4 players earned 6 to 10 individual medals, and 9 players achieved more than 10 individual medals during this period. The team is the most successful (of the three analyzed) in terms of collective achievements and the significance of the competitions won. However, it had the lowest number of individual medals earned due to having the smallest roster, with only 28 players. Vipers Kristiansand stands out as the most successful sports team among the three analyzed during the 2018–2023 period.

The CSM București team is the least successful (of the three) during the analyzed period, having won no European international competitions in which it participated. Its only achievements are at the national level, making it the most decorated women's handball team in Romania, a status maintained during the analyzed period. Domestically, the team became Romanian champions twice (2021 and 2023), finished second in the Romanian championship twice (2019 and 2022), won the Romanian Cup twice (2019 and 2022), was runners-up in the Romanian Cup once (2021), won the Romanian Supercup twice (2019 and 2022), and was runners-up in the Romanian Supercup twice (2020 and 2021). In other words, CSM București performed well domestically but disappointed internationally. The team's management was harshly criticized in the Romanian sports press for the lack of recent international results, although the team did win the Champions League in 2015.

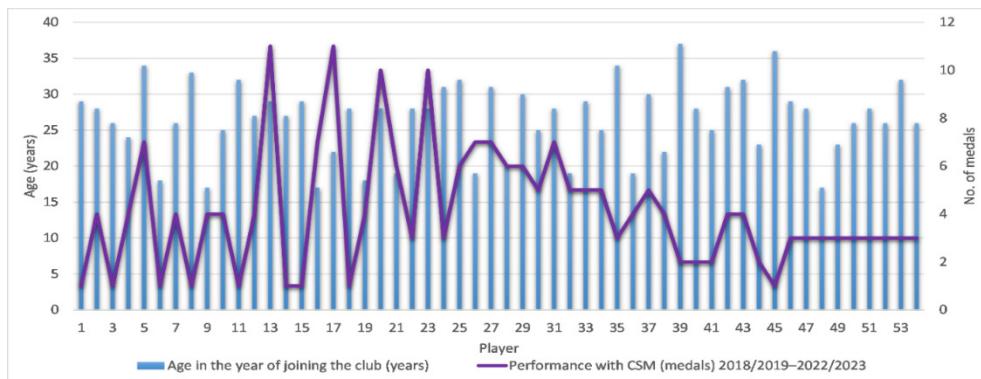


Fig. 21. CSM București: Number of Individual Medals Won During 2018–2023.

Regarding the individual performances of players during the 2018–2023 period, the 54 players of CSM București earned a total of 223 individual medals (Figure 21), the vast majority of which were of national significance. This results in an average of 4.13 medals per player, with most players (41, or 75.93% of the total) winning a maximum of five individual medals. Another 11 players (20.37%) earned between 6 and 10 individual medals, while only two players (3.70%) stood out with more than 10 individual medals.

The large number of individual medals earned by the players of CSM București during the analyzed period does not represent a notable achievement for two reasons. First, a high number of players were utilized, resulting in the lowest average medals per player among the three analyzed teams. Second, the value of the medals earned holds no European significance, as they were won exclusively in domestic competitions.

The Győry Audi ETO KC team ranks second among the three analyzed teams in terms of collective and individual performances achieved during the 2018–2023 period, both in domestic and international competitions. The team won the Hungarian Championship three times (2019, 2022, and 2023), finished second once (2021), won the Hungarian Cup twice (2019 and 2021), and finished second in the Hungarian Cup twice (2022 and 2023). Internationally, the team won the Champions League in 2019 (a feat also achieved in 2024, which falls outside the analyzed period), finished second in the Champions League in 2022, reached the semifinals in 2021, and secured third place in 2023. Although during the analyzed period, the team won the most prestigious European competition, the Champions League, only once (2019), it consistently reached the advanced stages (Final Four) of the competition nearly every year.

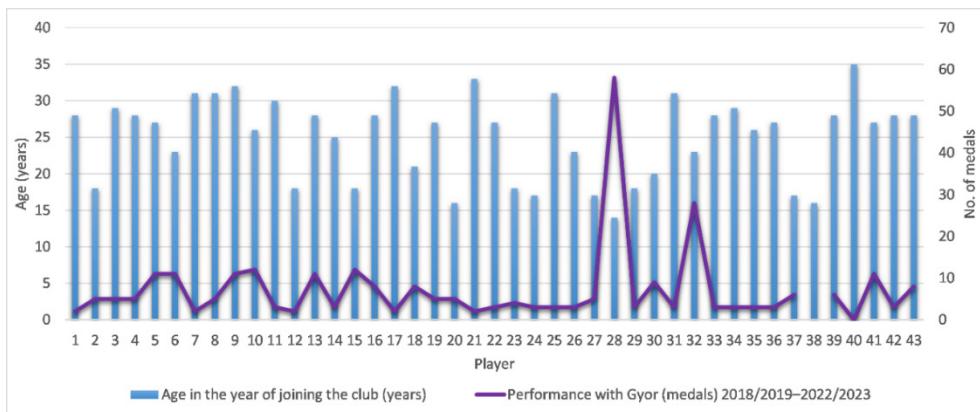


Fig. 22. Győry Audi ETO KC: Number of Individual Medals Won During 2018–2023.

The 43 players who were part of this team during the 2018–2023 period earned a total of 298 individual medals, resulting in the best average among the three analyzed teams, at 6.93 medals per player. Most players (28, or 65.12% of the total) won a maximum of 5 individual medals, 9 players (20.93%) earned more than 10 medals, and 6 players (13.95%) won between 6 and 10 individual medals, both nationally and internationally (Figure 22).

In conclusion, based on team and individual performances during the 2018–2023 period, the Norwegian team Vipers Kristiansand ranks first, followed by the Hungarian team Győry Audi ETO KC, while the Romanian team CSM Bucureşti occupies the last position.

The third composite indicator, management efficiency, results from the characteristics of specific elements that define the main features of managerial efforts, namely: the duration of players' stay at the analyzed club (player turnover rate); the quality of the club's infrastructure; the capacity of the sports hall where the team competes and the number of spectators attending sports events held in front of home supporters; the investment budget; and the salaries of players and coaches. The efficiency of a sports club's management increases when the duration of athletes' stay at the club is longer (the player turnover rate is lower), meaning that athletes are selected exclusively based on performance criteria and deliver the expected results. The infrastructure for sports performance is of superior quality, such as training and recovery facilities, medical services, and the quality of nutrition. The sports hall capacity is larger, and its facilities are more advanced. The average number of spectators at matches is higher, indicating the supporters' loyalty to the team, aligning with the proposed objectives and financially supporting the team through ticket and subscription purchases. The investment budget is balanced according to the

proposed performance objectives and is transparent. The level of salaries for athletes and technical staff is fair (according to the proposed performance) and competitive.

The duration of players' stay (player turnover rate) at the three analyzed clubs during the 2018–2023 period reveals the following specific traits. In the case of Vipers Kristiansand, the percentage of players who were active for only one season is the highest (9 players, representing 32.15% of the total 28 players active during the mentioned period), followed by the most stable players, who remained with the club for over four seasons (25.00%, or 7 players). Players with two seasons at the club numbered 6 (21.43%), followed by those who played three and four seasons, with both categories accounting for 10.71% each (3 players in each category). The Győry Audi ETO KC team had 43 players during the mentioned period, with the largest group consisting of those who stayed for more than four seasons (14 players, or 32.55% of the total), followed by players who stayed for only one season (12 players, or 27.91%), and those who stayed for two seasons (11 players, or 25.58%). The lowest percentages were for players who stayed three or four seasons, with each category accounting for 6.98% (3 players in each group). The CSM Bucureşti team used the most players during the analyzed period (54), having the highest player turnover rate. Players who stayed for only one season numbered 18 (33.33%), while those who stayed for two seasons accounted for 26 players (48.14%). Players who stayed for more than four seasons represented 9.26% (5 players), followed by those who stayed for three seasons (7.42%, or 4 players), and those who stayed for four seasons (1.85%, or 1 player). Based on this indicator, the team with the most efficient management is Győri Audi ETO KC, which had the lowest player turnover rate and notable international performances, with players carefully selected at the time of their recruitment. In second place is the Norwegian team Vipers Kristiansand, which had a moderate player turnover rate (compared to the other two analyzed teams) but achieved the most significant European performances. From this perspective, the Romanian team CSM Bucureşti had the least efficient management model, using the highest number of players, with the highest turnover rate during the analyzed period, the largest investments in player acquisitions, and the weakest international results.

However, it appears that the sports management of the Norwegian team Vipers Kristiansand was only effective in the short term, as in October 2024, the team was declared financially bankrupt. This raises several concerns about the management of the club's operations in recent years, despite the notable international sports achievements it had recorded.

The infrastructure dedicated to sports performance does not indicate significant discrepancies among the three teams. The facilities for training and match hosting, physical training equipment, recovery-specific resources, and the quality of medical services have been (and remain) of a high standard, designed to achieve top performance. Moreover, there are specific requirements set by international bodies that stipulate concrete standards, with regular evaluations conducted. A notable difference arises from the analysis of the capacities of the sports halls where these teams played their matches during the analyzed period. The hall with the largest capacity is the Audi Aréna in Györ, Hungary, with 5,500 seats, home to the Hungarian team Győry Audi ETO KC. The second-largest venue is the Sala Polivalentă in Bucharest, with 5,300 seats, used by CSM București. The third is the Aquarama in Kristiansand, Norway, with a capacity of 2,200 seats, where Vipers Kristiansand played their matches.

The capacities of the sports halls indicate, to some extent, the level of support from fans through ticket and season pass purchases. The most advantaged teams in this regard are Győry Audi ETO KC and CSM București, whose larger venues are almost fully occupied during major international matches and national derbies. Among the average number of spectators, approximately 40% are the most loyal supporters, holding season passes for the entire season.

One of the main limitations (weak points) of this study stems from the existence of very clear confidentiality clauses related to the salary levels of players and coaches, as well as the annual budgets allocated to achieving the proposed sports objectives. While in the case of the Győry Audi ETO KC and Vipers Kristiansand teams, things can be understood to some extent because private financial funds are involved, in the case of the CSM București team, there should be total transparency, as the financial funds are public (the main sponsor is the Bucharest City Hall), along with those from other sponsorships. The lack of financial transparency can lead to certain discrepancies in the efficiency of spending annual budgets (e.g., see the case of the Vipers Kristiansand team, which went bankrupt in October 2024). Nevertheless, the Liga Florilor (the national women's handball championship of Romania) is considered one of the most attractive women's handball championships in Europe and the world, especially from a financial point of view, with the CSM București team being the richest in Romania.

We consider that, based on the analyzed indicators, we can present a clear overview (with certain information gaps) of how high-level sports performance can (or cannot) be achieved in European women's handball. There are no infallible models, but a series of conclusions can be drawn regarding sports management and its implications for achieving performance.

4. CONCLUSIONS

The analysis of three elite women's handball teams-Vipers Kristiansand, CSM Bucureşti, and Győri Audi ETO KC-reveals significant insights into their contrasting strategies and outcomes. Vipers Kristiansand emerged as the most efficient and successful team during the period studied (2018-2023), achieving remarkable international success through a clear identity focused on young, locally nurtured talent, a stable coaching staff, and a cohesive management strategy. This approach not only minimized costs but also fostered a strong sense of team culture, leading to three Champions League titles.

In contrast, CSM Bucureşti, despite its substantial investments in recruiting internationally renowned players, struggled to replicate similar success on the European stage. While the team dominated domestic competitions, its lack of continuity in management and frequent roster changes diluted its sports identity and hindered its performance in international tournaments.

Győri Audi ETO KC, positioned between the two extremes, showcased balanced success. Its strategy involved blending Hungarian talent with select international players, resulting in consistent appearances in the Champions League's final stages and a victory in 2019. The team effectively balanced national pride with international competitiveness, achieving strong results while maintaining a stable management and player structure.

This comparative study underscores the critical role of clear sports identity, strategic performance metrics, and efficient management in determining the success of elite women's handball teams. The findings offer valuable lessons for sports management across various team sports, emphasizing that long-term success requires more than financial investment-it demands strategic alignment of identity, talent development, and operational efficiency.

Funding

"This research received no external funding.

Acknowledgements

During the preparation of this manuscript, the authors used ChatGPT (OpenAI, GPT-4, May 2025 version) to improve the clarity and readability of the English language. The authors have reviewed and edited the AI-generated content and take full responsibility for the final version of the publication.

Author Contribution

Conceptualization, B. C. and H.C.; methodology, B.C. and H.C.; software, S.F., G.V.; validation G. D., S.F., G.V., B.C., P.H., C.-P. R. and H. C.; formal analysis, B.C and G. V., G. D.; investigation, B.C.; resources, H.C.; data curation C.-P. R., F.S., G. D.; writing-original draft preparation, B.C., H.C.; writing-review and editing,

B.C. and H.C.; visualization, P.H., G. D.; supervision, H. C., B. C. and; project administration, B.C.. All authors have read and agreed to the published version of the manuscript

Conflicts of Interest

The authors declare no conflict of interest.

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