Tournament design for a FIFA World Cup with 12 four-team groups: Every win matters

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Abstract: After the expansion of the FIFA World Cup from 32 to 48 teams starting in the 2026 edition, the initial proposal was to split the 48 national teams into 16 groups of three. Among other drawbacks, this proposal provides potential for collusion. Recently, after widespread criticism, FIFA officials decided to revisit that proposal, instead approving a tournament with 12 groups of four teams. However, the approved format does not eliminate the possibility of collusion. In this chapter, we propose tournament formats for a World Cup with 12 groups of four teams, considering several criteria, such as non-collusion, symmetry in rest days, and no dead rubbers. At the same time, our proposals attempt to adhere to the traditional format, with some nuances in either the group or elimination stage.

Keywords: FIFA World Cup, round-robin, scheduling, soccer.

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1 Introduction

In January 2017, the FIFA Council decided to expand the FIFA World Cup (henceforth, FWC) from a 32- to a 48-team competition as of the 2026 edition. The initial proposal was to split the 48 national teams into 16 groups of three, such that the top two teams from each group advance to a single-elimination tournament starting from the last 32 and finishing with the final.[1] However, a group stage of three teams has a serious drawback of possible collusion (Chater et al., 2021; Guyon, 2020). More specifically, in a group of three teams with two qualifiers, it is possible that in the last game, both teams would know the exact result they need to advance to the knockout stage, possibly at the expense of a third team. A notable example is best known as the "Disgrace of Gijón", which refers to a game between West Germany and Austria that took place in Gijón, Spain, during the 1982 FWC. In that game, a win by one or two goals for West Germany would qualify both teams at the expense of Algeria. West Germany won 1:0, but both teams were accused of match-fixing because after the first goal was scored, neither of them tried to change the result. Although FIFA decided that the teams did not break any rule, it also decided that starting from the 1986 FWC, the last two games of a group must take place simultaneously.[2]

Obviously, two simultaneous games within a group are impossible if the group consists of three teams. After much criticism of this three-team group structure and in light of the thrilling group stage of the 2022 FWC, FIFA changed its mind and in March 2023 decided that the 2026 FWC would feature 12 groups of four instead of 16 groups of three teams.[3] An awkward complication arises from the fact that 12 is not a power of two. The progress of

[1] For additional details, see https://www.fifa.com/about-fifa/organisation/fifa-council/media-releases/fifa-council-unanimously-decides-on-expansion-of-the-fifa-world-cuptm--2863100. Last accessed on 28/04/2023.

[2] It is also worth noting Kendall and Lenten (2017), who presented many examples of sports rules gone awry.

[3] For additional details, see https://www.fifa.com/about-fifa/organisation/fifa-council/media-releases/fifa-council-approves-international-match-calendars. Last accessed on 28/04/2023.

group winners and runners-up to the knockout stage would select 24 teams, so the traditional single-elimination sequence would not arrive at two clear finalists, as it is now with the 16-team bracket. To fix this problem, FIFA decided that the eight best third-placed teams along with the two top teams of each group will compete in a single-elimination tournament from a round of 32 until the final.

While this can mitigate the risk of collusion, it does not completely eliminate it for several reasons. The first relates to possible information asymmetry, as outlined by Chater et al. (2021). This is because teams from groups that play their last game towards the end of the group stage have the advantage of knowing the exact result they need to achieve to advance to the elimination stage as one of the best third-placed teams, which is not the case for teams from groups that play their last group game at the beginning of the third round. For example, a similar structure of advancing several best third-placed teams was used in the 1986, 1990, and 1994 editions of the FWC, as well as in the 2016 and 2020 UEFA Championships. In all these tournaments, the third-ranked team of a group that played last in the group stage eventually advanced to the elimination stage. A notable example is Ireland, which, in the 2016 UEFA Championships, knew that a win against Italy would qualify it for the last-16 stage. Meanwhile, Italy had already ensured its first place in the group, and thus played with many substitute players. Ireland scored the winning goal in the 84th minute, which was enough to win 1:0 and qualify for the last-16 stage at the expense of Turkey, which had played one day earlier.[4]

Another problem of advancing several third-ranked teams is that teams may know that a win and a draw are highly likely to be enough to be among the best third-ranked teams, as in

[4] A similar situation occurred with Portugal, which eventually won the 2016 UEFA Championships. Portugal knew that a draw would be enough to finish among the top four best third places to qualify for the last-16 stage. In its last game, which also took place on the last day of the group stage, Portugal played against Hungary. The game ended in the score of 3:3, which was enough for Hungary to finish the group in the first place and for Portugal to qualify for the elimination phase of the tournament at the expense of Turkey, which had played one day before.

all the tournaments mentioned in the previous paragraph a third-placed team with a win and a draw was always among the best third-ranked teams. Thus, if the last game of the group stage is between the teams that have one win and one loss in the first two rounds, both teams might benefit from a draw.[5] A notable example is the last game of the group stage between Romania and Argentina in the 1990 FWC. Before that game, both teams had one win and one loss, while the USSR, which had lost twice, played against Cameroon, which had already ensured its qualification after two wins in the first two games. This meant that a draw between Romania and Argentina would qualify both teams for the elimination stage. Any other result would have qualified the USSR, which won against Cameroon 4:0. Unsurprisingly, the game between Argentina and Romania ended in a score of 1:1, allowing both teams to advance to the elimination stage at the expense of the USSR.

While the above examples illustrate the drawbacks when the best third-placed teams may qualify for the elimination stage, it is also possible that a draw in the last game may benefit both teams in groups in which only the top two teams qualify. This may happen when, after two games, one of the teams has won twice, another has one win and one draw, the third team has one draw and one loss, and the bottom-ranked team has lost twice. In such a situation, the last game involves one pair of teams that had not lost and another pair that had not yet won. This means that a draw in a game between the two unbeaten teams would qualify both of them for the elimination stage from the same ranks as before the last game, regardless of the result of the other game in the group. Such a situation occurred in the last game of the group stage between France and Denmark in the 2018 FWC. France was ranked first before the last game with two wins, while Denmark was ranked second with a win and a draw. The

[5] It is worth mentioning the case of Norway, which, in the 1994 FWC, finished last in the group in which all the teams had one win, one draw, and one loss. Thus, our reference is to the case when one of the teams has two losses before the last game of the group stage.

game ended in a score of 0:0, which eventually qualified both teams with the same rankings as before their game.

Obviously, beyond possible collusion, another problem with the approved format is the large number of games compared with previous tournaments (i.e., 104 vs. 64). This may create some challenges regarding the schedule of the tournament. In particular, it is important to ensure that all teams have a minimum number of days off between the games and that the difference in the number of days off between two opponents before their game is relatively small. In addition, as reported in the media, this format would split the 48 teams into two halves, and then each half would play according to the 24-team format used for the FWC between 1982 and 1994. The allocation of teams to groups would thus automatically dictate that many teams could never play against each other before a potential final. This is in contrast to the current format, in which *a priori* every team has a chance to meet every other team before the final.

In light of the drawbacks of the current tournament format, the aim of our chapter is to develop alternative formats and schedules for an FWC with 12 groups of four teams. It is important to note that allocating teams in the elimination stage of a tournament whose number of groups is not equal to a power of two might suffer from important issues, such as arbitrariness and unbalanced pairings (Guyon, 2018). However, we do not aim to assess the efficacy of each format quantitatively, but rather generate alternatives that would enhance FIFA's ability to feature a World Cup with 12 groups. To this end, we design three alternative formats that to our knowledge have not previously been used or proposed for major football tournaments. In addition, we outline a schedule of games for each of these formats, attempting to meet important criteria such as minimizing the possibility of collusion and ensuring symmetry in number of rest days among teams, no dead rubbers, tournament length, and a reasonable number of games.

The first tournament format resembles the format used in beach volleyball, in which each team in a group of four teams plays only two games. The first round has a predetermined allocation such that the highest pre-tournament ranked team in the group plays against the lowest ranked, whereas another game features teams that are ranked second and third. In the second round of the group stage, the winners of the first round play against the losers of the first round.[6] The top two teams from each group qualify for the elimination stage. While the best eight winners of the group stage qualify directly for the last-16 stage, the remaining qualifying teams (i.e., four other group winners and 12 runners-up) play in the qualification stage. Then, the eight winners of this qualification stage advance to the last-16 stage, when they join the previously mentioned eight best winners of the group stage. From there, the tournament is the same single-elimination format used in all previous World Cups between 1986 and 2022.

The second format is based on the usual design in which each team plays three games in the group stage and the top two teams qualify for the elimination stage of the tournament, pairing winners and runners-up from different groups to create a 24-team bracket. From there, it resembles the usual single-elimination structure, but as there would be 24 teams in the knockout stage, we need to make some adjustment before selecting two finalist teams. We make this adjustment right before the final, meaning that there will be stages of 24, 12, and six (instead of 16, eight, and four, as in the current FWC format). After the three winners of the last-six round become known, the best winner qualifies directly for the final, whereas the other two play in an "extra semi-final". The winner of this game qualifies for the final, while the loser is ranked third. This structure thus eliminates the need for the third-place game,

[6] Note that each game in the group stage has to be determined. FIFA has already considered a penalty shootout in case of a draw to determine the identity of the winning team. See https://theathletic.com/3949146/2022/11/30/world-cup-group-shootouts/. Last accessed on 28/04/2023.

which is widely considered unimportant.[7] The third format is a hybrid of the first and second formats, with a group stage of two games per team followed by a knockout stage with 24 teams.

This chapter belongs to an extensive literature on tournament design for sports competitions that can be found in many academic fields, such as economics, operational research, and computer and sport sciences. Previous studies have investigated various issues related to tournament design, such as collusion (Duggan & Levitt, 2002; Elaad et al., 2018; Guyon, 2018), incentives to lose (Csató, 2019, 2020a, 2020b, 2022; Dagaev & Sonin, 2018; Guyon, 2022; Haugen & Krumer, 2021; Krumer et al., 2023; Vong, 2017), scheduling (Alarcón et al., 2017; Durán et al., 2017; Ermakov & Krumer, 2022; Goller & Krumer, 2020; Krumer, 2020; Krumer et al., 2017a; Krumer & Lechner, 2017; Scoppa, 2015; Van Bulck et al., 2019, 2020), optimal seeding (Cea et al., 2020; Groh et al., 2012; Guyon, 2015; Krumer et al., 2017b; Nissim & Sela, 2020; Sziklai et al., 2022), tie-breaking rules (Berker, 2014), number of prizes (Krumer et al., 2020), and number of teams in the tournament (Di Mattia & Krumer, 2023).[8]

This chapter also relates to a growing literature on the 2026 FWC. For example, Guyon (2020) and Chater et al. (2021) criticized the FIFA's original proposal for groups of three teams. These studies discussed some alternative formats to mitigate the risk of collusion, including the possibility of having 12 groups of four teams with an elimination round starting with 32 teams, as later approved by the FIFA. A similar criticism appears in a recent working paper by Rennó-Costa (2023), which offered a double-elimination structure instead of the group stage. More recently, Krumer and Moreno-Ternero (2023) discussed the increase in the number of participating teams in the 2026 FWC and offered several ways to allocate the

[7] For example, see https://eu.usatoday.com/story/sports/columnist/martin-rogers/2018/07/12/world-cup-2018-fifa-bronze-playoff-pointless-england-belgium/778586002/. Last accessed on 28/04/2023.

[8] For additional references, see a recent book by Csató (2021).

additional slots between the continents, arguing that the European football confederation (UEFA) has a solid basis to claim additional slots.

The remainder of this chapter is organized as follows. Section 2 presents tournament design criteria relevant to the FWC. Section 3 proposes alternative formats and outlines a detailed schedule for each of these formats. Section 4 discusses how these proposals satisfy the tournament design criteria. Section 5 concludes with some final remarks.

2 Criteria to satisfy

2.1 Simultaneous games in the last round of a group

As discussed in the introduction, one of the most critical points of FIFA's original proposal was the potential for collusion implied by groups of three teams. In designing our proposals, we would like to create incentives for all teams to perform well during all of their games. It is worth noting that even in the current format of four teams per group, there might be situations in which these incentives become dubious. For example, in the third round of the group stage of the 2010 FWC, the last minutes of the match between Germany and Ghana saw almost no action as the incumbent score of 1-0 in favour of Germany was likely to qualify both teams for the elimination stage (simultaneously, Australia was leading 2-1 against Serbia in the remaining game of this group, insufficient for either team to overcome Ghana for second place in the standings).

2.2 Information asymmetry

One of the important features of a tournament should be that all the teams have the same probability of qualifying regardless of whether or not their groups are scheduled to play on the last day of the group stage (Chater et al., 2021). It is therefore important to create a tournament in which the effect of the information on the standings in the other groups would have as negligible as possible effect on teams' probabilities of qualifying for the next stage.

2.3 Incentives to draw in the last game of the group

As discussed in the introduction, there are several possible scenarios according to which both teams would benefit from a draw in the last game of the group stage at the expense of another team. Thus, the tournament design should aim to minimize or completely eliminate such a possibility.

2.4 No dead rubbers

From the attractiveness and competitiveness perspective, all games of a tournament should hopefully have something at stake. This is often the case in the current format of the FWC, although it is not always guaranteed, as the later games of the group stage might become dead rubbers given earlier results in the group (e.g., a third game between two opponents that both lost their first two games). On other occasions, the strongest team of a group would already qualify after winning its two first games, providing its third game's opponent with possibly higher chances of a good result than if its game was in the first or second round of the group stage (e.g., Brazil and France played with substitute players in their last group game in the 2022 FWC against Cameroon and Tunisia, respectively). A new format should therefore avoid the occurrence of dead rubber games (for one or both teams) or not increase their likelihood in comparison with the current format.

2.5 Rest days

It is well known in sports that too many games over a short period of time may cause player fatigue and increase the risk of injuries (Bengtsson et al., 2013; Dupont et al., 2010). FIFA's recommendation is that every team should have a minimum of three days off between consecutive matches. As for the maximum, although there is no predefined guideline, in the most recent editions of the FWC, the maximum resting period has been six days, in the transition from the round of 16 to the quarter-finals.

As a fairness concern, the difference between two teams in their respective numbers of days off before their match-up has become an important criterion in the sports scheduling literature (Atan & Çavdaroğlu, 2018; Durán et al., 2022; Goossens et al., 2020; Lambers et al., 2021; Van Bulck & Goossens, 2020). Empirical evidence presented by Scoppa (2015) has shown that a positive difference in rest days has a significant effect on the probability of winning when one of the teams has rested three or fewer days, while if both teams have rested at least four days, such a difference has no significant effect on the outcome of their game. Therefore, in building our schedules, we impose the criterion that every team should rest at least three days between consecutive matches.

2.6 Number of games in total

One concern in raising the number of teams from 32 to 48 has been a potential increase in the total number of games played during the tournament. This was perhaps one of the main reasons for FIFA to propose an event with 16 groups of three teams per group. With every team playing once against each of its group opponents, the original proposal would result in 48 games in the group stage. However, the approved format features 72 games in the group stage. Adding the 32 games planned for the elimination stage, this format will feature 104 games in total, 40 more than the 64 games played during the last seven editions. In general, more games require more days and more logistics resources from organizers and the media, which may also raise environmental concerns, so it is a criterion to consider in designing and scheduling of the tournament.[9]

[9] See Gammelsæter and Loland (2022) for discussion of the need for greater compatibility between elite sport and environmental sustainability.

2.7 Maximum number of games per team

In the current FWC format, the maximum number of games per team is seven, played by each of the four teams that reach the semi-finals. The original proposal of FIFA for the 2026 edition also involved at most seven games per team. Despite the initial desire to have at most seven games per team, FIFA decided to deviate from this tradition by approving a tournament in which the top four teams will play eight games each. We note that the calendar of games from domestic leagues and other international competitions is already demanding for the top players, so a desirable feature of a new format would be to keep the maximum number of games per team at seven or at least not increase the number drastically.

2.8 Minimum number of games per team

Part of the criticism received of FIFA's initial proposal for 16 groups of three has been that teams would play only two games in the group stage. In contrast, the current format guarantees that even those teams that do not progress to the elimination stage play a minimum of three games. Considering the large efforts of teams and fans preparing for the event, quick elimination after only two games might be less acceptable than the three games ensured by the current format. In a tournament with 12 groups of four teams, a single round robin within each group would imply 72 games during the group stage. Thus, securing three games per team involves a trade-off with the total number of games in the tournament. In finding a compromise, we believe that a feasible design should either reduce the minimum number of games per team from three to two or keep the number of games at a minimum of three but followed by a shorter elimination stage than the 32-team bracket approved by FIFA.

2.9 Fans travel planning

Over the years, FIFA has recognized the importance of convenience for fans. A popular product during the ticket sale stage is the "Follow My Team" series, which ensures tickets for

fans of a certain team wherever this team plays. When buying these tickets, the fans can specify whether they will follow their teams only during the group stage, or up to a certain round of the knockout stage. In the current format of the tournament, fans have certainty about the dates and venues of the three group-stage games, enabling them to make travel plans in advance. This is important, as the demand for accommodation and transportation around the dates and host cities of the event is very high. Planning for the elimination stage is subject to more uncertainty, as the qualification of each team depends on the performance realized during the group stage. Those teams that qualify as the first and runner-up of a group follow different paths in the elimination stage. Normally, a template with placeholders and predefined venues is known in advance, which allows fans some degree of anticipation regarding the cities where and dates when their teams will play if they keep progressing. An example illustrating how important this is for fans and teams relates to the 2023 Handball World Championship that took place in Poland and Sweden. In that tournament, the allocation of semi-final games to venues was not defined in advance, in order to give a chance for the host teams to play at home. Thus, even after some teams had won their quarter-finals, they still did not know in which country they had to play their next game, a flaw that exposed the organization to criticism from coaches, players, and fans.[10]

2.10 Balanced brackets and diversity

The expansion from 24 to 32 teams introduced in 1998 has enabled the FWC to have an elimination stage bracket with *balance* and *diversity*. Here, balance means that each section of the bracket has the same number of group winners and runners-up, and diversity means that teams from the same group are not allocated to close sections within the bracket. In the current format, these features are reflected in the last-16 stage, in which each half of the

[10] For additional details, see https://www.nrk.no/sport/norge-vant-gruppefinalen-mot-tyskland-_-moter-spania-i-kvartfinalen-1.16268421 (in Norwegian). Last accessed on 28/04/2023.

bracket contains four group winners matched with four group runners-up, all of them coming from eight different groups. This intrinsically facilitates diversity, so if two teams from the same group had to face each other after the group stage, this would happen in the latest stages of the tournament (in the semi-finals, as in the case of Brazil and Turkey in the 2002 FWC, or after the semi-finals, as in the case of Croatia and Morocco vying for third place in the 2022 FWC). A new tournament format should preserve some degree of balance and diversity, which is less straightforward to achieve in tournaments in which the number of teams differs from a power of two (Csató, 2021). Note that these criteria might involve a trade-off with the symmetry of resting days of opponent teams, as teams from different groups might finish their group games on different days.

2.11 Number of days without games

The FWC, whose 2018 edition was viewed by 3.57 billion viewers around the globe, is undoubtedly one of the few mega-events that can attract such a huge audience.[11] It is thus likely that FIFA authorities would like to minimize the number of days without games. For example, in the 2022 FWC, there were six days without games, whereas in the 2018 FWC, there were seven such days.

3 Proposed formats with 12 four-team groups

3.1 Two games in group stage and 16-team bracket in the elimination stage (G2B16)

In Table 1, we offer a possible schedule for the structure of 12 groups of four teams, in which each team plays only twice in the group stage. Such a structure has been widely used in

[11] For additional details, see https://www.fifa.com/worldcup/news/more-than-half-the-world-watched-record-breaking-2018-world-cup. Last accessed on 28/04/2023.

beach volleyball since 2017.[12] Note that groups A–F are on one side of the bracket, whereas groups G–L are on the other. This means that, to satisfy the minimal rest days criterion and to minimize asymmetry in rest days, a team on one side of the bracket can meet a team from the other side only in the final.

[Insert Table 1 about here]

In the first round of the group stage, the highest-ranked team of each group (e.g., A1) plays against the lowest-ranked team of the group (e.g., A4). The two remaining teams (e.g., A2 and A3) play in the second game. This resembles the pairings in beach volleyball, although it could also be that A1 plays against A3 and A2 plays against A4. Different matchings may result in different probabilities of winning and different exerted efforts (Groh et al., 2012). At this point, we leave it to future research to investigate the optimal matching in the first round. For simplicity, we schedule the games of the top- and bottom-ranked teams at 13:00 and 19:00, but this can also be changed. In addition, given a variety of time zones for the 2026 FIFA World Cup, the suggested time zones are generic rather than the actual zones of the host cities. We propose four games per day in four different time slots, recalling the structure of the first two rounds of the group stage of the 2022 FWC.

In the second round of the group stage, the winners of the first round play against the losers (note that, as discussed in the introduction, such a structure does not allow the existence of draws). There are two advantages of such a structure compared with the case in which winners play against each other and losers play against each other as well.[13] The first is that all the teams have incentives to win in the first round. If, however, winners play against winners, one team may strategically lose its first game in order to play the next game against a weaker

[12] See, for example, http://www.bvbinfo.com/Tournament.asp?ID=3288&Process=Pool. Last accessed on 28/04/2023.

[13] Note that in the second round of beach volleyball tournaments, the winners of the first round play against each other (and obviously the losers play against each other as well). However, unlike in the FWC, in beach volleyball the top three teams from each group qualify for the elimination stage.

team, giving it a high chance to improve its goal difference and qualify for the next stage. If, however, winners play against losers, we eliminate the incentives to lose in the first game. In addition, in the second round, all the teams always have a theoretical chance to qualify for the next stage or to be eliminated. Such a structure therefore eliminates dead rubbers.

Following a tradition that started in the 1986 FWC, both games of the final round of each group take place at the same time. The reason for such simultaneous games is to eliminate possible collusion as in the "Disgrace of Gijón". In the second round of the group stage, we offer three time slots per day with a difference of four hours between the kick-off times. Such a four-hour difference has also been used in the third round of the group stage of the last three World Cups.

The top-two-ranked teams from each group qualify for the elimination stage, whereas the bottom two teams in each group are eliminated. This means that 24 teams continue in the tournament. However, for a smooth elimination structure, the number of teams should equal a power of two, which is not the case with 24 teams. Thus, the best eight winners of the groups will qualify directly for the last-16 stage, whereas the other 16 teams (i.e., the four other group winners and all the runners-up) will have to play one game in a *qualification stage* (i.e., the four group winners will not play against each other).[14] It is important to note that the best eight group winners will have a relatively long rest time of up to ten days. This is similar to the case of Ukraine at the UEFA Euro 2020 and the USA at the 1994 FWC, both of which had eight days of rest between their last game in the group stage and their game in the last-16 stage.

To rule out any overlap between the games in the qualification stage, due to possible overtime and penalty shootouts, we offer three time slots per day with a difference of four

[14] The teams will be ranked based on well-accepted criteria such as the number of points, followed by the goal difference, the number of scored goals, fewer disciplinary points, and finally the drawing of lots.

hours between the kick-off times. Such a four-hour difference has also been used in previous World Cup eliminations stages.

Starting from the last-16 stage, the schedule follows the same pattern used in previous FWCs. More specifically, there will be two games per day with a four-hour difference between the kick-off times in the last-16 and quarter-final stages, with two rest days between the stages. Finally, two semi-finals will be played on days 26 and 27. The third-place play-off will take place on day 31. The last game of the tournament, the final, will take place on day 32.

3.2 Three games in the group stage and the 24-team bracket in the elimination stage (G3B24)

The idea of this format is to recall the traditional format during the group and elimination stages but to introduce an extra round before the final. First, a single round robin is played in each of the 12 groups, that is, every team plays once against each of its three group opponents. The top-two-ranked teams from each group qualify for the elimination stage, whereas the bottom two teams in each group are eliminated. The qualified teams are paired in such a way that the winner and runner-up of one group play against the runner-up and winner of another group, respectively (i.e., A1 vs. B2, A2 vs. B1, … , K2 vs. L1). In this round of 24, the paired teams play a single-elimination game as usual, recalling the round of 16 of the traditional format, but instead of eight games played by 16 teams, there are 12 games played by 24 teams. If the game is tied, there is extra time; if the tie persists, there is a penalty shootout defined as usual. The 12 winning teams progress to the second round of the elimination stage, which will feature six single-elimination games. The partition of the 12 teams into six pairs can be easily done beforehand to secure group diversity. The six winners then progress to the third round of the knockout stage, which will feature three games.

This format so far follows the principles of the traditional format, with a group stage in which every team plays three games and an elimination stage whose rounds of 24, 12, and six resemble the traditional round of 16, quarter-finals, and semi-finals. However, after the third round of the elimination stage, there would be three winners instead of two. Among these three, the *best* winner would progress directly to the final, while the other two teams would play an extra semi-final game. The winner of this game would qualify for the final, while the loser would end up ranked in the third place of the competition.

The selection of the best winner after the third round of the elimination stage should be based on predefined criteria. For example, a ranking could add up the points achieved by the winning teams in both the group and elimination stages, and other usual tiebreakers could be applied if needed. Note that this even increases the incentives to perform well throughout the group stage, including in the third group game for those teams that have already secured their progress to the elimination stage after only two games.

Table 2 outlines the schedule for this tournament format, which consists of 95 games. As shown in this schedule, the overall length of the tournament is 38 days, which is in line with the final approval of FIFA. However, it is possible to spread these games over 32 days, while still satisfying Scoppa's (2015) condition of non-asymmetry in rest days. Also, a side effect of this format is avoiding the need for a third-place play-off, often regarded as the game nobody wants to play.

[Insert Table 2 about here]

While this format matches the number of teams to a power of two right before the final, one could make this adjustment in any round of the elimination stage. An alternative, for example, is to rank the 12 winners of the round of 24 and promote the best four winners directly to the quarter-finals, while the remaining eight winners are paired in four games in a "pre-quarter-final" round. The four winners of this round would be matched with the four

previously selected best winners, and then the elimination stage would keep progressing with the traditional quarter-finals, semi-finals, final, and third-place play-off as usual. We have verified that for this alternative it is still possible to produce a schedule of games with the same (and even shorter) overall tournament length. However, since the ranking of 12 best winners is unknown *a priori*, it becomes more complicated to provide diversity in the knockout stage (in particular, the pairing of teams in the pre-quarter-finals and in the following round requires some special care to not mix teams from the same group, affecting the possibility of anticipating the paths that teams would follow to a potential final).

3.3 Hybrid format

We may also conceive hybrid formats, based on a combination of the formats presented in the previous sub-sections. Table 3 summarizes a schedule based on one of these combinations, in which each team would play two games in the group stage, as in beach volleyball, and an elimination stage with a 24-team bracket and an extra semi-final.

[Insert Table 3 about here]

4 Discussion

We focus our discussion on the criteria satisfied by the proposed formats. A summary is presented in Table 4, where we also include how these criteria have been met in the last two FWC tournaments and how they will be met in the 2026 edition. Note that the comparison with the 2026 FWC is incomplete since the exact schedule and format are not known yet. As for the non-collusion principle driven by the existence of simultaneous games in the last round of the group stage, all the proposals improve considerably upon the risk conveyed by FIFA's previous proposal of 16 groups of three teams.

[Insert Table 4 here]

In addition, the G2B16 (i.e., two group games with 16 teams in the first elimination stage) and hybrid (i.e., two group games with 24 teams in the first elimination stage) formats create clear incentives to perform well for all teams at all moments of the competition, including in the two group games in which there must always be a winner (which in turn eliminates the chances of dead rubber games). As for the G3B24 (i.e., three group games with 24 teams in the first elimination stage) format, although it features a group stage identical to the traditional case, the incentives to win all games are slightly stronger than in the current format. This is because the points collected in every game may become decisive to qualify directly for the final after the last-six round. This might also help reduce the likelihood of dead rubber games, although these persist when two teams lose their first two games and meet each other in the third round of the group stage.

However, all the proposed formats create information asymmetry. In the G2B16 format, teams that play in later groups may know the exact result they need to achieve to be among the best top-ranked teams to advance directly to the last-16 stage without playing in the qualification stage. In the same spirit, teams that play in the last game of the last-six stage in the G3B24 and hybrid formats know the exact result they need to achieve to advance directly to the final without playing in the semi-final. However, in all these cases, *both* teams involved in the respective games are incentivized to win, which mitigates the effect of information asymmetry. In addition, such asymmetry only affects the probability of qualifying for the next stage but does not directly eliminate other teams from the competition. However, in the format approved by FIFA, in which the eight best third-placed teams qualify for the elimination stage, the information asymmetry may help teams that know what result they need to achieve to qualify for the next stage. This means that other teams that did not have such information may be eliminated from the tournament. Thus, the main difference between our proposals and the one approved by FIFA is that, in our proposals, the information asymmetry

does not directly eliminate teams without full information, whereas in FIFA's proposal, differences in information may directly eliminate teams without full information.

Regarding the possible incentives to draw the last game in the group stage, the G2B16 and hybrid formats do not admit such a possibility since we enforce a "no-draw tournament", as has already been discussed by FIFA as a possible option. Moreover, teams are incentivized to win in every game since every game matters, whether to qualify for the elimination stage or to pass by one round as the best team. While the incentives to draw in the last group game are not completely eliminated in the G3B24 format, the possibility of advancing directly to the final without playing in the semi-final mitigates this problem. Obviously, as illustrated in the introduction (e.g., the case of Argentina vs. Romania in the 1990 FWC), the approved format of the 2026 FWC creates incentives to draw in the third round of the group stage.

Recall that the last two editions were played by 32 instead of 48 teams. Therefore, it should not be surprising that the formats we propose increase the number of games. The increase amounts to a moderate eight and seven additional games in the G2B16 and hybrid formats, respectively. In the G3B24 format, the number of games increases by 31, which is in any case lower than FIFA's finally approved increase of 40 games. The additional number of games in our proposals thus appears acceptable. Furthermore, despite the additional games, the length in days of the G2B16 and hybrid formats is 32 days, close to the 29 and 32 days used for the last two FWC editions. The proposed G3B24 format has 38 days, similar to the 38–40 days planned for the forthcoming 2026 FWC. We have also verified that it is possible to squeeze the G3B24 format into 32 days by having six instead of four games per day during the group stage.

A positive feature of the G2B16 and hybrid formats is that they keep the maximum number of games per team to seven, in line with FWC tradition. The G3B24 format increases this number to eight for only one of the finalists, specifically, the team that wins the extra

semi-final. These eight games are unavoidable for all four semi-finalists in FIFA's final approved format. Obviously, keeping the maximum number of games at seven, in some of our proposals, comes at the expense of guaranteeing every team only two instead of three games during the group stage, which is also the case in FIFA's original proposal of 16 groups of three teams. While our G3B24 format recovers the traditional three games per group, it is clear that there is a trade-off between securing this lower bound and not increasing the total number of games in the tournament.

Regarding the number of rest days, all the formats and schedules respect the minimum of four days between consecutive games for every team. The maximum number of rest days, however, is larger in our schedules, ranging from nine to ten, in comparison with the maximum of six rest days experienced in 2018 and 2022. In addition to the larger number of teams in the upcoming FWC than in the previous two editions, the main reason for this increase is that we construct our schedules taking care not to violate the asymmetry condition derived from Scoppa's (2015) empirical study. Consequently, the number of days without a game is greater in our schedules (and probably in the approved schedule) than in the last two FWCs.

Fans' experience and travel planning are plausibly better in the formats that secure all teams a minimum of three games, namely the G3B24 format.[15] As in this format the identity of the teams in the group games and the corresponding venues and dates can be assigned well in advance, it is easier for fans to plan their journeys. The G2B16 format is subject to more uncertainty, since only the first game of the group stage would be known with certainty beforehand. Yet, to mitigate this issue, all games of the same group could be hosted by nearby cities, which could enable fans to base themselves in a regional cluster and attend the games

[15] There is no official information yet regarding whether all the group games in the 2026 FWC will have a pre-determined schedule as was the case in the previous editions.

while travelling relatively shorter distances. In fact, for the 2026 edition, the 16 host cities have been grouped by FIFA into three clusters: West, Central, and East. It is also likely that the 2030 edition will follow a similar pattern, as the three confirmed bids to date involve multiple host countries.

Our proposals as well as FIFA's final approval increase the number of simultaneous games from 16 to 24, but this is simply a consequence of having 12 groups instead of eight. This is obviously done to preserve excitement in the group outcomes and to avoid match fixing.

A positive feature of the G3B24 format is that it enables balance and diversity without the necessity of ranking the teams that qualify for the knockout stage. In contrast, the selection of four best winners and the qualification stage in the G2B16 format reduce the chances to secure balance. Nevertheless, FIFA's approved format will also suffer in this respect, as some of the group winners will play against third-best teams and others against runners-up.

5 Conclusion

This chapter was motivated by the willingness of FIFA to revisit its decision regarding the format of the 2026 FWC, in which, instead of the original proposal of 16 groups of three teams, it decided to have 12 groups of four teams. We have elaborated on three possible formats for the 12-group alternative, together with providing a detailed schedule for each of these formats. These formats and schedules provide much clearer incentives for teams to perform well and they also reduce the possibilities of collusion compared with FIFA's original proposal of 16 groups of three teams and the finally approved format of 12 groups of four teams. Moreover, we have discussed how these tournament formats and schedules meet several other criteria relevant to the competition. Notably, the total number of games in our proposals ranges from 71 to 95, considerably lower than the undesirably high 104 games

resulting from a straightforward doubling of the old FWC format with 24 teams. Also, our schedules show that the length of the competition can be kept at about one month, as in recent tournaments. In general, our proposals could become viable options for upcoming FWC editions, adapting to the disruptive increase from 32 to 48 teams while retaining a large proportion of the most traditional features of the event.

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7 Tables

Table 1: Schedule of a tournament with two games per team in the group stage and a 16-team bracket (G2B16 format).

Round 1 of the group stage				
Day	*13:00*	*16:00*	*19:00*	*22:00*
1	A1–A4	A2–A3	B1–B4	B2–B3
2	C1–C4	C2–C3	D1–D4	D2–D3
3	E1–E4	E2–E3	F1–F4	F2–F3
4	G1–G4	G2–G3	H1–H4	H2–H3
5	I1–I4	I2–I3	J1–J4	J2–J3
6	K1–K4	K2–K3	L1–L4	L2–L3
Round 2 of the group stage				
Day	*14:00*	*18:00*	*22:00*	
7	Winner A–Loser A Winner A–Loser A	Winner B–Loser B Winner B–Loser B	Winner C–Loser C Winner C–Loser C	
8	Winner D–Loser D Winner D–Loser D	Winner E–Loser E Winner E–Loser E	Winner F–Loser F Winner F–Loser F	
9	Winner G–Loser G Winner G–Loser G	Winner H–Loser H Winner H–Loser H	Winner I–Loser I Winner I–Loser I	
10	Winner J–Loser J Winner J–Loser J	Winner K–Loser K Winner K–Loser K	Winner L–Loser L Winner L–Loser L	
11	***Rest Day***			
Qualification stage				
Day	*17:00*		*21:00*	
12	Team (A–F)–Team (A–F)		Team (A–F)–Team (A–F)	
13	Team (A–F)–Team (A–F)		Team (A–F)–Team (A–F)	
14	Team (G–L)–Team (G–L)		Team (G–L)–Team (G–L)	
15	Team (G–L)–Team (G–L)		Team (G–L)–Team (G–L)	
Last-16 stage				
Day	*17:00*		*21:00*	
16	Group Winner (A–F)–Winner Day 12		Group Winner (A–F)–Winner Day 12	
17	Group Winner (A–F)–Winner Day 13		Group Winner (A–F)–Winner Day 13	
18	Group Winner (G–L)–Winner Day 14		Group Winner (G–L)–Winner Day 14	
19	Group Winner (G–L)–Winner Day 15		Group Winner (G–L)–Winner Day 15	
20	***Rest Day***			
21	***Rest Day***			
Quarter-finals				
Day	*17:00*		*21:00*	
22	Winner Day 16–Winner Day 16		Winner Day 17–Winner Day 17	
23	Winner Day 18–Winner Day 18		Winner Day 19–Winner Day 19	
24	***Rest Day***			
25	***Rest Day***			
Semi-finals				
Day	*21:00*			
26	Winner Day 22–Winner Day 22			
27	Winner Day 23–Winner Day 23			
28	***Rest Day***			
29	***Rest Day***			
30	***Rest Day***			
Third-place play-off				
Day	*18:00*			
31	Loser Day 26–Loser Day 27			
Final				
Day	*19:00*			
32	Winner Day 26–Winner Day 27			

Table 2: Schedule of a tournament with three games per team in the group stage and a 24-team bracket (G3B24 format).

Round 1 of the group stage				
Day	*13:00*	*16:00*	*19:00*	*22:00*
1	A1–A4	A2–A3	B1–B4	B2–B3
2	C1–C4	C2–C3	D1–D4	D2–D3
3	E1–E4	E2–E3	F1–F4	F2–F3
4	G1–G4	G2–G3	H1–H4	H2–H3
5	I1–I4	I2–I3	J1–J4	J2–J3
6	K1–K4	K2–K3	L1–L4	L2–L3
Round 2 of the group stage				
7	A1–A3	A2–A4	B1–B3	B2–B4
8	C1–C3	C2–C4	D1–D3	D2–D4
9	E1–E3	E2–E4	F1–F3	F2–F4
10	G1–G3	G2–G4	H1–H3	H2–H4
11	I1–I3	I2–I4	J1–J3	J2–J4
12	K1–K3	K2–K4	L1–L3	L2–L4
Round 3 of the group stage				
Day	*14:00*	*18:00*	*22:00*	
13	A1–A2 A3–A4	B1–B2 B3–B4	C1–C2 C3–C4	
14	D1–D2 D3–D4	E1–E2 E3–E4	F1–F2 F3–F4	
15	G1–G2 G3–G4	H1–H2 H3–H4	I1–I2 I3–I4	
16	J1–J2 J3–J4	K1–K2 K3–K4	L1–L2 L3–L4	

Last 24 stage		
Day	*17:00*	*21:00*
17	Winner A–Runner up B	Winner B–Runner up A
18	Winner C–Runner up D	Winner D–Runner up C
19	Winner E–Runner up F	Winner F–Runner up E
20	Winner G–Runner up H	Winner H–Runner up G
21	Winner I–Runner up J	Winner J–Runner up I
22	Winner K–Runner up L	Winner L–Runner up K
23	***Rest Day***	
Last 12 stage		
Day	*17:00*	*21:00*
24	Winner Day 17 (17:00)–Winner Day 18 (17:00)	Winner Day 17 (21:00)–Winner Day 18 (21:00)
25	Winner Day 19 (17:00)–Winner Day 20 (17:00)	Winner Day 19 (21:00)–Winner Day 20 (21:00)
26	Winner Day 21 (17:00)–Winner Day 22 (17:00)	Winner Day 21 (21:00)–Winner Day 22 (21:00)
27	***Rest Day***	
28	***Rest Day***	
Last 6 stage		
Day	*17:00*	*21:00*
29		Winner Day 24 (17:00)–Winner Day 25 (17:00)
30	Winner Day 24 (21:00)–Winner Day 26 (17:00)	Winner Day 25 (21:00)–Winner Day 26 (21:00)
31	***Rest Day***	
32	***Rest Day***	
33	***Rest Day***	
Extra semi-final		
Day	*21:00*	
34	Winner Day 29/30–Winner Day 29/30	
35	***Rest Day***	
36	***Rest Day***	
37	***Rest Day***	
Final		
Day	*19:00*	
38	Winner Day 29/30–Winner Day 34	

Table 3: Schedule of a tournament with hybrid format

Round 1 of the group stage				
Day	*13:00*	*16:00*	*19:00*	*22:00*
1	A1–A4	A2–A3	B1–B4	B2–B3
2	C1–C4	C2–C3	D1–D4	D2–D3
3	E1–E4	E2–E3	F1–F4	F2–F3
4	G1–G4	G2–G3	H1–H4	H2–H3
5	I1–I4	I2–I3	J1–J4	J2–J3
6	K1–K4	K2–K3	L1–L4	L2–L3
Round 2 of the group stage				
Day	*14:00*	*18:00*	*22:00*	
7	Winner A–Loser A Winner A–Loser A	Winner B–Loser B Winner B–Loser B	Winner C–Loser C Winner C–Loser C	
8	Winner D–Loser D Winner D–Loser D	Winner E–Loser E Winner E–Loser E	Winner F–Loser F Winner F–Loser F	
9	Winner G–Loser G Winner G–Loser G	Winner H–Loser H Winner H–Loser H	Winner I–Loser I Winner I–Loser I	
10	Winner J–Loser J Winner J–Loser J	Winner K–Loser K Winner K–Loser K	Winner L–Loser L Winner L–Loser L	

Last 24 stage		
Day	*17:00*	*21:00*
11	Winner A–Runner up B	Winner B–Runner up A
12	Winner C–Runner up D	Winner D–Runner up C
13	Winner E–Runner up F	Winner F–Runner up E
14	Winner G–Runner up H	Winner H–Runner up G
15	Winner I–Runner up J	Winner J–Runner up I
16	Winner K–Runner up L	Winner L–Runner up K
17	***Rest Day***	
Last 12 stage		
Day	*17:00*	*21:00*
18	Winner Day 11 (17:00)–Winner Day 12 (17:00)	Winner Day 11 (21:00)–Winner Day 12 (21:00)
19	Winner Day 13 (17:00)–Winner Day 14 (17:00)	Winner Day 13 (21:00)–Winner Day 14 (21:00)
20	Winner Day 15 (17:00)–Winner Day 16 (17:00)	Winner Day 15 (21:00)–Winner Day 16 (21:00)
21	***Rest Day***	
22	***Rest Day***	
Last 6 stage		
Day	*17:00*	*21:00*
23		Winner Day 18 (17:00)–Winner Day 19 (17:00)
24	Winner Day 18 (21:00)–Winner Day 20 (17:00)	Winner Day 19 (21:00)–Winner Day 20 (21:00)
25	***Rest Day***	
26	***Rest Day***	
27	***Rest Day***	
Extra semi-final		
Day	*21:00*	
28	Winner Day 22/23–Winner Day 22/23	
29	***Rest Day***	
30	***Rest Day***	
31	***Rest Day***	
Final		
Day	*19:00*	
32	Winner Day 22/23–Winner Day 27	

Table 4: Comparison of satisfaction of criteria among different formats.

	FWC Russia 2018	FWC Qatar 2022	G2B16 proposal	G3B24 proposal	Hybrid proposal	FWC 2026
Simultaneous games in the last round of a group	✓	✓	✓	✓	✓	✓
Information asymmetry	✓	✓	✗ With effect on direct qualification	✗ With effect on direct qualification	✗ With effect on direct qualification	✗ With effect on direct elimination
Incentives to draw in the last game of a group	✗	✗	✓	✓	✓	✗
No dead rubbers	✗	✗	✓	✗ Only for teams that lose first two games	✓	✗
Total number of games	64	64	72	95	71	104
Length of tournament in days	32	29	32	38	32	38–40
Max number of games per team	7	7	7	8	7	8
Min number of games per team	3	3	2	3	2	3
Max number of rest days	6	6	10	9	9	*?*
Min number of rest days	3	3	4	4	4	*?*
Asymmetry in rest days below four days of rest	Only in the third-place game	Only in the third-place game	None	None	None	*?*
Number of days without games	7	6	8	9	9	*?*
Fan travel planning in the group stage	✓	✓	✗	✓	✗	*?*
Number of simultaneous games	16 (8 time slots)	16 (8 time slots)	24 (12 time slots)	24 (12 time slots)	24 (12 time slots)	24 (12 time slots)
Bracket balance	✓	✓	Some games 1 vs. 2 Some games 2 vs. 2	✓	✓	*?*
Bracket diversity	✓	✓	✗	✓	✓	✗

Note: As of 28/04/2026, the exact schedule of the 2026 FWC is unknown, so we mark the different unknown criteria with "*?*".