

SYNERGETIC APPROACHES AS NEW MODERN INNOVATIONS IN PHYSICAL CULTURE AND SPORTS

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Abstract

Recently, great importance has been paid to synergetic approach as new and effective innovation in sport. The purpose of this literature review is to give concise overviews about synergetic approach that will develop another way of thinking about sport and physical education and provide a summary of synergetic approach in physical culture and sport. Synergetic approaches as a new initiative increase the result and improve the performance of the team. Our literature search included the electronic databases Pubmed, SportDiscus and Web of Science, google scholar (from 2000 to 2021). In total, 30 studies met the inclusionary criteria for review. On July 2021 has started the electronic search and it has finished in the end of the September 2021. Studies argue that synergetic approaches enhance the final score of the team. For instance, synergetic approaches are used to capture and analyses the behaviors of athletes. Synergistic approaches are seen from the psychological, social, motor behavior perspectives as modern methods to make the performance better. Physical educators and specialists must have good knowledge in the principles of tactical, strategic organization and improvement of thinking by using modern approach as a way to enhance the performance.

Keywords. Synergetic, physical culture, sports, studies

Introduction

Synergy as a concept comes from Greek term which mean “acting together”. Latash’ (2021) study indicates that the synergy is as a way to structurally and functionally describe coordinative movements. In the research of Brunon & O’Dwyer, (2018) the term synergy provides a unifying concept within a field that includes complementary neural, computational, and behavioral approaches. While D’Avello et al., (2003) has describe synergy as “coherent activation in space or time of a group of muscle”. However different researches have different meaning of the term “synergy”, it is depended by the study approach.

The sum of functional structure of each individual synergy do not bring the team synergy. In order to understand team synergy, we must know how one synergy can transform into another at specific situations and moments, how different synergic functions can be incorporated and how distinct synergies can co-exist in the same system elements (Turvey, 2007). When people work as a team lead to high result in any kind of fields. In order to achieve good results all members of the team need to coordinate with each-other and to have common thoughts. A valuable example of team coordination is when team seek to create space by expanding, stretching in the court or by creating distance between members when they possess the ball. The opposite happens with the team while defending, player close down space by contracting and reducing distance between each-others (Araujo, A & Davids, K. 2016).

Teams must be trained to perceive how to use and share specific affordances, clarify how individual’s behaviors self-organize into

a group synergy (Araujo, A & Davids, K. 2016). Affordance are dynamic and more visible in interpersonal interaction. Interpersonal Interaction happen when action of one person cause the behavior of another person (Kimmel & Rogler, 2018). For example, the behavior of athlete number 1 is caused by the action of athlete number 2. Athletes create a perception-action system by interacting their behaviors with each other which is equated as interpersonal synergy (Marsh et al., 2006).

If the coach wants to create interpersonal synergy, he/she must consider the fact that each element (player) is unique. In order to understand the team behavior, we should take these unique elements of athletes seriously. We need to understand the role and the place of each player within the team and this can be measured by testing the relation of each player with the ball and how they stand up to the team goal (Carrilho et al., 2020).

The structure of synergetic approach includes the strategic partnership, mutual beneficial cooperation, collective unification. Synergetic approaches reinforce some important qualities such as good communication and understanding, teamwork, solidarity and socialization (Nazarov N.N. 2020). It is better to ask the athletes of team about their role in enhancing the team performance thus, it will develop and change the way of thinking. They will put more effort as a team to ensure victory. Recently, athletes, players of the teams or even the teams are considerate as complex adaptive systems (McLean et al., 2017). According to Barzel and Barabási (2013) each adaptive system requires its unique suite of analytical and numerical

tools to understand its behaviors because it is constrained by universal principles.

The most qualified team are those who have clearly defined rules and responsibilities for everyone. This means a team which is well-organized, well-structured and has an effective communication, motivation and appreciation toward each other. All those features mentioned previously show the feedback in competition performance. The study of Jukic et al. (2018) indicates that the quality of competition performance is a result of synergy of all aspects of sport preparation. The success of integral preparation (health, life, physical, mental preparation) is expressed in synergy of all types and the product is effective and long-lasting athlete's career. Moreover, the teams are constantly developed in a balanced and successful way in the long term. Jukic et al. (2018) continues to explain that this synergy can be achieved by a systematic process of transformation and monitoring of all characteristics that are related to sport. Synergetic approaches include monitoring qualitative and quantitative changes in pattern formation between degrees of freedom with changing constraints. Thus, this approach describes movement and constraints. Synergetic approaches provide necessary information to make right tactical decisions, develop strategies and prescribe modification of programs (strength and conditions program, speed and endurance program...).

Team synergy is achieved through systematic, long-term and hard work of a considerable number of people (coach, sports psychologist, athletes...). The success of a team is based on synergistic actions and synchronization of work of head coaches, strength and conditioning coaches,

nutritionist, psychologist, physiotherapist, sports analysts, doctors. Psychologists play an important role in creating a successful "team synergy" because this is more a psychological attribute. Psychologists and other experts must establish and implement a hierarchized network and clear structure with the athletes and expert team. Each athlete and expert must have defined the role, responsibilities and rules. The synergistic actions of all experts enable each individual player and the whole team to improve their performance (Jukic et al., 2021).

Jukic et al. (2018) reported in his study that the efficiency of team sports depends on the motivation and ability of the coach to create an integral service. Because of that, there has been a strong initiative to establish the integral performance system (Smith & Smolianov, 2016). The head coach is the responsible person who builds this integral system and the other members of the team follow the line to maintain the system. Thus, the synergistic approaches tend to change a little bit the role of the head coach and give him not only the professional competences in the field of sport but also management and communicative competences. The efforts of the coach are not only professional orientation (technical, tactical...) but they are also focused on improving, preparing and orientating the athlete's mental capacity. In Albania there is a lack of coaches or trainers who are informed and use synergistic approaches to enhance the performance of certain sports.

In the present review we aimed to give a summary of properties and constraints of synergistic approaches in physical activity and sports. Other purposes are to further promote synergistic approaches in sport as a way of improving performance and provide

overviews on the applications of synergetic approaches in sport.

Materials and Methods

Search Strategy: Our literature review included the Sport Discus, PubMed, Google Scholar, Web of Science, Scopus databases in order to find papers focused on synergetic approaches in sports. On July 2021 has started the electronic search and it has finished in the end of the September 2021. The keyword typed for the electronic research were *synergy in sports, interpersonal synergy, synergetic approach in team sports, coordination and synchronization, psychological attributes in sport, synchrony in sports...*

Inclusion Criteria: Firstly, all articles used in the review were written in English and they were published from 2000 to 2021. Secondly, the inclusion criteria are based on the articles that have the same content as our study. Only thirty articles from 500 founded on the electronic search met the inclusionary criteria for review.

The properties of synergetic approaches

An important attribute of team synergy is the ability of one member of the team to influence behaviors of other players (Riley et al., 2011; Araújo et al., 2016). It is observed how multiple players synchronize activities in accordance with dynamic performance environments implying that the decisions and actions of players forming a synergy should not be seen as independent (Silva et al., 2016).

Another feature of synergetic approaches is flexibility which is synonymous with adaptability. This mean that the members of the team change the coordination patterns

and at the same time maintaining functional performance (Seifert et al., 2016). Synergy can be transformed, spread and dissipated according to changes made by different situation. Moreover, different synergies can be formed for the same task (Carrilho et al., 2020). In teams where synergetic approaches are used, the simultaneously coordination of team members become a key feature that indicate a state of shared understanding between each-others.

Another key feature of team members while using synergetic approaches is synchronization processes. Synchronization processes that characterize a synergy are not collaborations of individual structural components, but the cooperativity of their functional roles. The measurement of synchronization captures the properties of team synergy behavior. One of the properties of synergetic approach is unpredictable potential. We can enhance unpredictable potential through by forming new synergetic potential and becoming sensitive the members of the team and their efforts, increase the organization and becoming unpredictable for the opponent (Pol, R et al., 2020).

The properties of team synergies are identified across different task by Araujo et al., 2016, like dimensional compression, degeneracy, reciprocal compensation and interpersonal linkages. Dimensional compression is concepted as synchronization or as the representation of collective behavior by an order parameter (Corrilho et al., 2020). Degeneracy is defined as adaptation and flexibility of team' behavior as a reaction of momentary and local changes. Reciprocal compensation indicates the ability of team to reorganize and adapt in different situations during the

match and capture compensation among athletes within the team (Corrillo et al., 2020). Interpersonal linkages are the contributions of athletes in the team synergy.

Constraints of synergetic approaches

Some of the principles that destroy the team synergy are superiority toward teammate, being not responsible for the team, selfish and not being active in team's decisions (Abdullayev, A & Xonkeldiyev, Sh. 2005). Environment events such as match configuration have tight impact in performer's behavior patterns (Araujo, A & Davids, K. 2016). The result of Carrillo et al., indicated a high connection between athletes and the performance environment. Sometimes the circumstances of environment events do not make possible the realization of some prepared team's behavior patterns. Consequently, we can consider as environmental constraints against synergetic approaches in sport. Despite the fact that environment shapes individuals, there are also individuals who modify their environment (Withagen and Van Wermeskerken, 2010). Individual's perceptual and action capabilities are constraints for successful performance in sports (Araújo et al., 2006).

The way how athletes use the information for action selection and goal achievement is another indicator of team success. If the athlete does not perceive the information appropriately the selection of the actions will not be the right one. Consequently, individual's wrong perceptual can be considerate as constraints of synergetic approaches. Athletes who are psychologically distance from the other players can prevent interpersonal synergies

(Miles et al., 2010) and lead to another constrain toward synergetic approaches.

Interpersonal synergies

According to Richardson et al., (2010) the activity of the synergy in the team is reflected by interpersonal coordination. The team is considered to be a single dynamic system and athletes form what has been coined an interpersonal synergy (Kraben et al., 2019). Another study of (Schmidt & Richardson, 2008) shows that interpersonal rhythmic coordination creates interpersonal synergy. The activity of synergy is supported by visual coupling of team members' degree of freedom (Marsh et al., 2009). Connecting the degree of freedom of the adaptive system (athletes motor system) into synergy create interpersonal coordination. Interpersonal synergies are established by interpersonal movement coordination. In some cases, interpersonal coordination may be accidental, thus it doesn't reflect the true coordination of athlete's movements (Garrod and Pickering., 2009). Athletes seems to have coordinative movements because they execute similar motor programs in the same time (Sebanz et al., 2006).

Interpersonal synergies are not properties of athlete's neuromuscular systems but they are features of perception-action systems. The study of Hove and Risen, 2009 concluded that interpersonal coordination forms the interpersonal synergies that helps to build rapport between athletes. There is strong connection between the performance of environment and athletes and this is related to the concept of interpersonal synergies (Araujo et al., 2016).

The total synergy of the team comes from the sum of interpersonal synergies. Interpersonal synergies help with memorization of people whom they interact, thus it improves the performance of social cognitive (Milles et al., 2010). The mechanism for interpersonal coordination of team sports can be synergetic approaches (Passos et al., 2009). A good example is the

fact that effective teams use more synergetic approaches compare to poorly effective teams. By understanding the social perception-action systems we can develop the interpersonal synergies.

Results

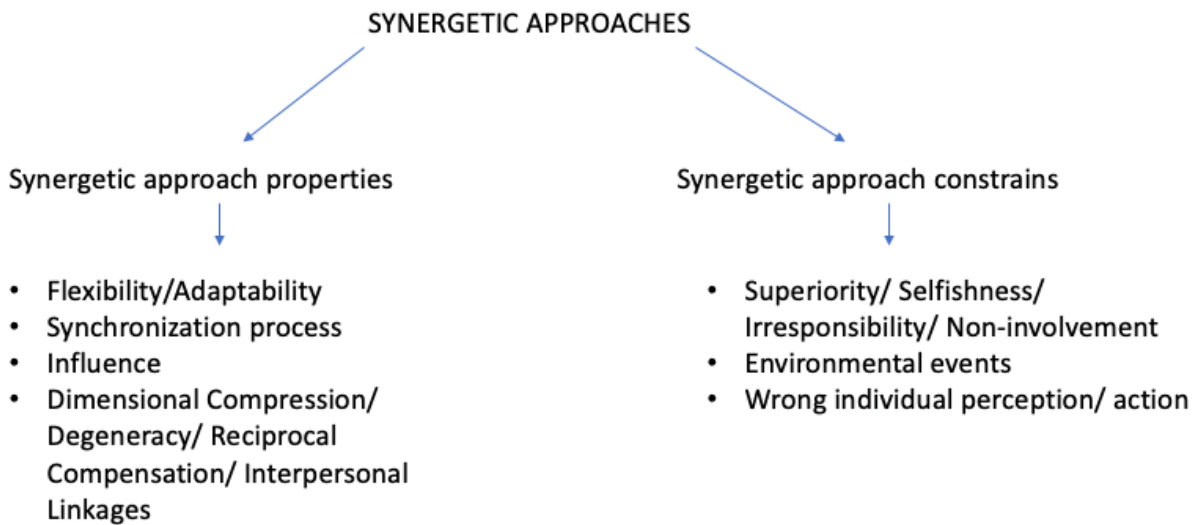


Table 1. The table display the summary of synergetic approaches properties and constrains.

The table above show the summary of synergetic approaches properties and synergetic approaches constrains. The properties of synergetic approaches mention above are flexibility/ adaptability, synchronization process, influence... In our study, synergetic approach constrains are consider to be superiority/ selfishness/ irresponsibility/ non-involvement, environmental events and wrong individual perception/ action.

Most of the study argue that using synergetic approach in sports is necessary to capture and analyses the behaviors of athletes. Moreover, many studies have

supported the hypothesis that synergetic approaches increase the performance in sport. Synergetic approach is also conceptualized as social energy between members of the dynamic system.

Discussion

The aim of this study was to give information about synergetic approaches in sport, and promote them as a good method to enhance the team performance. The study includes the summary of synergetic approaches properties, constrains and interpersonal synergies.

Once again returning to the conception of synergetic approaches many researchers concluded in their studies that synergetic approaches prove to be an accessible framework where is base sports performance analysis. For another author synergetic approach is a methodology of generating innovations, design creative thinking, determine characteristic features and making decisions by testing ideas (Varienytsia, L., 2021). According to (Myers, D. N., 2013) synergetic approach was a demonstration of a new and flexible method. While as Latash et al. (2002) findings that synergetic approaches are presented when systems (athletes, coaches...) show reciprocal compensation among elements. This approach was more preferred compare to familiar, traditional and restrictive methodology.

Many studies have reported that the main synergetic channel is perception of shared affordance between players (Silva et al., 2013). Affordance is understood as opportunities for action offered by the environment and perceived by athletes which develops over time (Woods et al., 2020). The study of (Carrilho et al., 2020) showed a high level of synchronization due to continuous adaptation during reciprocal compensation measurement. On the other hands the team was unbalanced during specific events or sudden changes of the match equilibrium.

Supporting to hypothesis, we found many studies reported that synergetic approaches improve the performance of the sports discipline. Synergetic approaches aim to foster a collaborative spirit in the team. To achieve the success in team, athletes need to collaborate with each-other by using synergetic approaches but at the same time

they also have to compete with their teammates (Landkammer et al., 2019). Coaches tend to encourage competitions between players in order to enhance the performance. But when it comes to accomplish a task, they encourage to collaborate with each-other and achieve the success against the other teams.

In team sports like football, basketball, volleyball... it's impossible to achieve the goal by containing independent behavior. For this reason, the synergy of the team is very important to achieve cooperation between players because failure to achieve the goal leads to the loss of the team.

The success of the performance in team in not only related with the synergy of players but also with the timeframe over which the synergy act. Player' s co-adaptive behavior tends to be more successful when it is close to the decision moments (Passos, Cordovil, Fernandes, & Barreiros, 2012).

In the last two decades, great importance has been paid to mental preparation and maintaining this mindset during training or matches. Even though, the popularity of sport psychology has grown many coaches are hesitant to seek a sport psychologist to help in mental preparation, mindset, synergetic approaches... The coaches must understand how the mental skills effect the performance (Gee, C. J., 2010). It is still in its infancy the study of synergetic features in sport.

Considering synergetic approach in sports closer to the psychological perspective, Fredrickson's study suggests that emotions such as fun, interest, joy, and fascination help in expanding the attention, action, cognition, and creative thinking (Puig & Vilanova, 2011). These benefits that come from studies in positive psychology translate

into better results in sports. But in the other hand emotions can perform even negative functions which may lead to failure (Puig & Vilanova, 2011). This happens because they are not able to manage their emotions. Interpersonal synergies help a lot in facing their negative emotions.

Apart of emotion the passion is another condition that sportspeople need if they want to achieve good performance in sport. According to Vallerand et al (2008) the passion is considered as sets thing in motion by providing athletes with goals and energy to engage in sport. In the other words, passion and emotions are attributes that fulfill the synergy between athletes in team sport.

In terms of motor behavior, stability and variability are two features that bring motor behavior interaction between players. Complementary between stability and variability is considered as functional synergy according to dynamic theory (Kelso & Engstrom, 2006). The complementary of stability (the system resilience to external variables) and variability (adaptability) use the system to achieve the same task goal through different ways (Kelso & Engstrom, 2006). Possessing the ball most of the time during a competitions or match day which is an effective tactical strategy create stability and variability in athletes. In order to achieve this strategy, we must create a functional which can be reached when components of a system behave as a whole by contributing in development of specific task (Kelso, 2009).

From social overview a team ball game is consider to be social system which interpersonal interaction/synergy bring the collective behavior. In studies which test the

synchronization of players in team sport there are found large synergetic relation with each-other. Although the presence of synergy between players in team sports is so great, again sports specialists do not consider this part important by not seeking to expand knowledge in this field. The study of (Muxitdinovich, F.Y., 2020) have the same approach toward sport specialists and professionals of team sport, who do not know the team approach, tactics and strategy.

Limitations of the study: Despite providing important concise overviews about synergetic approaches in sport, this study is not without its limitations. One of the limitations of this study is not having a concrete measurement of synergy between players or as a whole in team. Not having a method that asses and analyzes the team synergy is another limitation of this study. Showing an appropriate synergetic approach in psychological and tactical direction is an important case to be taken into consideration by future researches. Also analyzing the synergy in team sports will be fruitful topic to future research. It is important to make a concrete measure of synergetic approach in teams. This is a relevant topic to be addressed in future investigation in sport sciences. In this study individual sport have a lesser development compare to team sport because in sport-people's consciousness, synergetic approaches are mostly for team sport. This is not true and it will be a good topic for future researches.

Conclusion

In conclusion synergistic approaches are seen from the psychological, social, motor behavior perspectives as modern methods

to make the performance better. Physical educators and specialists must have good knowledge in the principles of tactical, strategic organization and improvement of thinking by using modern approach. It is very necessary to use and practice synergetic approaches during training session or matches because this leads to good results. The aim of the coaches is developing synchronized player movements during competitions and training sessions. Synergetic approach may be a model for sports science. By reviewing these studies, we identify and support the conceptualization of synergetic approach in sport.

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