A PROJECT ON

Study on Effectiveness of Technology in Taekwondo

BY

Sanika Dilip Jagtap

SUBMITTED TO

Department of Sports Management

Nagindas Khandwala College of Commerce, Arts and

Management Studies,

Mumbai – 400064

In partial fulfilment of the requirements for the Degree of

Bachelor of Management Studies – Sports Management – SEM VI

Academic Year 2023-2024

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TYBMS (SPORTS MANAGEMENT) Roll no – 24

DECLARATION

I wish to state that the work embodied in this dissertation titled **Study on Effectiveness of Technology in Taekwondo** is my own contribution. The Dissertation is carried out under the guidance of **Dr. Deepak R Gupta in this academic year 2023-24.**

SIGNATURE OF THE CANDIDATE

(Sanika Dilip Jagtap)

PLACE: MUMBAI

DATE: 18th MARCH 2024

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CERTIFICATE

This is to certify that **Ms. Sanika Dilip Jagtap** - has successfully completed the Dissertation as a part of the semester VI Syllabus Titles **Study on Effectiveness of Technology in Taekwondo** under the guidance of **Dr. Deepak R Gupta** during the **Academic Year 2023-2024.**

Prof. Dr. Deepak R Gupta

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Date: 18th March 2024.

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development. Within its structure, the General Assembly, World Taekwondo Council, and Recognized Organizations collaborate to govern and promote Taekwondo worldwide. Kukkiwon serves as the guardian of Taekwondo authenticity, while national federations like the Taekwondo Federation of India (TFI) play a crucial role in nurturing talent and organizing competitions. The evolution of Taekwondo from traditional to modern practices reflects its dynamic nature, blending cultural heritage with technological advancements to meet the demands of contemporary practitioners and compete on a global scale. Technology has revolutionized Taekwondo in numerous ways, from training to competitions and beyond. Athletes can now access instructional videos and virtual platforms from anywhere, enhancing learning opportunities. In competitions, electronic scoring systems ensure fair and accurate results, while smart devices track athletes' fitness levels and analyze movements for targeted training. Moreover, technology fosters global connectivity among Taekwondo enthusiasts, creating a vibrant community for knowledge exchange and collaboration. As technology continues to advance, Taekwondo evolves into a more accessible, engaging, and effective martial art, enriching the lives of practitioners worldwide. The literature review encompasses a comprehensive analysis of scholarly works spanning various dimensions of Taekwondo, including performance evaluation, technological integration, pedagogical methodologies, psychological considerations, and assessment protocols. Through rigorous examination, researchers have delved into topics such as offensive and defensive strategies, technology acceptance models, biomechanical frameworks, mental imagery applications, stress mitigation techniques, scoring dynamics, instructional innovations, and performance assessment tools. These studies collectively underscore the dynamic evolution of Taekwondo, its symbiotic relationship with technology, and the interdisciplinary approaches adopted to deepen insights and elevate proficiency in the discipline. Overall, the literature furnishes invaluable insights into the nuanced facets of Taekwondo, offering pragmatic implications for training methodologies, coaching practices, competitive strategies, and academic inquiry.

This research aims to investigate the impact of sensor scoring technology on fairness and accuracy in Taekwondo competitions, compared to traditional manual scoring methods. The study also seeks to explore the perspectives of Taekwondo athletes and coaches regarding the effectiveness of technology in training and competition.

The first objective is to determine whether sensor systems enhance the precision and fairness of scoring in Taekwondo competitions. This involves evaluating the effectiveness of sensor

EXECUTIVE SUMMARY

Taekwondo, a South Korean martial art, emphasizes high-speed kicking techniques alongside punching maneuvers. Established in the 1950s, it stands as one of the oldest martial arts globally, promoting physical health, mental discipline, and personal development. Governed by organizations like the Korea Taekwondo Association (KTA) and the International Taekwon-Do Federation (ITF), Taekwondo has evolved into a competitive sport, recognized by its inclusion in the Olympic Games since 2000. Taekwondo's focus on powerful kicks and a balanced approach to offensive and defensive strategies makes it a holistic discipline with a lasting impact on martial arts worldwide. The belt system, ranging from white to black belts, symbolizes progression and mastery within the art form. After World War II, Seoul witnessed the establishment of martial arts schools known as Kwans, founded by skilled Korean martial artists with diverse experiences in Japanese, Chinese, and indigenous Korean martial arts. This resurgence responded to the suppression of native disciplines during Japan's colonial rule. Recent transformations in Taekwondo competition, notably rule revisions in 2017, have emphasized more aggressive approaches, elevating the importance of timing in attacks for elite athletes globally. The discussion on Taekwondo's origins is divided between traditionalism, asserting deep indigenous roots, and revisionism, linking it to karate. In India, Taekwondo was introduced by Master Puran Andrew Gurung in 1969, leading to the formation of the Taekwondo Federation of India in 1976. In Taekwondo, there are two main forms: Kyorugi (sparring) and Poomsae (sequences of movements). Kyorugi involves dynamic combat between two individuals, emphasizing kicks and punches, scored by an electronic system. Poomsae, on the other hand, focuses on set sequences judged on technique and precision. It enhances skills, balance, and visualization, crucial for both training and competition. Scoring in Poomsae is based on presentation and accuracy, with recognized and freestyle competitions. The practice of both forms has evolved Taekwondo, improving body posture, balance, and mental calmness during bouts, as seen in recent national games. Taekwondo is experiencing a surge in popularity, marked by the introduction of events like the Taekwondo Premier League (TPL) in 2023, providing a platform for athletes to enhance their skills and competitiveness. The World Taekwondo organization oversees the sport globally, ensuring its growth and

technology in accurately detecting and registering scoring actions during matches, such as kicks and punches. The research hypothesis posits that the introduction of technology significantly improves competition results, ensuring fair evaluations compared to traditional methods.

The second objective involves gathering insights from Taekwondo practitioners to understand how technology impacts training and competition. The study hypothesizes that online Taekwondo classes and videos make training easier than regular in-person classes. Additionally, it explores whether the use of video analysis tools leads to a higher rate of skill development among Taekwondo athletes compared to traditional feedback methods. By addressing these objectives and hypotheses, the research aims to contribute to the understanding of how technology influences fairness, accuracy, and skill development in Taekwondo, providing valuable insights for practitioners, coaches, and competition organizers.

This comprehensive study delves into the influence of technology on Taekwondo training and competition, drawing insights from a survey conducted among practitioners. The research scrutinizes various facets of technological integration, shedding light on preferences, challenges, and opportunities within the Taekwondo community.

One prominent discovery is the overwhelming preference for sensor technology in scoring systems, indicating a widespread belief in its ability to enhance fairness and accuracy in competitions. Respondents expressed satisfaction with the real-time nature and precision offered by sensor-based scoring, highlighting its pivotal role in transforming the sport's competitive landscape.

Moreover, the study unveils a growing reliance on mobile applications and wearable technology among Taekwondo enthusiasts. Mobile apps tailored for practicing and learning Taekwondo Poomsae, along with wearable devices like smart watches and fitness trackers, have emerged as indispensable tools for performance tracking and analysis. These technological advancements not only facilitate individual progress but also contribute to a more data-driven approach to training and skill development.

Furthermore, the study underscores the significant impact of social media platforms in promoting Taekwondo and fostering community engagement. With over half of the respondents acknowledging social media's role in raising awareness about the sport, there is a clear opportunity to leverage digital platforms for knowledge sharing, collaboration, and outreach initiatives.

Despite the promising benefits of technology, the study acknowledges challenges such as accessibility issues, particularly for athletes in underprivileged or remote areas. Addressing these barriers will be crucial in ensuring equitable access to technological resources and opportunities for all practitioners.

In conclusion, the study emphasizes the transformative potential of technology in shaping the future of Taekwondo. By embracing technological advancements judiciously and addressing associated challenges, the sport can evolve while preserving its core values and principles. Ultimately, technology holds the promise of fostering a more inclusive, efficient, and enjoyable Taekwondo experience for practitioners worldwide, paving the way for continued growth and innovation in the sport.

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CHAPTER -1

INTRODUCTION

'Taekwondo'- A South Korean Martial Arts, which fully focuses or emphasis more on kicking techniques and complemented by a substantial focus on punching techniques. What makes Taekwondo unique is its emphasis on high, fast kicks. The name itself reflects this focus: "Tae" means foot, "Kwon" means hand or fist, and "Do" means the way or path. So, Taekwondo is often translated as "the way of the foot and fist. It was established in 1950s and taekwondo stands as the one of the oldest form of martial arts globally. Taekwondo is not only a sport for self-defense but also teaches the art of promoting the idea to become a better person through consistent practice, teaches discipline to achieve something and mental discipline, respect for others and a sense of integrity and unity through the sports 'Taekwondo'. There are many young and even older people who are practicing taekwondo for personal joy and betterment of their physical health.

Back in 1959, the Korea Taekwondo Association (KTA) was formed. It's like the oldest group overseeing Taekwondo. But the big international boss in the Taekwondo world is the International Taekwon-Do Federation (ITF), started by General Choi Hong Hi. He's often called the father of Taekwondo. Taekwondo isn't just about waving hands and kicking feet randomly. It's a serious sport where people make full-on contact. Originally from Korea, Taekwondo is famous for blending cool hand and foot moves. So, it's like this awesome martial art that's all about hitting and kicking, and it got super organized by these big groups like the KTA and ITF.

Taekwondo used to be all about old-school moves, but now it's a sport where players plan their attacks and defenses. It got really popular worldwide, especially because they included it in the Olympic Games from the year 2000 in Sydney. So, it's not just a martial art; it's a big deal in global sports!

The fact that Taekwondo is in the Olympics shows that it's not just about tradition—it's also a lively and competitive sport. It is a global stage that highlights Taekwondo cultural roots and its exciting side as a sport. In Taekwondo, the main focus is on powerful kicks (strikes of the kick). The training is all about learning and mastering various kicking techniques, making it a big part of the whole deal. Taekwondo is a martial art that blends offensive and defensive strategies. It aims for a well-rounded approach to combat skills. The synthesis of these elements makes Taekwondo a holistic discipline, addressing both offensive and defensive aspects of martial prowess. With a rich history and decades of practice, Taekwondo has a lasting impact not just in Korea but globally in the martial arts community.

Being recognized as one of the oldest forms of martial arts highlights the enduring importance of its principles and techniques, which have stood the test of time. Taekwondo is essentially a blend of foot and hand techniques, forming a disciplined and strategic approach to combat that can be considered an art form. As practitioners engage with the comprehensive curriculum, they immerse themselves in a tradition that seamlessly combines offensive and defensive elements, embodying the true spirit of martial excellence.

Belts

So. belts in taekwondo are as follows –

1) White

2) Yellow

3) Green

4) Green-1

5) Blue

6) Blue-1

7) Red

8) Red-1

9) Black (Dan -1)

10) Dan-2 and above

- White belt is the beginning of any taekwondo trainee and purity of entering into new stage.
- Yellow belt is the student's knowledge in the taekwondo aspects where it begins to grow and signifies the first ray of sunlight.
- Green belt means growth of the plant, indicating the further development of skills and techniques.
- Blue Belt symbolizes the sky as the student's knowledge increases, reaching higher levels of understanding and better insights in Taekwondo.
- Red belt means advanced knowledge or techniques of taekwondo in athlete's journey. At this stage, practitioners often refine their techniques and deepen their understanding of Taekwondo principles.
- Black belt means master of taekwondo, signifies that you have a solid understanding of the fundamental techniques and principles of Taekwondo. You have mastered the basics of kicks, punches, blocks, and stances.

In India's Taekwondo community, ORF (Olympic Ranking Federation) belts are highly valued. They are earned through an athlete's performance in recognized national and international competitions. These belts signify the practitioner's skill, commitment, and success in the sport.

1.1 HISTORY

After World War II, starting from 1945, Seoul saw the creation of martial arts schools called Kwans. Skilled Korean martial artists, often with experience in Japanese and Chinese martial arts, founded these institutions. This era marked a revival of martial arts in Korea, responding to the previous suppression of native disciplines like taekkyon due to Japanization policies during Japan's colonial rule. The early architects of taekwondo, forming the cadre responsible for founding the nine original Kwans, underwent a spectrum of training experiences. Those fortunate enough to study in Japan were exposed to a repertoire of Japanese martial arts, including but not limited to karate, judo, and kendo. Simultaneously, other pioneers were immersed in the martial traditions of China and Manchuria, alongside the indigenous Korean martial art of taekkyon.

In recent years, the landscape of Taekwondo competition has undergone transformations, marked by adjustments in the arena and revisions to the competition rules. Notably, the revisions implemented in 2017, which introduced direct point additions to opponents, have shifted the emphasis towards encouraging athletes to adopt more aggressive approaches. This alteration underscores the increased significance placed on the timing of attacks, thereby raising the bar for the competitive prowess of elite Taekwondo athletes on a global scale. In competitive Taekwondo, the smart use of attacking techniques is crucial for scoring points. Athletes need to master a variety of techniques and tactics to be successful. Understanding the factors that affect competitive performance is essential. This insight helps identify areas for targeted improvement or specific training, contributing to a higher level of competition. Therefore, conducting a thorough analysis of the factors influencing Taekwondo competitive ability is essential. It's a crucial step towards raising the standards of competition in this dynamic martial art.

The discussion about the influences shaping Taekwondo early days is divided into two main views: traditionalism and revisionism. Traditionalism strongly believes that Taekwondo has deep indigenous roots, while revisionism argues that its fundamental origins are in karate. Lately, the Korean government has been actively supporting traditionalist views. Their goal is

to separate Taekwondo from historical connections to Japan, asserting Korea's cultural legacy as genuinely distinct and authentic.

HISTORY OF TAEKWONDO IN INDIA

Master Puran Andrew Gurung, after returning from Hong Kong to India he introduced taekwondo to India. He studied taekwondo under Korean Great Grand Master Lee Pyung Pal from 1969 to 1974. The first demonstration happened in Lucknow at Oudh Gymkhana Club, with help from his brothers Mike, Ram, and Lachman.

In 1975, Master Jimmy started teaching Taekwondo to the Police, Army, Railway Protection Force, and the public at Christian College in Lucknow. The Taekwondo Federation of India, or "TFI," was formed on August 2, 1976.

TAEKWONDO PREMIER LEAGUE –

As you all know that the sports is growing in India drastically and has phenomenally changed the sporting scenario positively. Taekwondo earlier was not known enough as the awareness of the sports to bring it into a global platform was somewhere lacking. But today, if you see taekwondo, the global awareness and interest of sports to play from sub junior level to senior level has increased. In 2023, taekwondo premier league (TPL) was organized for taekwondo athletes providing a golden platform to improve speed, technique, skills an attitude towards game.

1.2 FORMS

In Taekwondo, there are two main forms:

- Kyorugi
- Poomsae.

1. KYORUGI:

Kyorugi, also known as sparring, is a key aspect of Taekwondo. It involves a dynamic combat engagement between two individuals, adhering to strict rules to ensure safety and fair competition. Athletes wear protective gear equipped with sensors to register kicks and punches, facilitating an objective scoring system. In the Olympics since 2000, Kyorugi follows a protocol initiated by the central referee, and athletes are required to wear various protective gear with integrated sensors for point evaluation.

Points are recorded using an electronic scoring system, ensuring fairness across Taekwondo players worldwide.

Points are awarded based on the intensity of strikes:

1) Punch: 1 point
2) Chest guard: 2 points
3) Head kick: 3 points
4) Spinning kicks on head guard: 5 points
5) Spinning kicks on chest guard: 4 points

The match concludes after three rounds, with victory determined by knockout or accumulating more points. In case of a tie, a golden point round ensues.

Penalties (Gam Jeom) can be imposed for actions like crossing boundaries, falling down, delaying the match, holding, pushing, and more.

If the score is tied after the regular rounds, there's a special round called the Golden Point Round. In this round, the first fighter to score a point becomes the winner. It's like a tiebreaker to determine who comes out on top.

A standard Taekwondo sparring match is divided into three rounds, each lasting two minutes, and separated by a one-minute break. The winner can secure victory by either earning more points than the opponent or by achieving a knockout.

2. POOMSAE:

Poomsae refers to a set sequence of movements representing defense and attack techniques. Unlike Kyorugi, it is a performance judged on factors like technique, balance, and precision. It is a way for practitioners to demonstrate their mastery of Taekwondo's forms in a structured and artistic manner.

These sequences serve as fundamental training tools, aiming to refine and consolidate the practitioner's skills. Primarily used for basic training purposes, patterns are thoughtfully designed to enhance techniques and movements, contributing to the overall development of skills in Taekwondo training. Poomsae helps to improve body balancing and visualization (mind exercise) skills which is necessary in our day to day life. In Taekwondo, Taegeuk denotes a collection of Pumsae (alternatively known as Poomsae or Poomse), representing prescribed patterns of defense-and-attack movements utilized for instructional purposes in the teaching of Taekwondo. It enhances the taekwondo spirit and helps in cultivating techniques of self-defense more deeply. Kyorugi, as a practical application of the poomsae, manifests the Taekwondo spirit not in abstract mental philosophies documented but rather in the dynamic actions of the poomsae. Poomsae requires a lot of training for the body to adapt that posture which requires flexibility, strength, concentration, quickness, blocks and kicks strikes while performing particular poomsae. To learn poomsae it requires a lot of time for the body adaption and kyorugi (sparring) it is a practical application of poomsae, manifests the Taekwondo spirit

in the dynamic actions of the poomsae. Poomsae is such technique where your mind and body work together where it enhances your breathing control, concentration and most importantly body balance and posture which helps in bringing best performance on mats. First 8 Poomsae are the learning level for all kup grades (coloured belts) and further 9 poomsae are for the Dan grades (black belts). It is the must learning technical form for the kup and the Dan grading.

SCORING OF POOMSAE

Overall total poomsae scoring system is 10 and out of 10, where 6.0 points are for the presentation of the performance and 4.0 points are for the accuracy.

6.0 Points – Presentation (Speed, Power, Tempo, Rhythm, expression of energy, flow of the poomsae)

4.0 points – Accuracy (detailed accuracy of blocks stances and other basic technical movements and balancing)

Competition- so there are 2 forms of poomsae which are as follows-

a) Recognized poomsae (individual, pair, and group poomsae competitions) and the time limit is from 30-60seconds.

b) Freestyle poomsae (individual, pair and mixed team poomsae competitions) and the time limit is from 60-70 seconds.

The time interval between 2 poomsae should be 30-60seconds not more than that. Ring size which are mats should be 10 meters by 10 meters as per the world taekwondo guidelines.

Earlier times poomsae taekwondo form was not well known than sparring taekwondo form. But in the modern era of sports taekwondo, the inclusion of form poomsae and the importance of poomsae has developed taekwondo to the next level. It was discovered that the poomsae practice has helped the sparring athletes for correct body posture, balancing and most importantly mind calmness during bout. Hence, the inclusion of taekwondo (both forms – sparring and poomsae) in the recent 37th national games goa has groomed the athletes to the next level by giving wide range of exposure and providing a golden platform and world class experience to showcase their talent and to get identify for international competition.

THESE TWO COMPONENTS OF TAEKWONDO TRAINING ARE INTERCONNECTED:

In the realm of Taekwondo, two core components stand out: poomsae and kyorugi. Poomsae, often described as the structured forms or patterns, represent a graceful blend of defensive and offensive movements. These sequences, akin to a meticulously choreographed dance, are integral to honing a practitioner's technique, balance, and mental acuity. On the other hand, kyorugi, the sparring element, brings Taekwondo to life in dynamic combat scenarios. It's the arena where practitioners put their skills to the test, engaging in controlled combat that demands agility, strategy, and split-second decision-making.

While seemingly distinct, poomsae and kyorugi are intricately intertwined. Poomsae serves as a blueprint for technical prowess, offering a platform to understand the mechanics and applications of various techniques. This understanding becomes invaluable when transitioning to kyorugi, where practitioners draw upon their poomsae training to execute techniques with precision and efficiency. Moreover, both disciplines cultivate a profound mind-body connection, fostering mental discipline, focus, and adaptability—qualities essential for success both on and off the mat.

Ultimately, the synergy between poomsae and kyorugi is foundational to the holistic development of a Taekwondo practitioner. Each aspect complements the other, contributing to a well-rounded skill set that encompasses not just physical prowess, but also mental resilience and emotional maturity. By embracing both poomsae and kyorugi, practitioners embark on a journey of self-discovery and martial arts mastery, guided by the timeless principles of discipline, respect, and perseverance.

1.2 WORLD TAEKWONDO

World Taekwondo is the international organization that oversees and organizes Taekwondo globally, including competitions at the Olympic Games. Formerly known as the World Taekwondo Federation (WTF) until June 2017, it underwent a rebranding and now goes by the name World Taekwondo.

The decision to change the name was made to steer clear of any negative associations with the acronym "WTF" in English slang. The goal was to avoid any unintentional negative connotations and maintain a more professional and respectful image for the sport on the global stage.

World Taekwondo works together with national Taekwondo groups, governments, and other global sports organizations. They team up to bring people together, cooperate on various initiatives, and always strive to make Taekwondo better as a sport. This collaboration helps in creating unity and making continuous improvements in how Taekwondo is practiced and enjoyed around the world.

ORGANIZATIONAL STRUCTURE

1) General Assembly (GA)
2) World Taekwondo Council
3) President
4) Secretariat
5) Recognized Organizations (Continental Unions)

1) General Assembly

General assembly is basically conduction of big meeting where representatives of every country comes together every 2 years to make important decisions in terms of rules of taekwondo competitions.

2) World Taekwondo Council

Think of this group as the managers who take care of things in between the big meetings who follow the rules set by the General Assembly, manage the money, and handle day-to-day stuff and daily meetings.

3) President

President is the leader of all taekwondo and they get chosen by the countries, and their job is to guide and represent taekwondo on the world stage.

4) Secretariat

These are the people who do the daily work to keep everything running smoothly. They follow the rules and decisions made by the Council and the General Assembly.

5) Recognized Organizations

Besides the main group, there are other organizations like Continental Unions. These groups are authorized by the big taekwondo meeting to work in different regions. They help spread and organize taekwondo activities in those areas. They help to manage overall taekwondo activities in a systematic or orderly way.

So basically it's a team effort which helps in bringing a total success in the taekwondo activities world widely. It helps in organising a smooth structure of activities going on in those areas. Team work has helped in the smooth functioning and execution of the process. Big team effort

with meetings, leaders, managers, and regional groups, all working together to make taekwondo happen around the world.

KUKKIWON

Kukkiwon, headquarter of world taekwondo academy which was officially named on 6th February 1973. It is under supervised by International Sports Division of the Ministry of Culture, sports and tourism and officially governed by South Korean government. It is the home of the world taekwondo. In May 1973, the KTA- Korean taekwondo association and kukkiwon hosted the very first world championship with approx. 200 competitors of 17 countries. And from September 1974 then, kukkiwon has a permanent team of taekwondo demonstration.

Kukkiwon acts as the guardian of Taekwondo authenticity and excellence. It ensures that the teachings and practices of Taekwondo remain consistent and of high quality, contributing to the strength and unity of the global Taekwondo community. Kukkiwon serves as a support system for the global Taekwondo community. It provides resources, guidance, and a sense of unity to practitioners, instructors, and organizations involved in the martial art.

1.4 TAEKWONDO FEDERATION OF INDIA (TFI)

The Union Ministry of Youth Affairs and Sports officially recognized the TFI as the national governing body for taekwondo in 1988.TFI, National governing body of India. It is responsible to organization management and conduct of national federation championship in India which is conduct with every academic year. This championship helps for talent identification in India so that the athletes can prepare for international championship. They keep national camp for the training of the athletes under professional coaching system.

Each state has its own federation such as taekwondo association of Maharashtra (TAM) to conduct state championships for the selection of the athletes for nationals which is conducted by taekwondo federation of India. Its motive is to up bring talent pool from grassroots level and train the athletes for the bright future of India in future of taekwondo.

In general, national Taekwondo federations, including the Taekwondo Federation of India, play a crucial role in governing and promoting the sport within their respective countries. They are responsible for organizing competitions, overseeing training and development programs, and ensuring that Taekwondo is practiced in accordance with international standards, often set by organizations like Kukkiwon and World Taekwondo.

Each year, TFI organize six National Championships catering to different age groups, namely Sub-Junior, Cadet, Junior, and senior categories. This includes hosting a National Open Championship and a National Inter-Zonal Championship, determined through Zonal Championships. In addition to these championships, they actively conduct various national-level events such as Coaches Seminars, Referees Seminars, and other related activities to enhance the overall development and quality of Taekwondo in our region.

1.5 TRADITIONAL TAEKWONDO VS. MODERN TAEKWONDO (OLD SCHOOL VS. NEW SCHOOL OF TAEKWONDO)

Traditional school, a period where technology growth has not taken place yet and the scenario of fighting was deeply rooted into combination kicks with more intense power way in combat situations. It is often utilizes more on customary patterns, hand movement and techniques. Old taekwondo was totally focused on real world situations and provides a holistic approach to martial arts.

Traditional taekwondo placed more importance on practicing for the forms known as 'poomsae'. The biggest disadvantage was the limited sporting culture of taekwondo as it was not given more emphasis on sports competitions of taekwondo to up bring the sports ,includes sparring (kyorugi).

In traditional Taekwondo, there is a pronounced emphasis on cultivating not only physical prowess but also the development of essential character traits.

The martial art is deeply rooted in a philosophy guided by five fundamental aspects:

1) Courtesy

2) Integrity,

3) Perseverance,

4) Self-control,

5) And indomitable spirit.

These core principles serve as the moral and ethical foundation of Taekwondo practice, emphasizing values such as respect, honesty, resilience, self-restraint, and an unwavering determination to overcome challenges. The integration of these aspects into training gives a

holistic nature of traditional Taekwondo, emphasis mere physical techniques to instill a profound sense of character, unity, discipline, and respect within practitioners.

In the evolution of old Taekwondo, the modern school of the martial art has developed elements of sport and self-defense. However, the essence of the "old school" of Taekwondo stands as a stepping stone upon which the discipline was established. It focuses on not only the fundamental techniques but also the deeply rooted values that have shaped Taekwondo into the multifaceted discipline were we recognize it today. This traditional foundation serves as a stepping stone and preserves the very core principles and cultural richness in Taekwondo practices.

MODERN TAEKWONDO

Contemporary Taekwondo outlets both dual identity, seamlessly blending its traditional exposure in self-defense with a modernized emphasis on sports. Its debut at the 1988 Summer Olympics in Seoul, South Korea, marked a pivotal moment, showcasing Taekwondo as a demonstration sport on the global worldwide stage. This inclusion was reiterated at the 1992 Summer Olympics in Barcelona, Spain. The mixture of its traditional foundations and its recognition within the Olympic context underscores Taekwondo dynamic evolution in development of sports on a very global platform, enhancing athlete's excellence in sports taekwondo.

In taekwondo competition in modern world, electronic scoring system (ESS) adaptation has enhanced taekwondo more smoothly and efficiently. Within this framework, sensors have played a crucial role into competitors' protective gear which helps in identifying and validating strikes. This introduction of sensors into protection gears has diminished the dependency on subjective judgments, enhancing more precisely into upbringing athlete's performance level and evaluation of competitor's performance. Coaches and athletes have integrated video analysis tool during training sessions and even video replay system which serves as a valuable tool for reviewing and scrutinizing techniques employed during practice and competitions. The motion capture technology has helped to examine the movement's patterns of the body helping practitioner to get deeper understanding. This detailed analysis not only aids in refining form

of the athlete but also contributes to an overall enhancement of athletic performance. Virtual reality (VR) and augmented reality (AR) has enhanced more exposure to the training methodology. It helps to stimulate sparring scenarios, improving reaction time and reflex actions which helps to improve strategic decision making.

Even technology has groomed so much that athletes in today's world have wearable devices which helps to monitor various aspects of performance including heart rate, impact force during training which helps in optimizing training regiments and preventing injuries. In the evolving development, certain equipment has undergone a technological transformation. There are now smart kicking pads equipped with advanced technology. These innovations has helped the athletes to give real time feedback to athletes about the accuracy of kicking strikes. The incorporation of this technology functions as a valuable asset, empowering athletes with the ability to promptly evaluate the efficacy and accuracy of their techniques. This immediate feedback not only deeper their understanding of performance but also facilitates a more informed and adaptable training approach helps in the development of athletes performance. It helps to provide insight immersive learning experience

In the context of a typical Taekwondo match, athletes routinely employ repetitive defensive and offensive kinetic patterns, demanding a combination of muscle precision, strength, and power. Enhancing an athlete's technique in this dynamic setting necessitates the meticulous monitoring of punches and kicks under actual game conditions. In sports science research, various tests and instruments are utilized to measure performance, encompassing contact mats, accelerometers, force plates, and video analysis. For instance, in martial arts, the estimation of kick forces often involves the application of a 3D accelerometer, airbag force transducers, and kinematic analysis. While these tools offer precise evaluations within controlled laboratory environments, their limitations, such as high cost and lack of portability, restrict their practical application.

Consequently, there has been a concerted effort to develop body-wearable sensor systems, addressing issues of cost and portability. Wearable computing devices have become instrumental in research on humane machine interaction. Advancements in artificial bioinspired electronic skin (e-skin) aim to detect applied pressure directions, particularly

relevant in robotics applications. Moreover, the integration of wearable sensors into soft materials holds significant promise in healthcare applications.

In the realm of sports science and applications, diverse approaches leverage inertial sensors, marking a significant trend in the use of wearable technology. This interdisciplinary exploration underscores the pivotal role of wearable sensor systems in enhancing performance assessment, biomechanical analysis, and overall advancements in athletic training and sports science.

In summary, the contrast between traditional and modern Taekwondo reveals a dynamic transformation within the martial art. Traditional Taekwondo, deeply rooted in cultural and historical practices, which gives more importance to customary patterns, hand movements, and techniques, fostering a relatable connection to cultural heritage.

Whereas modern Taekwondo has evolved to embrace technological advancements, within equipment's and standardized competition rules and self-defense fitness. While traditional Taekwondo gives limelight to cultural heritage of the discipline, modern Taekwondo adapts to meet the evolving needs and preferences of practitioners in the modern era. The inclusion of Taekwondo in the Olympic Games serves as a powerful affirmation acceptance to its global recognition and as a competitive sport on the global stage.

The coexistence of traditional and modern Taekwondo training methodologies significantly contributes to the continuous evolution and enrichment of this martial art. Each approach presents distinct advantages and perspectives that cater to the diverse needs and preferences of practitioners. The decision to embrace traditional or modern training methods is often contingent upon individual goals, personal preferences, and the strategic orientation of the training institution.

While embracing technological advancements, it is crucial to maintain a delicate balance, preserving the essence of traditional values in Taekwondo.

As the martial art continues to evolve, incorporation of technology ensures that it remains relevant, engaging, and adaptable to the ever-changing needs of athletes in a technologically world era. In essence, the marriage of tradition and technology in Taekwondo not only elevates the sport's competitiveness but also fosters a dynamic and inclusive environment for

practitioners to thrive. As technology continues to advance, its role in Taekwondo is poised to grow, shaping the future of this martial art in innovative and exciting ways.

EFFECTIVENESS OF TECHNOLOGY IN TAEKWONDO

Technology has brought some really cool changes to Taekwondo! Now, people can use their phones or computers to watch videos and learn new moves from anywhere. There are also special gadgets and apps that help athletes and coaches look at how they do kicks and moves, so they can get even better.

In competitions, we don't rely on people with paper and pens to score anymore. There are special sensors in the gear that the athletes wear, and these sensors can tell when someone makes a good hit. This makes scoring fair and quick. Some athletes even use fancy devices like smart watches to keep track of how fit and healthy they are. Coaches can use this information to plan the best training for each person and help them avoid injuries. Also, there are cool virtual reality and augmented reality things that make training more fun and realistic. It's like playing a video game, but it helps you become a better Taekwondo athlete.

Technology is really important in making sure that athletes in sports, like Taekwondo, play fair. There are smart ways to test for banned substances that might give someone an unfair advantage. These advanced methods help catch anyone trying to cheat and make sure everyone has the same chance to win. So, technology is like a superhero in keeping sports fair and square.

Electronic scoring systems have replaced traditional manual scoring in Taekwondo competitions. Sensors in athletes' protective gear detect accurate and precise contact, ensuring fair and unbiased scoring. This technology has not only improved the accuracy of judging but has also enhanced the spectator experience by providing real-time scoring updates.

Fancy tools like motion sensors and special computer programs have changed how we look at how people do in sports, like Taekwondo. Athletes and coaches can now look very closely at

how someone moves, kicks, and stands. This helps them find ways to get even better by figuring out what needs improvement. So, it's like having a super-smart assistant that helps athletes and coaches train smarter and perform better!

And hence, integration of technology in taekwondo has definitely enhanced various aspects of the sport. From training and skill development to performance analysis, scoring systems, and global connectivity, technology continues to play a crucial role in shaping the present and future of Taekwondo. As innovations continue to emerge rapidly, the effectiveness of technology in the martial art is likely to evolve and expand further surely.

Technology serves as a vital tool in fostering communication and collaboration within the global Taekwondo community. Online forums, social media platforms, and communication applications provide a platform for practitioners, coaches, and enthusiasts to exchange knowledge, share experiences, and offer insights. This interconnected network significantly contributes to the worldwide growth and development of Taekwondo. The seamless exchange of information and ideas across borders facilitates a collaborative and synergistic approach to advancing the discipline on a global scale.

In Taekwondo training, introduction of Virtual Reality (VR) and Augmented Reality (AR) technologies to make the experience more interactive and realistic. Virtual training environments create scenarios that feel like real-life situations. This helps practitioners improve their reaction times, be more aware of their surroundings, and make better decisions during training. This technology-driven method makes training sessions not only more effective but also more interesting and engaging. It's like bringing a high-tech twist to traditional training to make it better and more enjoyable.

Thanks to technology, Taekwondo practitioners can now access training materials from anywhere through virtual platforms and instructional videos. Online tutorials, video analysis tools, and mobile applications provide personalized guidance, allowing individuals to improve their techniques, learn new forms, and enhance their overall skills. This modern approach to

training ensures accessibility and personalized learning, making it easier for practitioners to develop and refine their abilities at their own pace and convenience.

To sum it up, technology has brought positive changes to Taekwondo. It allows people to learn and practice the sport from different places, thanks to online tutorials and virtual platforms. In competitions, electronic scoring systems have replaced traditional methods, ensuring fair and accurate results. Smart devices, like fitness trackers, help athletes stay fit, while advanced tools analyze movements, assisting in targeted and effective training.

Moreover, technology connects Taekwondo enthusiasts globally through forums and social media, creating a community that shares knowledge and experiences. This interconnectedness contributes to the continuous growth and development of Taekwondo on an international scale. As technology continues to advance, Taekwondo is poised to benefit even more, making the sport more accessible, engaging, and effective for practitioners worldwide.

In a nutshell, technology has made Taekwondo better in many ways. It helps people learn and train from anywhere, improves scoring in competitions, and even keeps athletes healthy. Smart tools also analyze movements, making training more effective. Plus, technology connects Taekwondo enthusiasts worldwide, creating a global community. As technology keeps evolving, Taekwondo is set to become even more awesome!

In summary, technology has brought substantial changes to Taekwondo. benefiting both practitioners and the community. Electronic scoring systems make competitions more accurate and more fair game and online resources help with learning and training. Technology has become a crucial tool, making Taekwondo more dynamic and accessible for everyone involved. including practitioners and coaches. Promoting taekwondo in a positive way in the technological advanced era world.

In Taekwondo, we're not just talking about kicks and punches. It's like a special way of learning and growing. As we go on, we'll find out where it comes from, what it believes in, and how it's changed over time. Come along as we explore the cool world of Taekwondo, where you not only learn to defend yourself but also become a better person. Let's jump into the journey of Taekwondo, where strength meets wisdom.

CHAPTER - 2

2 REVIEW OF LITERATURE

WHAT IS REVIEW OF LITERATURE?

A "review of literature" means taking a close look at all the scholarly works, research articles, books, and other published stuff about a particular topic. It's like gathering and summarizing all the important information already out there to understand what's known about the subject. This helps to see the bigger picture and figure out what questions still need answers. It helps to provide existing information of available literature study and survey related to the subject. Literature review means critical evaluation and helps in understanding insights existing research and debates relevant to your subject and helps to enhance or build the knowledge in your field. At the end of literature review, hyperlink is posted so as to direct the reader if they want to read the original content.

M.A. Godik (1982), the study shows that how martial artists control and engage in competitions is closely connected to the size, variety, and effectiveness of their offensive and defensive moves. The researchers recorded and studied the activities in three major national martial arts competitions, and then used computer technology to process the collected data. The analysis highlighted that kicking techniques were central to these competitions, making up the entire set of moves (100%). Specifically, kicks to the body with hands constituted 2.1%, kicks to the body with legs were prominent at 82.3%, and kicks to the head with legs were at 15.6%. Interestingly, when it comes to striking techniques, hits to the body with hands were minimal at 2.1%, while hits with legs dominated significantly at 97.9%. This information provides insights into the main approaches and tactics used in these martial arts competitions.

Davis's (1989), studied technology acceptance model into how people, like spectators, athletes, and coaches, felt about using technology during the 2010 US Open Taekwondo Championship. They did a survey and interviews. and the results showed that people thought the technology was useful and enjoyable. This made them have a positive attitude and be more likely to use it again. The study gives us important information about what factors affect how people accept and use technology in the context of the Taekwondo Championship in 2010.

Bartlett (1997), has put forth a critique, highlighting a perceived deficiency in many performance-oriented sports biomechanics studies. According to Bartlett, a substantial portion of this research lacks a robust theoretical foundation and frequently omits references to critical elements such as motor control theory, universal biomechanical principles, or the fundamental laws of physics governing human movement.

Heidegger (1998), presents a thought-provoking viewpoint regarding technology, suggesting that it operates as a transformative cultural system with the power to fundamentally alter the entire social framework. positioning itself as an entity to be controlled. According to

Heidegger's theories, technology goes beyond being a simple tool; it forms an intricate system that profoundly impacts society. This pervasive influence extends across all aspects of the social landscape, gradually replacing existing non-technological structures and shaping the entirety of social life.

Feenberg (1999), advocates for the advancement of a more critical theory of technology, aligning with the broader framework of critical theory. Within this paradigm, technology is not perceived as a static entity in the conventional sense, but rather as an inherently "ambivalent" process of development, existing in a state of suspension between various potentialities. The concept of ambivalence in technology, as articulated by critical theory, distinguishes itself from neutrality by ascribing a significant role to social values not only in the utilization but also in the design of technical systems.

Bass (2009), the connection between technology and sports has become increasingly intricate over the years. On one side, technology is seen as essential, especially in sports like motorsport where it's deeply ingrained in the nature of the activity. On the flip side, it acts as a tool for enhancing performance in various sports. This complex interplay is evident through innovations in gear, progress in wearable tech, cutting-edge facilities, and changes in media broadcasting and performance analysis. The dynamic relationship between technology and sports keeps evolving, influencing how athletes compete and how sports are both experienced and analyzed.

Sun, J. (2020 October) highlighted the need for a change in traditional teaching methods in Taekwondo. He emphasized the importance of using multimedia technology to improve instruction. By incorporating multimedia tools, teaching becomes more dynamic and interesting for students. This approach helps students better understand the fundamental movements in a lively and intuitive way, fostering a deeper comprehension of essential actions. Additionally, it empowers students to master key technical elements, enhancing their development of crucial motor skills necessary for proficiency in Taekwondo.

Meuter et al (2000), delved into Technology-Based Service Systems (TBSS), which include various interfaces like telephone/interactive response, online/internet platforms, and interactive kiosks. Taekwondo academies have embraced TBSS by utilizing channels such as social media and online applications. This is done to create connections between martial arts masters, children practicing Taekwondo, and their parents. Additionally, TBSS is used to provide extra services, such as sending text messages when children enter the Taekwondo academy. This approach aims to build trust and confidence among parents involved in their children's Taekwondo activities.

Glazier (2002), suggested that dynamical systems theory is a relevant and valuable theoretical framework for research in sports biomechanics, especially concerning performance. This approach brings an interdisciplinary perspective, particularly helpful in understanding how coordination and control work within the human motor system. The idea is that dynamical systems theory offers a comprehensive lens for exploring and analyzing the complexities involved in Human motor performance within the realm of sports biomechanics research.

Parnabas, V (2015), seeks to understand how Taekwondo athletes utilize mental imagery. Essentially, we want to explore how athletes at various levels, including national, state, district, and university ranks, incorporate mental imagery into their sports performance. Additionally, the study aims to assess the impact of different types of mental imagery—both internal and external—on the performance of Taekwondo athletes. By doing so, we intend to pinpoint the most effective mental practices that significantly enhance athletes' overall performances.

Sprey (2016), talks about how tools can make martial arts training better by improving athletes' striking speed and precision. This shows that training methods in martial arts are changing. People have different opinions on whether traditional or new methods are better for taekwondo training. The ongoing conversation also looks at things like task conditions, planning strategies,

and smart use of training tools. All of this shows that martial arts training is always adapting and changing to be the best it can be.

Petrovic, K. (2017), aimed to explore whether practicing Taekwondo, a Korean martial art, could help undergraduate students manage stress. The unique approach focused on helping students from various disciplines at a city university achieve emotional balance, inner peace, and overall well-being in their body, mind, and spirit. This research, which is the first of its kind, brought together insights from higher education, human development, psychology, nursing, sociology, and the philosophy of Taekwondo.

We invited ten undergraduate students to participate, and eight agreed to join from various academic backgrounds. The study was open to all undergraduates at the university. We used a research method called phenomenology to identify common themes in the experiences of these students dealing with stress. Through this approach, we discovered new insights into how practicing Taekwondo helped these students overcome stress, leading to improved health and well-being in their body, mind, and spirit.

Gutiérrez-Santiago (2020), the goal of this study is to uncover and examine the specific actions and strategies that lead to scoring points in taekwondo matches. We focused on 209 scoring moves within the male category, specifically those weighing less than 68 kg, and observed them on the international stage. To thoroughly understand these moves, we employed various analytical methods, including traditional statistics, the identification of T-Patterns (sequential patterns of actions), consecutive delays, and polar coordinates. What sets our study apart is that while previous research in taekwondo primarily focused on technical analysis, we took a more comprehensive approach. By utilizing a combination of statistical techniques and pattern recognition, we aimed to provide a deeper insight into the intricate technical and tactical aspects of scoring in taekwondo competitions, particularly in the specified weight category and competitive setting.

Rosendahl (2021) suggested a new approach by using 360° videos to teach predefined movement sequences in sports taekwondo poomsae form. Despite advancements in this technology, there's a lack of detailed analysis on how 360° videos specifically support teaching and learning in martial arts. While there's some research on interactive technologies, there hasn't been a thorough exploration of the potential use of 360° videos in martial arts education. This area represents an untapped opportunity in current scholarly discussions.

Chen, H. (2022) aimed to use smart Internet of Things (IoT) technology to thoroughly analyze the factors influencing the competitive skills of Taekwondo athletes. The focus was on three crucial aspects: psychological ability, technical proficiency, and tactical acumen. The goal was to create a strong model that captures the overall competitive ability of Taekwondo athletes. This model incorporates intelligent IoT technology for real-time monitoring and assessment of relevant indicators, ensuring an effective construction of the model. The study's results highlight the success of the competitive ability model for Taekwondo athletes, which integrates psychological, technical, and tactical dimensions.

YÜKSEK, S. (2023) introduced the Taekwondo Performance Protocol (TPP) as a tool for assessing taekwondo-specific speed and quickness performance. The study involved 79 active athletes, at least at the 1st kup level (red to black belt). Through reliability calculations and validity assessments comparing TPP with various performance measures, such as agility, sprint, jump, and anaerobic power, the study aimed to determine TPP's effectiveness in differentiating athletes across performance levels. The results showed that TPP is highly reliable, has moderate associations with key performance measures, and is effective in distinguishing athletes of varying performance levels. In conclusion, TPP emerges as an economical, simple, reliable, and valid test tailored specifically for assessing taekwondo performance.

Hoang, T. T (2023), developed a method for evaluating Taekwondo Poomsae performance by employing a set of choreographed training movements. Despite recent advancements in 3D human pose estimation (HPE), analyzing human actions, particularly in Taekwondo Poomsae, poses challenges. This difficulty arises from the lack of time-synchronized data and the need to compare postures, rather than relying solely on joint locations due to variations in human body shapes.To overcome these challenges, our approach involves decomposing the representation of human joints into joint rotation (posture) and limb length (body shape). We then synchronize the comparison between test and reference pose sequences using Dynamic Time Warping (DTW) and compare pose angles for each joint. Our experimental results demonstrate the effectiveness of our method in synchronizing test action sequences with reference sequences. Additionally, it reveals a significant performance gap between practitioners and professionals.

Silva, T. (2023), the comprehension of critical metrics such as speed and force in specific movements is imperative for both athletes and coaches. In the context of Taekwondo, a sport that places emphasis on attributes like strength, speed, and acceleration, obtaining precise data becomes paramount. Analysing characteristic techniques, such as the execution of Miryio Tchagui—a foot movement designed to create distance from the opponent—requires rigorous examination to derive meaningful insights. This study holds a direct correlation with User Experience (UX) Design and User Interface (UI) Design, as it delves into the principles of human perception derived from real-world information, akin to the way users assimilate information within an interface. Beyond the realm of design, this methodology extends its relevance to both data structuring and Taekwondo. Misinterpreting the nuances of a movement or technique can adversely impact the strength and acceleration of a Taekwondo athlete.

Moreover, the principles highlighted in this study find practical application in gamification—a field centered on game development. Games leverage mental capacity and quick thinking, necessitating a profound understanding of visual and theoretical elements. Therefore, the insights gained from the analysis of human perception have implications not only in design but also in optimizing performance and comprehension in disciplines like Taekwondo and gamified activities.

CHAPTER – 3

RESEARCH METHODOLOGY

3.1 WHAT IS RESEARCH?

Research is a methodical exploration, examination, and understanding of information to deepen knowledge about a specific topic or occurrence. It entails collecting, analyzing, and interpreting data to derive conclusions and sharing findings with others. Research spans across diverse fields like science, social sciences, humanities, business, and technology. It follows an inquiry process to address particular inquiries or challenges using dependable methods. Ultimately, research endeavors to generate fresh insights and understanding, aiding in better comprehension of our surroundings and guiding decision-making processes.

TYPES OF RESEARCH

- **Descriptive vs. Analytical**
- **Applied vs. Fundamental**
- **Qualitative vs. Quantitative**
- **Conceptual vs. Empirical**

1. **Descriptive vs. Analytical**

   Descriptive research focuses on describing the characteristics or properties of a phenomenon or population. It aims to answer questions about what, where, when, and how something happens, without delving into the reasons behind it. Descriptive research typically involves gathering data through observations, surveys, or archival records, and then organizing and summarizing this data using statistical measures or graphical representations. Analytical research, on the other hand, goes beyond mere description to examine the underlying causes, relationships, or patterns within a phenomenon. It aims to answer questions about why and how something happens by investigating the relationships between variables and testing hypotheses. Analytical research often involves data analysis using statistical techniques, experiments, or theoretical models to uncover patterns, identify trends, or establish causal relationships.

2. **Applied vs. Fundamental**

   Applied research is conducted to address specific practical problems or to solve real-world issues. It aims to produce solutions, innovations, or interventions that can be directly applied to improve existing processes, products, or practices. Applied research often involves collaboration with industry partners, policymakers, or other stakeholders to ensure that the findings have immediate relevance and applicability. Fundamental research, also known as basic or pure research, is driven by the quest for knowledge and understanding without any immediate practical application. It aims to expand our theoretical understanding of phenomena, explore fundamental principles, or uncover new insights into the natural world. Fundamental research is often curiosity-driven and may not have direct, immediate practical implications.

3. **Qualitative vs. Quantitative**

Qualitative research focuses on exploring and understanding complex phenomena through in-depth examination of non-numerical data such as words, images, or observations. It emphasizes subjective experiences, meanings, and interpretations, aiming to provide rich, detailed insights into the underlying motivations, perceptions, and behaviours of individuals or groups. Quantitative research involves the collection and analysis of numerical data to understand phenomena, establish patterns, and test hypotheses. It relies on statistical methods for data analysis and often involves surveys, experiments, or observational studies with structured data collection instruments.

4. **Conceptual vs. Empirical**

Conceptual research focuses on the development or refinement of theoretical frameworks, concepts, or models without necessarily involving empirical data collection or analysis. It aims to explore abstract ideas, theoretical constructs, or philosophical concepts, often through literature review, conceptual analysis, or theoretical synthesis. Empirical research involves the collection and analysis of data to test hypotheses, evaluate theories, or answer research questions. It relies on empirical evidence derived from observation or experimentation to draw conclusions and make inferences about the phenomena under investigation.

3.2 SIGNIFICANCE OF STUDY:

The significance of the study lies in its contribution to the intersection of sports management and technology integration within Taekwondo. By evaluating the effectiveness of technology in training and competition, the study enhances athlete development, improves performance outcomes, and fosters fairness in competitive environments. This research serves as a valuable resource for optimizing training methodologies and advancing the integration of technology in Taekwondo practices.

3.2.1 NATURE:

This study takes a DESCRIPTIVE approach, which means it breaks down the topic of technology in Taekwondo into smaller, clear parts. It's like zooming in on details to understand them better. By doing this, the study aims to find new ideas and solutions related to using technology in Taekwondo, making it easier to grasp and apply in practice.

3.3 RESEARCH PROBLEM-

This research checks if sensor scoring technology in Taekwondo makes things fair by removing bias from judges.

RESEARCH OBJECTIVE:-

- **Objective 1:-** To determine if using sensor systems in Taekwondo competitions is better at keeping scores right compared to the old way of scoring by hand.
    - The objective aims to investigate whether employing sensor technology in Taekwondo competitions enhances the precision and fairness of scoring in comparison to the conventional method of manually recording scores. This involves evaluating the effectiveness of sensor systems in accurately detecting and registering scoring actions during matches, such as kicks and punches, and determining whether they provide a more reliable and consistent means of determining winners and losers in Taekwondo contests.
- **Objective 2:-** To explore the viewpoints and insights of Taekwondo athletes and coaches regarding the effectiveness of technology.
    - This objective involves seeking input from Taekwondo practitioners to understand their views on how technology, like sensor systems, impacts training and competition. By gathering their insights, we aim to gain a clearer understanding of the practical benefits and challenges associated with using technology in Taekwondo.

3.4 RESEARCH HYPOTHESIS

1) Null Hypothesis (H0):

- The introduction of technology does not significantly impact Taekwondo competition results compared to traditional methods.

Alternative Hypothesis (H1):

- The introduction of technology significantly improves Taekwondo competition results, ensuring a fair evaluation than traditional methods.
    - ➢ This study aims to assess how technology influences Taekwondo competition outcomes. The null hypothesis states that there's no significant contrast in competition results when comparing traditional methods with technology integration. Conversely, the alternative hypothesis suggests that technology does make a difference, resulting in improved competition outcomes. This research is crucial for evaluating whether technology enhances fairness and accuracy in Taekwondo competitions.

2) Null Hypothesis (H0):

- Online Taekwondo classes and videos don't make training easier compared to going to regular classes in person.

Alternative Hypothesis (H1):

- Online Taekwondo classes and videos make training much easier than regular classes in person.
    - ➢ This study compares online Taekwondo classes and videos to traditiona', in-person classes. The null hypothesis indicates that there's no notable distinction in training ease between these approaches. Conversely, the alternative hypothesis proposes that online classes and videos provide a significant advantage in training ease over attending in-person classes. This research is essential for evaluating the viability and advantages of remote learning in Taekwondo training.

3) Null Hypothesis (H0):

- There is no significant difference in skill development between Taekwondo athletes using video analysis tools and those relying solely on traditional feedback methods.

Alternative Hypothesis (H1):

- Taekwondo practitioners utilizing video analysis tools show a significantly higher rate of skill development compared to those relying solely on traditional feedback methods.
    - ➢ This pair of hypotheses explores how video analysis tools affect skill development in Taekwondo. The null hypothesis implies that there's no significant difference in skill improvement between athletes using video analysis tools and those relying solely on traditional feedback methods. Conversely, the alternative hypothesis suggests that practitioners using video analysis tools witness a notable increase in skill development compared to those who don't. This study is crucial for assessing the effectiveness of integrating technological tools to enhance skill acquisition and improvement in Taekwondo training programs.

3.5 SCOPE OF THE STUDY –

The study focuses on assessing the utilization and impact of technology in Taekwondo training and competition contexts. It includes an analysis of various technological advancements such as sensor scoring systems, video analysis tools, virtual reality training, and wearable devices. The scope also encompasses athletes' perceptions, attitudes, and experiences regarding the adoption of these technologies, as well as their implications for fairness, performance enhancement, and overall training effectiveness.

3.6 LIMITATION-

Limitations of the study include potential bias towards male athletes, focusing primarily on seniors and overlooking juniors and cadets. Reliance on self-reported data may introduce biases, while limited accessibility to technology may exclude insights from underprivileged athletes. Geographical restrictions and temporal constraints further limit the study's scope and generalizability. Addressing these limitations is crucial for ensuring the study's reliability and relevance in informing Taekwondo practices and policies.

3.7 SAMPLE DESIGN AND SIZE

For this research project. a descriptive survey design is employed. The method of judgment and convenience sampling will be used to gather data regarding people's views and opinions. This approach is chosen because we aim to investigate traditional or technological development in taekwondo preferences, age, category or other variations regarding technological development in taekwondo through respondents. To conduct this research, a structured questionnaire is prepared, and a sample of 92 users, including taekwondo athletes and coaches, is taken into consideration.

3.8 DATA COLLECTION

To fulfill the requirements of the study and gather comprehensive information regarding the extent of awareness and people's perceptions regarding effectiveness of technology in taekwondo, a close-ended survey was employed for the collection of primary data.

The study is totally focused on effectiveness of technology in taekwondo.

Secondary data was gathered through various websites by conducting internet searches and through coach guidance.

SOURCES OF DATA:

The following methods were utilized to gather data:

1) **Primary Data**
2) **Secondary Data**

PRIMARY DATA

In assessing the effectiveness of technology in Taekwondo, the study employed a structured approach. Data collection primarily centered on the impact and utilization of technological advancements within the realm of Taekwondo training and competition. Various methods, including surveys and interviews, were utilized to gather insights from athletes, coaches, and stakeholders. The analysis focused on evaluating the role of technology in enhancing training methodologies, improving performance, and ensuring fairness in competitions. Through systematic examination and interpretation of the collected data, the study aimed to provide comprehensive insights into the efficacy of technology in advancing the practice and standards of Taekwondo.

SECONDARY DATA

Secondary data pertaining to the utilization and effects of technology in Taekwondo training and competition is gathered from diverse online sources, including academic journals, reputable websites, conference proceedings, and reports published by sports organizations. These digital repositories provide valuable insights into the trends, challenges, and advancements in technology integration within the Taekwondo community. By synthesizing information from these sources, the study aims to augment its understanding of the multifaceted impacts of technology on Taekwondo practices and athlete performance.

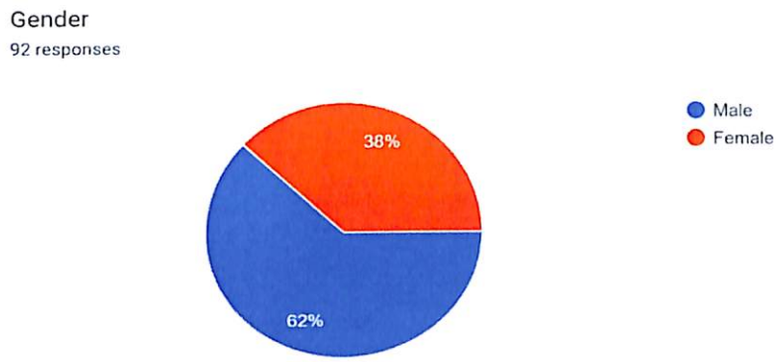
3.9 TOOLS AND TECHNIQUES OF ANALYSIS:

The collected data will be analyzed using statistical techniques, such as bar graphs and pie charts, to extract meaningful insights and trends.

CHAPTER – 4

DATA ANALYSIS AND INTERPRETATION

1) **Gender**
   - **Male**
   - **Female**



Gender	Number of Responses
Male	**57**
Female	**35**

Objective –

The purpose of asking this question is to find out the % of female as well as male differently who participated in this survey for easy interpretation of data.

Primary analysis

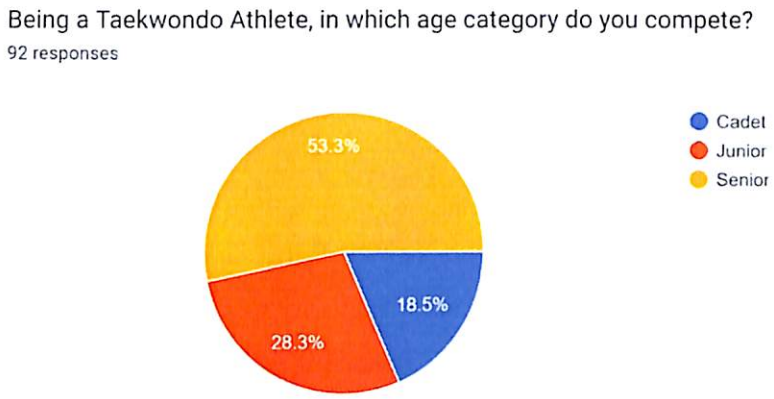
The above chart states that the most number of respondent are male audience with 62% while female with 38.0%. There are

- 57 males respondents
- 35 female respondents

  Out of total 92 people who have participated and filled the survey form.

2) **Being a Taekwondo Athlete, in which age category do you compete?**

- **Cadet**
- **Junior**
- **Senior**



Age category	Count
Cadet	**17**
Junior	**26**
Senior	**49**

Objective

The purpose of asking this question is to find out taekwondo athletes age category in which they compete. (Cadet, junior, senior)

Primary analysis

The above chart clearly stated that most respondent (taekwondo athletes) are into senior category (18 and above). Second most respondents are into junior category (14-17yrs) and least respondents are into cadet category (12-14yrs).

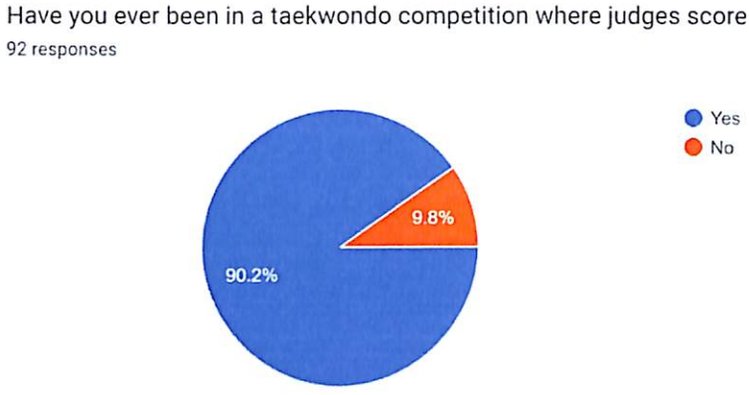
The above data interprets that total audience of

- Cadet taekwondo athletes are 17 with a percentage of 18.5%
- Junior taekwondo athletes are 26 with a percentage of 28.5%
- Senior taekwondo athletes are 49 with a percentage of 53.3%

  Out of total 92 respondents who have actively participated in this survey.

3) **Have you ever been in a taekwondo competition where judges score manually?**

- **Yes**
- **No**



Yes	**83**
No	**9**

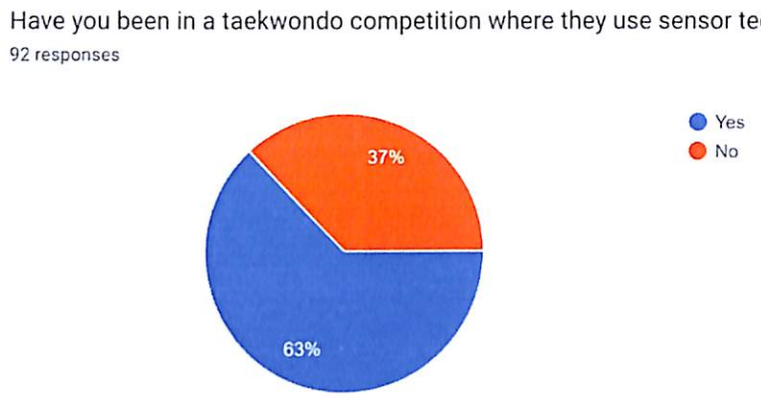
Objective

The purpose of asking this question is to find out the number of taekwondo athletes who have competed in the manual scoring system taekwondo competition.

Primary analysis

The above chart interprets that mostly everyone has participated or have experience in the manual scoring system done by judges. It states that out of 92 people 83 people have participated in the manual scoring with a % of 90.2% and only 9 audience has not participated earlier in the traditional means of taekwondo with a % of 9.8% out of total 92 taekwondo athletes participated in this survey. This question was asked to know more about the athletes if they are adapting to technological world or still this respondents prefer traditional manual scoring means of methods.

4) **Have you been in a taekwondo competition where they use sensor technology?**
   - **Yes**
   - **No**



Yes	**58**
No	**34**

Objective –

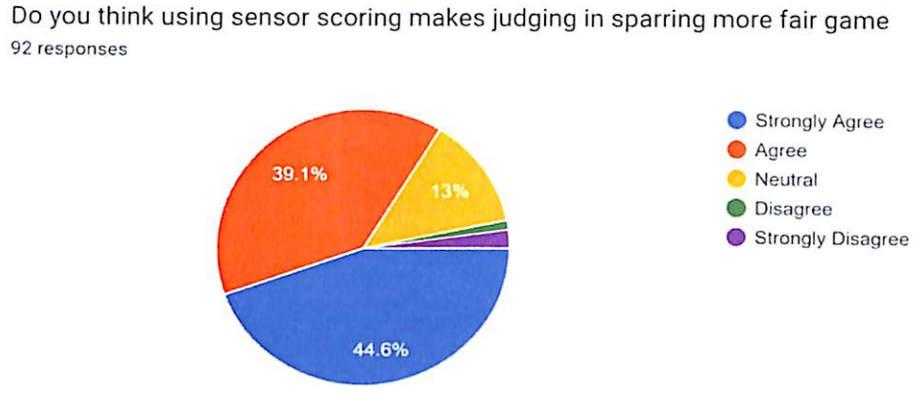
This question was asked to find out how many taekwondo athletes have competed in taekwondo competition where sensor scoring technology is used.

Primary analysis –

The above data states that almost half of the people who have participated in this survey are experienced for sensor technology game. Another 37% of audience are not yet exposed to sensor game but they have the idea of how technological game in taekwondo works in bout. This will help us to have more insight about technology from taekwondo athletes. The above graph states that –

1) 63% of audience i.e. 58, are experienced to technological sensor game.
2) 37% of audience i.e. 34 are manual scoring experienced players. They have the insight idea of how it works in competition.

5) Do you think using sensor scoring makes judging in sparring more fair game



Response	Count
Strongly Agree	**41**
Agree	**36**
Neutral	**12**
Disagree	**1**
Strongly Disagree	**2**

Objective-

The objective of asking this question was too find out the insights of Taekwondo athletes about their views on using sensor scoring in sparring and to understand their thoughts on whether this technology makes competition judging fairer and more effective.

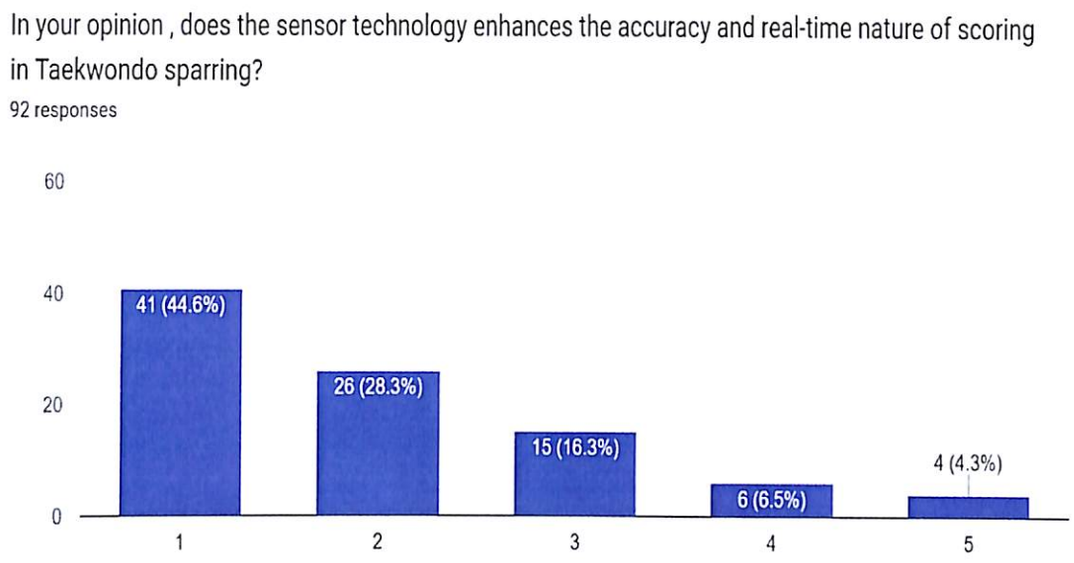
Primary analysis-

The above data of respondents states that majority of taekwondo athletes either strongly agree **(44.6%)** or agree **(39.1)** with the idea of using sensor scoring in sparring which enhances more fair game than manual scoring done by the judges. A small group of taekwondo athletes are neutral in nature for the same with a percentage of **13%**. This suggests that they have lack of opinions about the effectiveness of technology in taekwondo. Only 1 audience respondent has disagreed for the same **(1.1%).** This suggest that the individual still doubts the efficiency of technology in taekwondo for much fair game. The respondent believes that the traditional judging methods are good enough and worry that using sensor scoring might create new issues or unfairness in competitions. There are 2 respondents who has strongly disagreed with a

percentage of **2.2%.** These athletes probably have serious concerns about the technology, doubting its accuracy or feeling it goes against the spirit of traditional sparring.

To wrap up, most athletes favor using sensor scoring in sparring, believing it can improve fairness and accuracy in judging. However, some are neutral or against it, showing that there's a range of opinions among Taekwondo athletes about this technology. The survey shows that many people like the idea of using sensor scoring in sparring, but some aren't sure or disagree. We need to look into it more to understand how well it works and if it's fair. We should check if the sensors always work right, if they could favor some fighters over others, and how easy it is to actually use them in sparring matches. This way, we can make sure we're making the right choice about using sensor scoring in sparring.

6) **In your opinion, does the sensor technology enhances the accuracy and real-time nature of scoring in Taekwondo sparring?**



Strongly agree	
1	**41**
2	**26**
3	**15**
4	**6**
5	**4**
Strongly disagree	

Objective-

The objective of asking this question was to find out the opinion of taekwondo athletes of sensor technology whether the effectiveness of technology in taekwondo whether the results are accurate scoring and registers in real time in sparring.

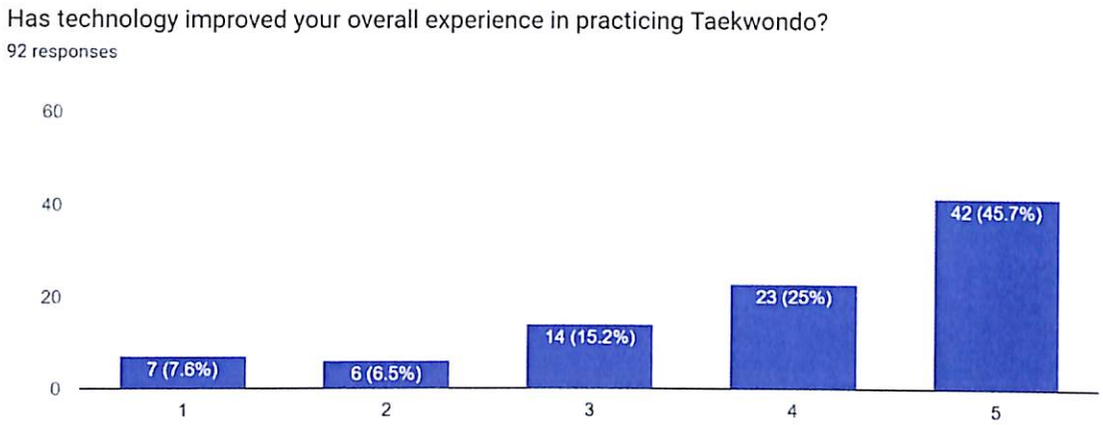
Primary analysis-

The above data clearly states that most of the respondents are strongly agreed to the technological development towards accuracy and real time scoring in taekwondo sparring with a percentage of **44.6%.** There are some taekwondo athletes with a percentage of **28.3%** who agreed for the same.15 of the respondents with a percentage of **16.3%** are neutral for the same due to lack of strong opinion towards the question asked. There are 6 respondents with a percentage of **6.3%** who disagree with the

effectiveness of technology in taekwondo for accurate and real timing nature scoring system in taekwondo sparring. There are 4 respondents taekwondo athletes who totally disagrees with the same and suggests that traditional taekwondo would be much better use, manual judging than the sensor technology where mostly depends on the impact of the kick on the guards for point registration.

Overall most of the respondent's taekwondo athletes with the help of the earlier experience with technology strongly agreed to the accuracy and real time scoring is perfect

7) **Has technology improved your overall experience in practicing Taekwondo?**



Strongly disagree	
1	**7**
2	**6**
3	**14**
4	**23**
5	**42**
Strongly agree	

Objective-

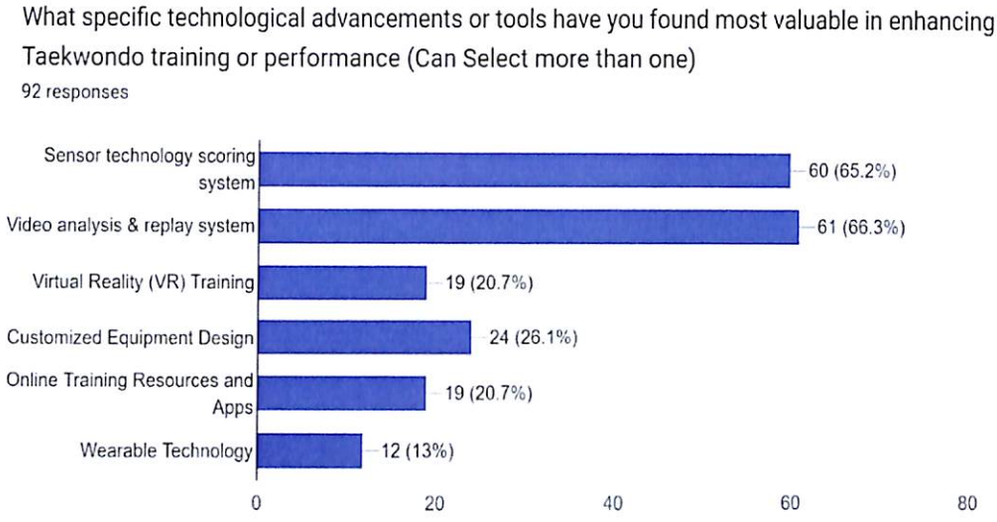
The objective of asking this question was to find the overall experience of taekwondo athletes if the technology has enhanced their taekwondo practice with the help of technology overall for athletes development.

Primary analysis-

The above data states that most of the respondents that is 42 of the audience with a percentage of **45.7%** totally or strongly agrees that the development of technology in taekwondo has enhanced their training and experience in development of athletes. 23 audience with a percentage of **25%** also somewhat agrees to the enhancement of athletes through technology. There are some of the taekwondo athletes that is 14 respondents with a percentage of **15.2%** are neutral for the same because they lack strong opinion towards technological enhancement

of overall taekwondo athlete's development. This audience are unsure about the results or outcome that comes with the help of technology for betterment of athletes. There are only 6 respondents with a percentage of **6.5%** who disagrees for the same. This audience experience in the field of technology for taekwondo hasn't been a remarkable and the overall experience for this respondents was not good for the development of athletes training. The remaining 7 respondents totally or strongly disagrees for the same.

8) **What specific technological advancements or tools have you found most valuable in enhancing your Taekwondo training or performance <u>(Can Select more than one)</u>**



Technologies	Responses
Sensor scoring system	**60**
Video analysis and replay system	**61**
Virtual reality training	**19**
Customized equipment design	**24**
Online training resources and apps	**19**
Wearable technology	**12**

Objective-

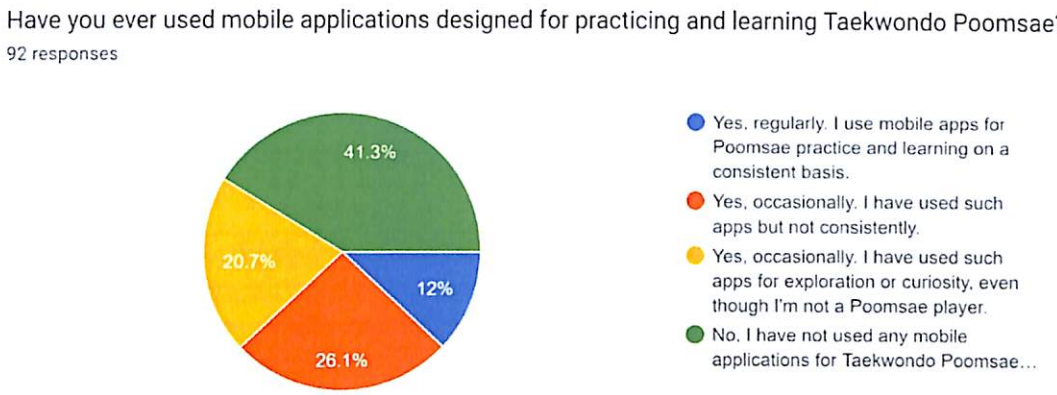
The objective of asking this question to respondent's taekwondo athletes is to find out what specific technology tools or advancements are used by majority and what they found the most valuable among them.

Primary analysis-

The above data suggest that most valuable technological advancement is sensor scoring system with the total % of **65.2%** which is also mostly used by the taekwondo athletes. Second most used and most valuable technological tool is video analysis and replay system with a total % of **61%**. This technological tool has helped the athletes for much fair game. This has allowed the judges to check whether the score has been registered accurately when the opposition team takes objection. The third most valuable source of technological advancement is equipment

customized design which was designed for sensor attachment. The third most is virtual reality training and online training apps resources with a % of **20.7%.** This technology has helped the taekwondo athletes to get prepare mentally before entering the bout to face the reality. Virtual reality training has the potential to accelerate skill development and improve reaction times. The last and the final valuable technology is wearable technology with a total respondents % is **13%**. Wearable technology, like fitness trackers or smart clothing, can give useful information about how your body is performing during Taekwondo training. Even though it's not used as much in Taekwondo as it is in some other sports, it still has the potential to make training better. These gadgets can tell you things like how fast your heart is beating, how you're moving, and how much energy you're using. By using wearable technology, you can plan your training sessions better, see how you're improving over time, and make sure you're not pushing yourself too hard and risking injuries. So, while it might not be the most common tool in Taekwondo, it can still be really helpful for making your training more effective.

9) **Have you ever used mobile applications designed for practicing and learning Taekwondo Poomsae?**



Mobile applications for learning	Responses
Regularly	11
Occasionally	24
Curiosity (not a poomsae player)	19
Not used any applications	38

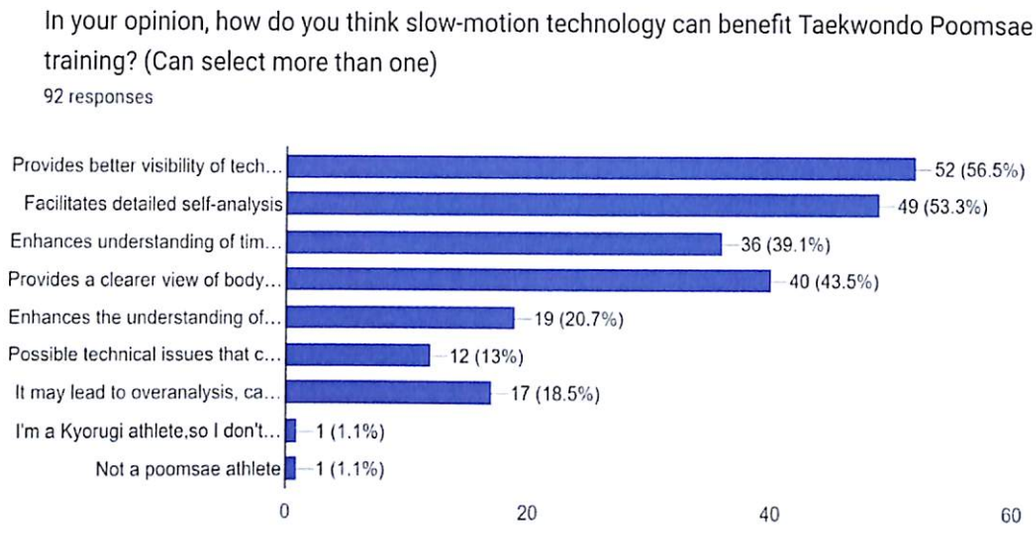
Objective-

The objective of asking this question to respondent's taekwondo athletes is to find out the usage of mobile applications that are designed for training, learning and practice of taekwondo athletes for poomsae form.

Primary analysis-

The above data states that most of the respondent's taekwondo athletes (38) with a % of **41.3%** do not use any mobile applications for poomsae training. This data conveys that mobile applications are not yet useful for taekwondo athletes for training or learning. But there are some of the respondents (11) who use mobile applications with a % of **12%.** This conveys that mobile applications are not that useful for training but it can help to track the training pattern daily routine. There are some respondents (24) with a % of **26.1%** who use mobile applications occasionally whenever it is required for them. And there are 19 respondents who are curious about using the mobile technological advancements apps in future even tho they are not a poomsae taekwondo athletes.

10) In your opinion, how do you think slow-motion technology can benefit Taekwondo Poomsae training? (Can select more than one)



Provides better visibility	**52**
Facilitates detailed self-analysis	**49**
Enhances understanding of timing and precision	**36**
Clear view of body	**40**
Enhances the understanding of weight distribution and balance	**19**
Technical issue	**12**
Over analysis	**17**
Kyorugi Athlete	**2**

Objective-

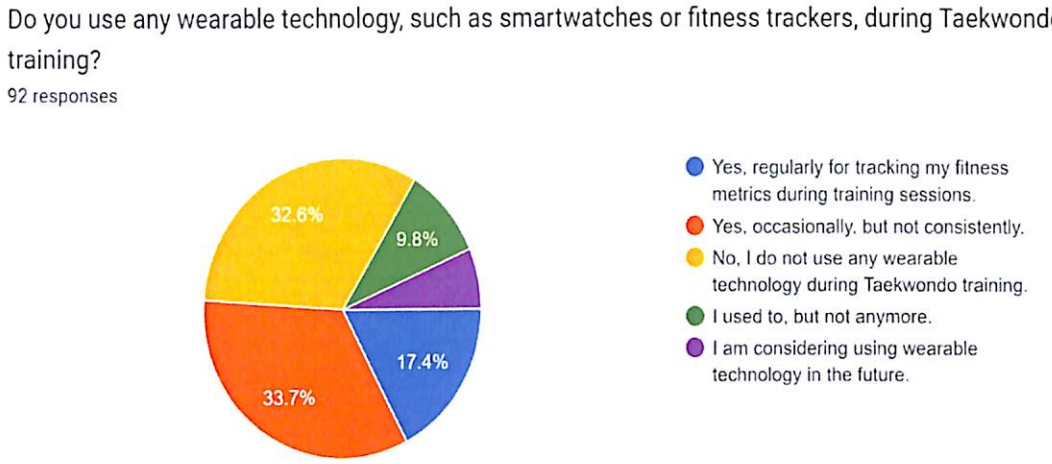
The objective of asking this question to respondents is to find out whether the slow motion video technology has benefitted taekwondo poomsae training.

Primary analysis-

The above data states that slow motion technology for taekwondo poomsae training is valuable for the respondents with a % of **56.5%** which provides better visibility of body movements and techniques. It also facilitates detailed self-analysis in slow motion techniques with a % of

53.3% of respondents who agreed to it. By replaying movements at a slower speed, practitioners can scrutinize their form, posture, and execution, leading to more precise adjustments and refinement of their poomsae techniques. Enhances understanding of timing and precision with a % of **39.1%** respondents has agreed that slow-motion technology provides a detailed examination of the timing and precision of movements within poomsae routines. Clear view of body with a % of **43.5%** respondents has agreed that Slow-motion footage offers a clear and detailed view of the body during poomsae performances. Slow-motion technology helps Taekwondo practitioners see how they distribute their weight and maintain balance during poomsae movements. By watching these movements slowly, they can better understand how to stay balanced and stable throughout their routines. There are some of the respondents with a % of **13%** who suggest that or gives an inside thought that using slow motion or video analysis system in taekwondo training may lead to over analysis, causing athletes to become overly critical of minor details and respondents with a % of **18.5%** states that there will be possible technical issues that could disrupt the training process. In summary, slow-motion technology offers several benefits for Taekwondo poomsae training, including improved visibility, detailed self-analysis, enhanced understanding of timing and precision, clear observation of the body, and deeper insights into weight distribution and balance. These advantages can collectively contribute to refining techniques, optimizing performances, and advancing overall proficiency in poomsae practice.

11) Do you use any wearable technology, such as smart watches or fitness trackers, during Taekwondo training?



Regularly	**16**
Occasionally	**31**
Do not use any wearable technology	**30**
Not anymore	**9**
Considering in future	**6**

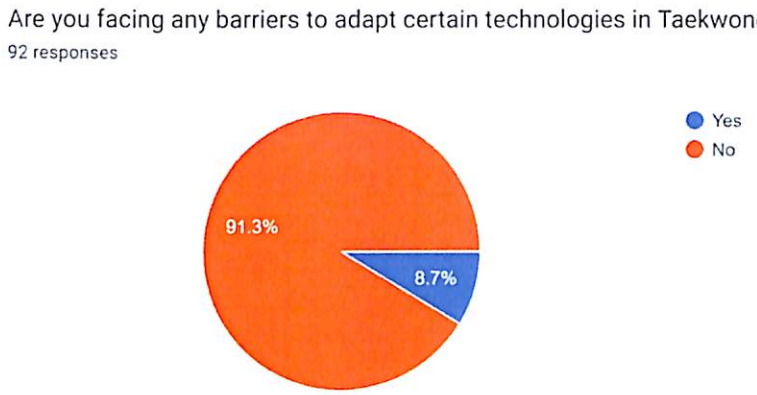
Objective-

The objective of asking this question is to find out the wearable technology such as smart watches or fitness trackers has helped or useful for the taekwondo athletes during training.

Primary analysis-

The above data states that most of the respondents with a % of **33.7%** occasionally uses wearable technology such as fitness trackers or smart watches to keep a track for the taekwondo training. The respondents with a % of **17.4%** regularly uses wearable technology for training track progress. The majority of the respondents with a % of **32.6%** do not use this technology for training as they don't find it beneficial for their training program. The rest **9.8%** used wearable technology but they don't use it now as they uses other technological advancements as they find it more valuable. The remaining respondent's % of **6.5%** has agreed to the wearable technological tools have been useful for taekwondo athletes and they are considering to keep a training track in future

12) Are you facing any barriers to adapt certain technologies in Taekwondo?



Yes	**8**
No	**84**

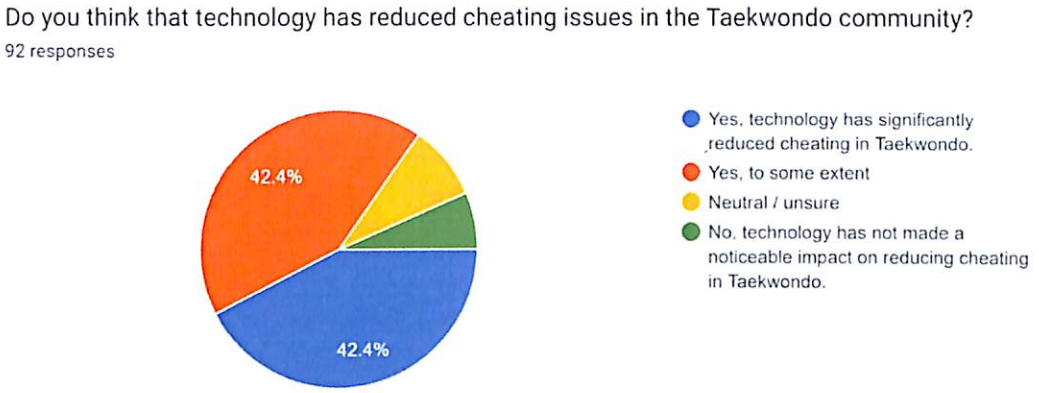
Objective-

The objective of asking this question is to find out in the world of technological development coming up in this generation are not facing any barriers or difficulties to adapt.

Primary analysis-

The above data states that most of the majority respondents with a percentage of **91.3%** does not face any barriers or difficulties to adapt certain technologies in taekwondo. This data shows that technological advancements for taekwondo athletes has been a smooth process for training or to adapt the new innovative techniques in the training procedure. The rest 8.7% of respondents faces certain barriers or difficulties to adapt taekwondo technologies. They states that the power impact for point registration is very difficult for them as sometimes the point does not get registered which was much easier during manual scoring judging system competition.

13) Do you think that technology has reduced cheating issues in the Taekwondo community?



Yes	**39**
To some extent	**39**
Neutral or unsure	**8**
No	**6**

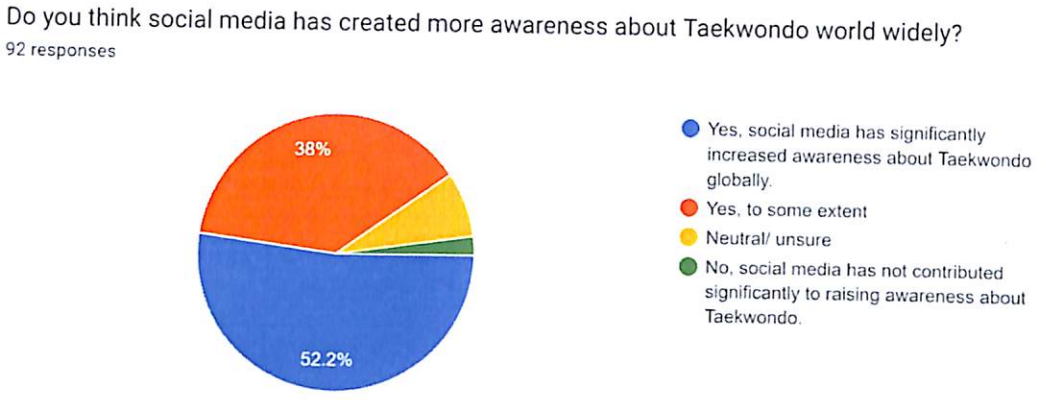
Objective-

The objective of asking this question is to find out from taekwondo athletes whether as per their experience of competition where technology is used reduced cheating issues in the taekwondo community.

Primary analysis-

The above data states that most of the respondents with a percentage of **42.4%** agrees that technology has significantly reduced cheating in taekwondo, whereas with a percentage of same **42.4%** also agrees that it has reduced to some extent. Respondents with a percentage of **8.5%** was unsure or neutral in nature as this audience lacks strong opinion towards the question. Remaining percentage of respondents that is **6.5%** states that technology has not made a noticeable impact on reducing cheating in taekwondo. The opinions regarding whether technology has reduced cheating in the Taekwondo community are varied.

14) Do you think social media has created more awareness about Taekwondo world widely?



Yes	**48**
To some extent	**35**
Neutral or unsure	**7**
No	**2**

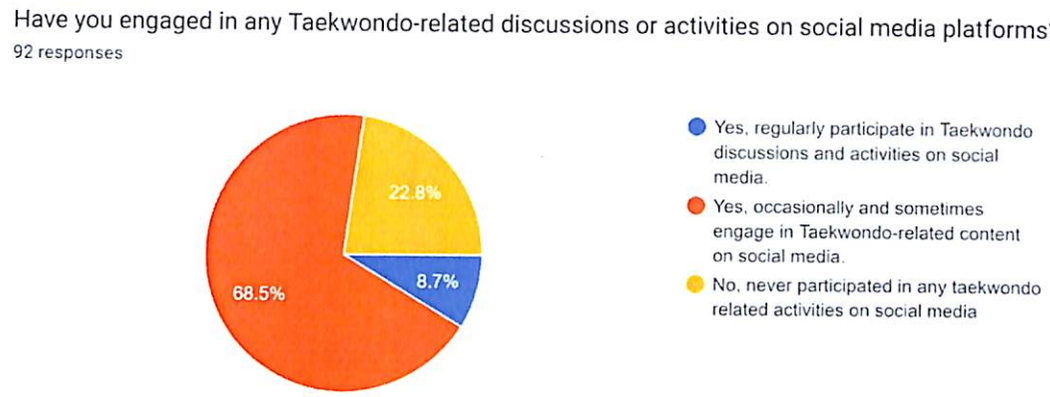
Objective-

The objective of asking this question is to find social media overall impact in creating more awareness about taekwondo world widely.

Primary analysis-

The above data states that majority of the respondents with a percentage of **52.2%** totally agrees that social media has significantly increased awareness about taekwondo globally. The **38%** of the respondents also states that the social media has not entirely increased awareness but has impacted to some extent. The **7.6%** respondents are neutral and unsure in nature due to lack of strong opinion. The remaining **2.2%** totally states that there is no contribution done through social media to raise awareness about taekwondo.

15) Have you engaged in any Taekwondo-related discussions or activities on social media platforms?



Yes regularly	**8**
Occasionally	**63**
No	**21**

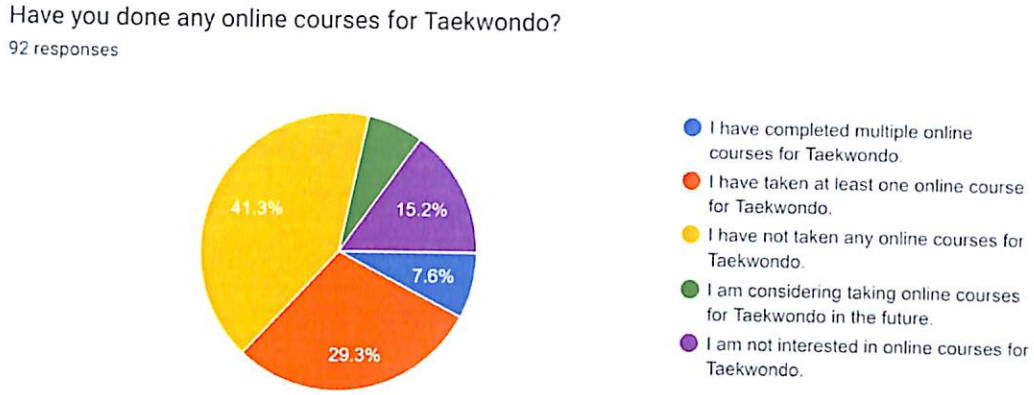
Objective-

The objective of asking this question to respondents is to find out the% of the taekwondo athletes engaging in any activities or taekwondo related discussion on social media platforms.

Primary analysis-

The above data states that most the respondents with a percentage of 68.5% engage occasionally on social media platforms for any taekwondo related discussion or activities for enhancing their knowledge. The respondents with a percentage of 8.7% has regularly used social media for various taekwondo related activities or discussions that has taken place on social media platforms. The remaining 22.8% respondents have not participated in any taekwondo related activities on social media.

16) Have you done any online courses for Taekwondo?



Completed multiple courses	**7**
At least one course	**27**
Not taken any course	**38**
Considering in future	**6**
Not interested	**14**

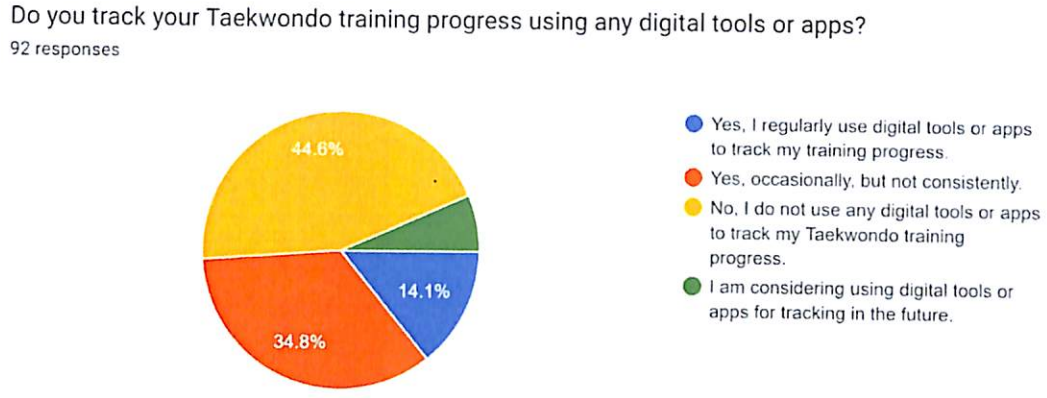
Objective-

The objective of asking this question is to find out the percentage of the respondent taekwondo athletes whether they are engaged into some online courses for taekwondo practice.

Primary analysis-

The above data states that most of the respondents with a percentage of **29.3%** have taken at least one online course for taekwondo. This states that taekwondo athletes not only up bring their performance level through training methods but also increases techniques knowledge through online course. The respondents with % of **7.6%** have completed multiple courses and **41.3%** of respondents have not taken any courses. The respondents with a % of **6.5%** are willing take online course in future while the remaining **15.2%** are not interested in opting for any online courses for taekwondo.

17) Do you track your Taekwondo training progress using any digital tools or apps?



Yes regularly	**13**
Occasionally	**32**
No	**41**
Considering to use in future	**6**

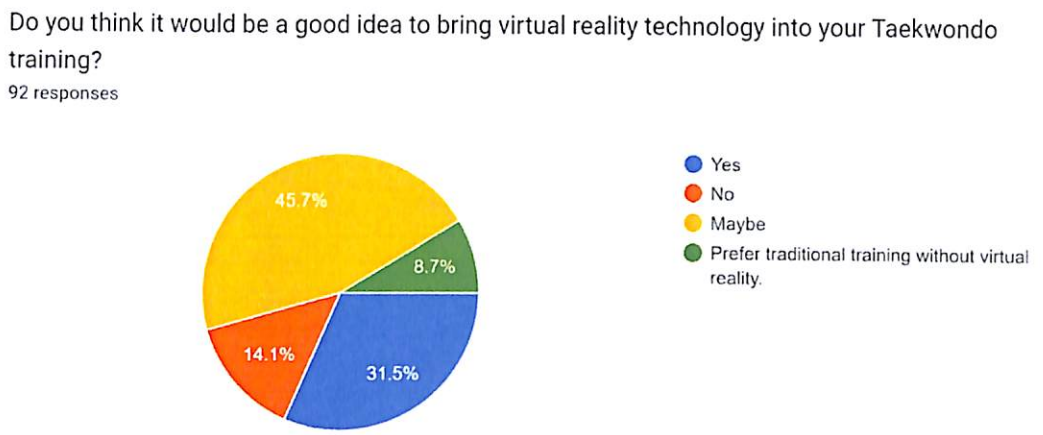
Objective-

The objective of asking the question is to find whether taekwondo athletes track their progress using any digital apps or tools.

Primary analysis-

The above data states that **14.1%** respondents uses digital tools and apps to track progress regularly while **34.8%** respondents uses digital apps and tools occasionally. There are some respondents with a percentage of **6.5%** considering to use digital apps or tools in future. There are majority of the respondents taekwondo athletes with a percentage of **44.6%** who do not use any digital platform tools and apps for betterment of their training program.

18) Do you think it would be a good idea to bring virtual reality technology into your Taekwondo training?



Yes	**29**
No	**13**
Maybe or neutral	**42**
Prefer traditional training	**8**

Objective-

The objective of asking this questions is to find out taekwondo athletes opinions on integrating virtual reality technology into Taekwondo training could be to assess the level of readiness and openness within the Taekwondo community towards adopting innovative training methods.

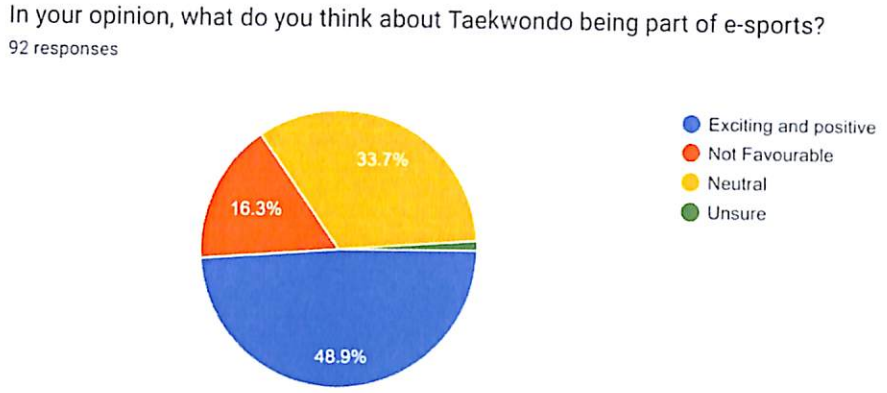
Primary analysis-

Positive Responses (Yes): Responses of taekwondo athletes with a percentage of **31.5%** indicating a positive stance toward integrating virtual reality technology into Taekwondo training. These respondents see potential benefits and opportunities in using VR for enhancing their training experiences.

Negative Responses (No): Responses of taekwondo athletes with a percentage of **14.1%** expressing a negative opinion regarding the integration of VR technology into Taekwondo training. These respondents might have concerns or reservations about the effectiveness or suitability of VR in this context.

Neutral or Ambivalent Responses (Maybe or Neutral): Responses of taekwondo athletes with a percentage of **45.5%** indicating uncertainty or neutrality toward the idea of incorporating VR

19) In your opinion, what do you think about Taekwondo being part of e-sports?



Exciting and positive	**45**
Not favorable	**15**
Neutral	**31**
unsure	**1**

Objective-

The objective of asking respondents about their opinions on Taekwondo being part of e-sports and their perceptions and attitudes toward the potential integration of Taekwondo into the realm of e-sports.

Primary analysis-

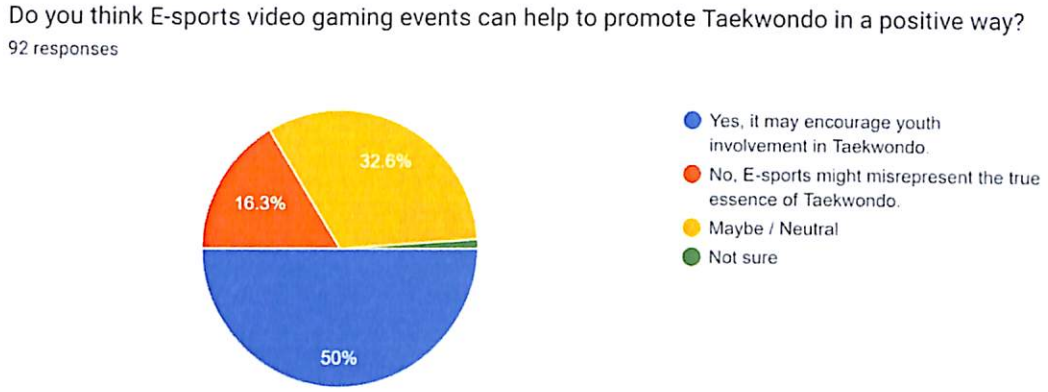
Exciting and Positive: Most people (45) with a percentage of **48.9%** think it's a great idea to include Taekwondo in e-sports. They're enthusiastic about showing off Taekwondo skills to more people through online gaming platforms.

Not Favorable: Some people (15) **16.3%** aren't keen on the idea. They might worry about how Taekwondo fits with video gaming or if it stays true to the sport's values.

Neutral: Quite a few folks (31) **33.7%** don't feel strongly either way. They're not particularly for or against Taekwondo in e-sports, showing they're not sure about its pros and cons.

Unsure: Only one person isn't sure at all. They seem to be in the minority, not having a clear opinion on whether Taekwondo belongs in the world of online gaming.

20) Do you think E-sports video gaming events can help to promote Taekwondo in a positive way?



Encourage youth involvement	**46**
Misrepresent true essence of taekwondo	**15**
Maybe	**30**
Not sure	**1**

Objective-

The objective of asking respondents about their opinions on e-sports video gaming events promoting Taekwondo is to assess perceptions regarding the potential of such events to positively impact the promotion of Taekwondo.

Primary analysis-

Encourage Youth Involvement: A significant majority of respondents (46) **50%** of respondents believe that e-sports video gaming events can help promote Taekwondo in a positive way by encouraging youth involvement. This suggests that they see these events as an effective means of engaging younger generations with the sport and generating interest among them.

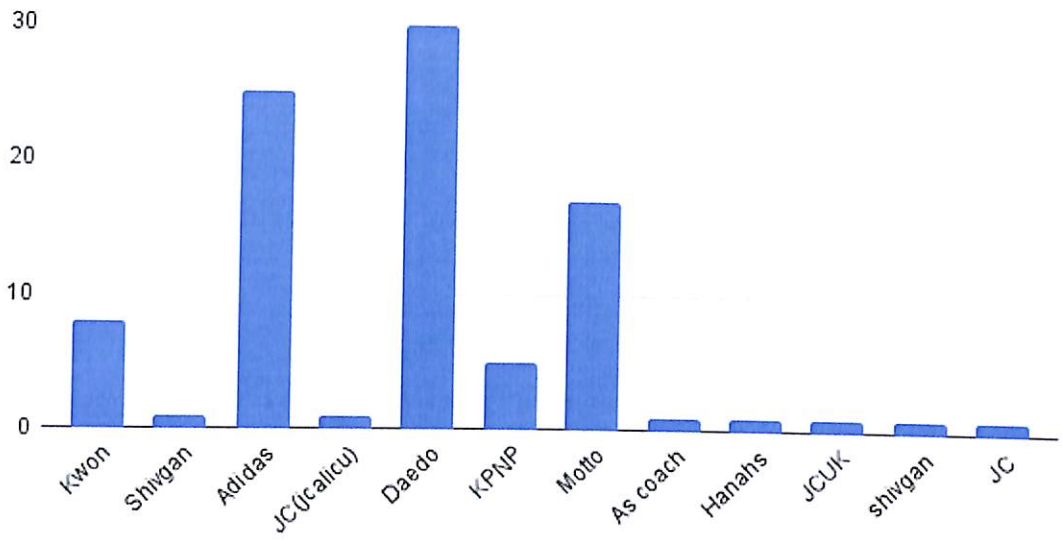
Misrepresent True Essence of Taekwondo: A smaller portion of respondents (15) **16.3%** express concerns that e-sports video gaming events might misrepresent the true essence of Taekwondo. These individuals may worry that the competitive and virtual nature of gaming could dilute or distort the core values and principles of Taekwondo.

Maybe: A significant number of respondents (30) **32.6%** are uncertain or neutral about whether e-sports video gaming events can effectively promote Taekwondo. This indicates a lack of strong opinion or uncertainty about the potential impact of such events on the promotion of the sport.

Not Sure: Only one respondent indicates being unsure about their opinion on this matter, suggesting a limited number of participants who are uncertain about whether e-sports video gaming events can positively promote Taekwondo.

Overall, the data suggests a notable level of optimism regarding the potential for e-sports video gaming events to promote Taekwondo, particularly by encouraging youth involvement. However, there are also concerns about the possibility of these events misrepresenting the true essence of the sport

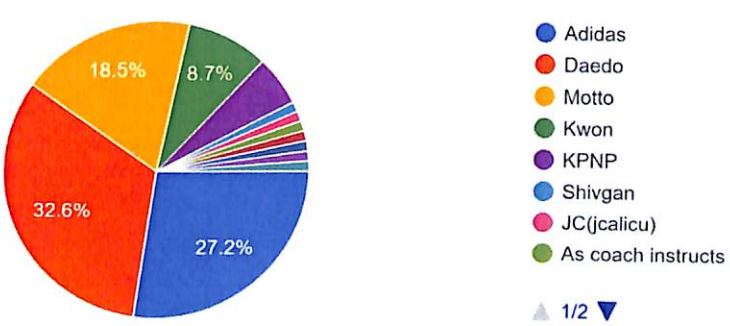
21) Which Taekwondo brand you mostly prefer?



Count of Which Taekwondo brand you mostly prefer?

Which Taekwondo brand you mostly prefer?

92 responses



Objective-

The objective of asking this question is to find out overall brand taekwondo athletes use for equipment or uniform

Primary analysis-

The above data states that most brand used by taekwondo athletes is **Daedo**, not only for clothing but also for equipment.

Adidas: Adidas emerges as the most frequently mentioned brand in the responses, with a significant number of respondents expressing a preference for this brand. This suggests that Adidas is popular among practitioners and instructors within the Taekwondo community.

Daedo: Daedo is also mentioned frequently, indicating that it is another preferred brand among respondents. It appears to be a popular choice for Taekwondo equipment and gear.

Kwon: Kwon is mentioned several times, though less frequently compared to Adidas and Daedo. However, it still represents a notable presence among respondents' preferences for Taekwondo brands.

Other Brands: Other brands such as Motto. KPNP. Shivgan, JC (JCalicu), Hanahs, and JCUK are mentioned sporadically in the responses. indicating a diverse range of preferences within the Taekwondo community.

Coach's Instruction: Some respondents mention following their coach's instructions regarding Taekwondo brand preferences. indicating that professional guidance plays a role in their decision-making process.

Overall, Adidas, Daedo, and Kwon appear to be the most prominent brands among respondents' preferences for Taekwondo equipment and gear. These brands likely offer quality products that meet the needs and preferences of practitioners and instructors within the Taekwondo community.

OVERALL SUMMARY:

- Gender Distribution: The survey revealed that 62% of respondents were male, while 38% were female, indicating a higher male participation rate.

- Age Categories: Most respondents competed in the senior category (53.3%), followed by the junior category (28.5%), and the cadet category (18.5%). This distribution reflects the age diversity within the Taekwondo community.

- Experience with Scoring Systems: A vast majority of respondents (90.2%) had experience with manual scoring systems in Taekwondo competitions, while 63% had also participated in competitions using sensor technology.

- Perception of Sensor Technology: The majority of respondents (83.7%) believed that sensor scoring technology makes judging in sparring more fair, indicating a positive perception of technological advancements in the sport.

- Impact of Technology: Many respondents (70.7%) agreed that technology, such as sensor scoring systems and video analysis, has enhanced their overall experience in practicing Taekwondo.

- Preference for Technological Tools: Sensor scoring systems (65.2%) and video analysis/replay systems (66.3%) were identified as the most valuable technological advancements for enhancing Taekwondo training and performance.

- Engagement with Mobile Apps: A significant portion of respondents (38.4%) had occasionally used mobile applications for practicing and learning Taekwondo poomsae.

- Benefits of Slow-motion Technology: The majority of respondents (56.5%) believed that slow-motion technology provides better visibility and facilitates detailed self-analysis in Taekwondo poomsae training.

- Adoption of Wearable Technology: While some respondents (33.7%) occasionally used wearable technology during Taekwondo training, a majority (44.6%) did not use any digital tools or apps to track their progress.

- Readiness for Virtual Reality Technology: Responses were mixed regarding the integration of virtual reality technology into Taekwondo training, with 45.5% expressing uncertainty or neutrality.

- Opinions on E-sports Integration: While 48.9% of respondents found the idea of Taekwondo being part of e-sports exciting and positive, 16.3% expressed concerns about potential misrepresentation of the sport's essence.

- Preference for Taekwondo Brands: Popular Taekwondo brands among respondents included Adidas. Daedo. and Kwon. reflecting diverse preferences for equipment and gear.

Overall, the survey highlights a positive reception toward technological advancements in Taekwondo, with respondents acknowledging their benefits in enhancing training, performance, and fairness in competitions. Additionally, opinions varied regarding the integration of Taekwondo into e-sports and the adoption of virtual reality technology, indicating a need for further exploration and discussion within the Taekwondo community.

CHAPTER 5

FINDINGS, SUGGESTIONS & CONCLUSION

Findings

- According to the study most of the respondent taekwondo athletes are male than female athletes.
- According to the study, it clearly states that the most respondent's age group is 18 and above which comes under senior age category athletes.
- Second most respondent's age group is 14 – 17 years which comes under junior age category athletes.
- Third most respondent's age group is 12 – 14 years which comes under cadet age category athletes.
- It is found that majority of the respondents have played manual scoring judging system.
- It is also found that the same majority of the respondents have played competitions where sensor technology is used.
- According to the study, it is found that most of the respondents love to play competitions where sensor technology is used.
- They states that sensor scoring has helped to be more fair game.
- According to the study, it is found that sensor technology enhances the accuracy and real-time nature of scoring in Taekwondo sparring.
- It is found that respondents agreed that the technology improved your overall experience in practicing Taekwondo.

- Valuable Technological Advancements -
- A) Sensor technology scoring system.
- B) Video analysis & replay system.
- 38.1% of the respondents uses mobile applications designed for practicing and learning Taekwondo Poomsae.
- 17.1% regularly uses wearable technology, such as smart watches or fitness trackers, during Taekwondo training.
- 42.4% of the respondents have agreed that technology has reduced cheating issues in the Taekwondo community.
- 52.2% of the respondents have agreed that social media has created more awareness about Taekwondo world widely.
- Most of the respondents 68.5% occasionally engaged in any Taekwondo-related discussions or activities on social media platforms.
- 31.5% states that it would be a good potential to bring virtual reality technology into your Taekwondo training.
- 48.9% states that taekwondo being part of e-sports would be exciting and can help to promote Taekwondo in a positive way.
- Most of the respondents 32.4% uses Daedo brand both for equipment and uniform.
- Preference for Sensor Technology: Strong preference among practitioners for sensor technology in scoring systems.
- Rising Reliance on Mobile Apps and Wearable's: Growing dependence on mobile apps and wearable devices for performance tracking and analysis.
- Impact of Social Media: Social media platforms play a significant role in promoting Taekwondo and fostering community engagement.
- Accessibility Challenges: Challenges related to accessibility persist, particularly for athletes in underprivileged or remote areas.

Suggestions-

- Encourage gender diversity in Taekwondo by implementing targeted programs to increase female participation.

- Tailor training programs and competitions to different age groups to better meet their needs and preferences.

- Promote the integration of sensor technology in Taekwondo training and competitions for enhanced fairness and accuracy.

- Advocate the use of mobile apps and wearable tech to improve performance tracking and analysis.

- Implement effective measures to prevent cheating and uphold the integrity of Taekwondo.

- Offer interactive online platforms with instructional videos and personalized training plans for remote learning.

- Integrate biometric sensors into equipment to provide real-time feedback on physiological indicators.

- Provide virtual coaching sessions through video conferencing or virtual reality platforms.

- Use data analytics to analyze performance metrics and identify areas for improvement.

- Develop interactive training tools like augmented reality targets to enhance skills.
- Create nutrition and recovery apps tailored to Taekwondo athletes' needs.
- Utilize wearable devices to monitor movement patterns and prevent injuries.
- Design gamified training apps to make practice more engaging.
- Develop virtual training partners for realistic sparring simulations.
- Establish online community platforms for knowledge sharing and collaboration.
- Utilize social media platforms to raise awareness about Taekwondo and engage the community through regular discussions and updates.
- Explore the potential of virtual reality technology and consider promoting Taekwondo as an e-sport to attract wider interest.
- Foster partnerships with preferred brands like Daedo to ensure availability and quality of equipment for practitioners.

Conclusion-

- In conclusion, the study highlights the significance of technology in enhancing various aspects of Taekwondo training and competition.

- It underscores the preference for sensor technology scoring systems and the positive impact of mobile applications, wearable technology, and social media in promoting the sport

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- The study's findings highlight the significant influence of technology across different aspects of Taekwondo, including training methods and competition strategies. The widespread preference for sensor technology scoring systems, along with the positive feedback regarding mobile apps, wearable devices, and social media platforms, reflects a rising dependence on technology to improve accessibility and interaction within the sport.

- Furthermore, the findings suggest opportunities for further integration of technology, such as virtual reality training and e-sports initiatives, to expand participation and engagement within the Taekwondo community. Overall, embracing technological advancements can contribute to a more inclusive, efficient, and enjoyable Taekwondo experience for practitioners worldwide.

- Transformative Potential of Technology: Technology has the potential to shape the future of Taekwondo by enhancing fairness and accuracy in competitions.

- Opportunities for Engagement: Digital platforms offer opportunities for knowledge sharing, collaboration, and outreach within the Taekwondo community.

- Addressing Accessibility Barriers: Overcoming accessibility challenges is essential to ensure equitable access to technological resources for all practitioners.

- Continued Evolution of the Sport: Embracing technological innovations while preserving core values can lead to a more inclusive and enjoyable Taekwondo experience globally

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- However, while technology presents numerous benefits, it is not without limitations and challenges. Accessibility issues, particularly for athletes in underprivileged or remote areas, may hinder widespread adoption.

- Ultimately, this study underscores the transformative potential of technology in shaping the future of Taekwondo. By leveraging technological advancements judiciously, the sport can continue to evolve while maintaining its core values and principles, ensuring a vibrant and inclusive landscape for practitioners worldwide.

- In conclusion, technology has significantly improved Taekwondo training, performance, and competition. By integrating it carefully with traditional methods, we can further advance the sport while staying true to its essence and spirit.

- In summary, this investigation provides valuable insights into the evolving role of technology within the realm of Taekwondo, particularly in its impact on training methods and competitive dynamics. Through a detailed examination, it underscores the significance of various technological tools such as sensor-based scoring systems, video analysis software, and wearable gadgets in optimizing athlete performance and refining training regimens.

- Furthermore, the study emphasizes the importance of considering factors like gender balance, age group representation, and accessibility when integrating technology into Taekwondo practices. While acknowledging the benefits, it also acknowledges the presence of limitations such as sampling biases, potential biases in self-reported data, and challenges related to technology access, which warrant careful consideration and mitigation strategies for a more inclusive approach.

- In conclusion, by tactfully harnessing technological innovations while addressing inherent limitations, the Taekwondo community can foster a more dynamic and effective training environment, thus enhancing the sport's accessibility, fairness, and overall appeal to practitioners globally