

A PROJECT ON
The Study Of Cricket Bats

BY
Mohammad Sami Abdulwahab Shaikh

SUBMITTED TO
Department Of Sports Management

Nagindas Khandwale College of Commerce, Arts and Management Studies,
Mumbai – 400064

In Partial Fulfillment of the Requirements for the Degree of
Bachelor of Management Studies –
Sports Management – Sem VI

Academic Year – 2022-23

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Nagindas Khandwala College of Commerce, Arts and
Managements Studies(Autonomous)**



Department of Sports

Management

CERTIFICATE

This is to Certify that **Mr. Mohammad Sami Abdulwahab Shaikh** has successfully Completed the Dissertation as a part of the of semester 6 syllabus titled. Project topic The Study of Cricket Bats Under the Guidance of Ms. Kinnarie Singh during the Academic Year of 2021-22

Prof. Mr. Deepak Gupta

Co-ordinator

Principal

Date:



DECLARATION

I wish to state that the work embodied in this dissertation titled **The Study of Cricket Bats** is my own contribution. The dissertation is carried out under the guidance of Prof. Deepak Gupta in this Academic year 2022-23.



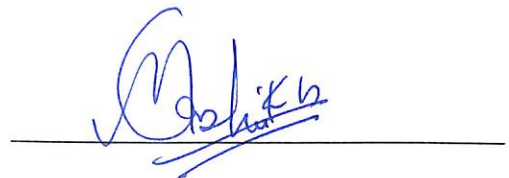
SIGNATURE OF THE CANDIDATE
(Mr. Mohammad Sami Abdulwahab Shaikh)

PLACE:

DATE:

ACKNOWLEDGEMENT

I, **Mr. Mohammad Sami Abdulwahab Shaikh** would take this opportunity to express my sincere gratitude and appreciation to the principal of our college, National Academy of Sports Management, for allowing me to do my dissertation smoothly and easily. I wish to thank my Coordinator, Vice Principal for all the help and support that she has given me. I would like to acknowledge and thanks the people who made this project work possible, Prof. Deepak Gupta who has been a guiding force to me while doing this project and the teaching staff of my college, friends for providing their help as when required to complete this project. Without their support and encouragement, making this reports would have been impossible for me. I would also like to thanks the respondents who provided me with their best knowledge and co-operation throughout the project.



Shaikh Mohammad Sami Abdul Wahab

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EXECUTIVE SUMMARY

Cricket is a very popular Sports in all over the world and it is also called „Gentleman Game“. Two teams with 11 players each make up this game. To score the most runs is the game's primary objective. It is played on a field that has been well-maintained for that purpose , on a pitch. Particularly Cricket is most popular game in England and India. A game of Cricket is played with bat and bowl. A particular piece of gear required to play cricket is a bat. In order for player to deliver the cricket ball at a high pace, there are many different types of bats produced by various companies; the most of them are constructed out of high quality wood that is shock resistant and tough.

One of the most distinctive components of the game is the cricket bat. The actual bats are just composed of wood; they have a rounded, leather or rubber-wrapped handle for grip, and the blade must be 38 inches or less and the blade must be 4.25 inches wide. Depending on the type of hitter you are and how much force you want for each hit, these bats can come in a variety of shape.

Chapter 1: Introduction

1.1: General

There are variety of woods are used in the manufacturing of cricket bats, willow is the one that is most frequently chosen. The wood of the willow tree, often known as “Cricket Bat Willow tree” is traditionally used to make cricket bats. The scientific name of this willow tree is *Salix Alba*. This willow tree is frequently grown in the southeast English counties of Essex and Suffolk, where it flourishes in low-lying places. The white willow (English willow) and the Kashmir willow are the two species of willows most frequently used to make cricket bats. The Kashmir valley is home to a lot of Kashmir willow trees. Thousands of willow trees can currently be seen across the valley. Thus willow’s wood is often used to make cricket bats since it is strong, resilient to stress and long-lasting. The term “Kashmir willow” is now used to refer to bats made from its wood.

This Kashmir willow grow naturally and is also raised for its wood, which is used to make cricket bats. During the colonial era, it is reported that the British transported willow saplings of the Kashmir species from Essex. Similar to this, English willow refers

to willow that grows in England. This willow is planted exclusively for the production of cricket bats. The English willow is produced exclusively for the purpose of making bats in plantations. In terms of quality the English willow tree cricket bat is regarded as being the best. It occurs as a result of the wood utilised in the manufacture of these bats. In order to be grown there as well, saplings from Essex in England were transported to Australia and New Zealand but unfortunately they perished.

The willow trees, which is quickly grow to heights of 60 to 80 feet, have long been a feature of Kashmir’s landscape and cold climate. Jammu and Kashmir has historic bat manufacturing facilities in Punjab, Haryana, Gujarat, Uttar Pradesh and Rajasthan, however these facilities employ teak and saal wood, which is obviously inferior to

Kashmiri willow in quality. Willow wood typically comes in large quantities to Kashmir from the neighbouring cities of Anantnag, Baramulla, Pahalgam, Sopore, and Kupwara. Additionally to being marketed in India, these bats are also exported to other nations. Before, it was to see piles of willow wood next to the shops and sawdust flying through the air in the warehouses. Unfortunately, due to unrest in the valley, rising raw material prices and an increase in taxes the traditional Kashmiri willow cricket bat industry is currently fighting to exist and is under a great deal of strain.

The main different between this Willow trees are in their colour. While Kashmir Willow trees are light brownish colour and English willow trees are whiter in colour. This wood is used because it can endure bumps and is robust. Due to the contact of the ball arriving at a fast speed, it is not broken or even dented. Additionally, the weight of this wood is light. Because they are softer in nature than Kashmir willow bats, English willow bats are suitable for experienced players who play with hard balls.

The handle of the cricket bat can be predominantly constructed of cane and wood, but the blade should only be made of wood. It's interesting to note that the current style of willow blades with a cane handle was invented in the 1880s by Charles Richardson the head engineer of Severn Railway Tunnel. Willow wood is renowned for its distinctive qualities, particularly its resilience and because it is light in weight, it is simple to chisel and hammer into shape. The batsman can manoeuvre the bat in the air more quickly the lighter the bat. On the other hand, many strong and hard hitting batsman favour using heavier bats.

In the game of cricket, batsmen utilise these bats. Willow wood is typically used to make cricket bats. The first time it is used is in 1624. This specific cricket bat has a paddle-like shape and a long, cushioned handle that is comparable to but stronger than a tennis racquet's handle, which is typically cylindrical in shape. This broadens into the bat's blade, a bigger hardwood block with a V-shaped ridge on one side to allow for more airflow during the follow through. The v in the rear of a cricket bat, however, is more significant since it increases the strength of the whole bat and

increases the power to weight ratio by removing wood from parts where it isn't needed and leaving it thick enough in the centre, where the ball is typically struck. The front of the cricket bat, which is flat, is used to hit the ball. The toe of the bat refers to the bottom of the blade, whereas the shoulder refers to the point where the handle opens into the blade.

The specialized gear that cricket players use is called a bat. Cricket bats may come in a variety of sizes, but their maximum length and width are 38 inches and 4.25 inches, respectively. Professional, club, and beginning batsmen all use cricket bats. The cricket bats are designed for various playing styles. Although Kashmir willow bats are also well-known for their quality and durability, top batsmen worldwide generally preferred English willow bats because they are lighter, softer, and have better grain quality than Kashmir willow bats. For this reason, most top batsmen and seasoned players around the world favour English willow bats. However, compared to Kashmir willow bats, English willow bats are more expensive.

Because Kashmir Willow is so strong, resilient to stress, long-lasting, and light in weight, it is utilised to make bats. The use of Kashmir willow bats by professional cricket players is due to this.

The English Willow (*Salix alba* var. *caerulea*), from which the cricket bat is typically constructed, is treated with raw (unboiled) linseed oil. In addition to serving as protection, oil improves surface friction with the ball, which improves control. This wood is employed because it is lightweight, extremely durable, and shock-resistant, not considerably damaged or splintering on the impact of a cricket ball travelling at a high speed. Where the handle meets the blade, a hardwood spring is incorporated into the design. Charles Richardson, a student of Brunel and the chief engineer of the Severn railway tunnel, created the modern design of a cane handle attached to a willow blade in the 1880s.

The bat's length is restricted to 38 in (965 mm) and its width to 4.25 in (108 mm) by Law 6 of the Laws of Cricket, as the regulations of the game are known. Although there is no standard,

bats typically weigh between 2 lb 8 oz and 3 lb (1.1 to 1.4 kg). In order to improve grip, the handle is typically coated with a cloth or rubber sleeve, and the bat's face may have a protective coating. The Laws of Cricket, Appendix E, provided more detailed guidelines. Modern bats are typically created by machines, however a small number of craftsmen still make hand-crafted bats, especially for professional players (6 in England and 2 in Australia). Podshaving is the term for the craft of producing cricket bats by hand.

The shape of cricket bats has changed over time. Prior to the 18th century, bats frequently resembled modern hockey sticks in shape. This might have been a holdover from the game's purported roots. Despite the fact that the origins of cricket are lost in the mists of time, it's possible that shepherds' crooks were once used to play the game. The shape of cricket bats has changed over time. Prior to the 18th century, bats frequently resembled modern hockey sticks in shape. This might have been a holdover from the game's purported roots. Despite the fact that the origins of cricket are lost in the mists of time, it's possible that shepherds' crooks were once used to play the game. Prior to the formalisation of cricket's regulations in the 19th century, lower stumps were frequently used, the ball was often thrown underarm (now prohibited), and batters did not typically wear protective pads as they do now. A different-shaped bat was discovered to be better when the game altered. The 1729 cricket bat, which is on exhibit in the Sandham Room at the Oval in London, is considered to be the oldest bat still in use. Prior to the formalisation of cricket's regulations in the 19th century, lower stumps were frequently used, the ball was often thrown underarm (now prohibited), and batters did not typically wear protective pads as they do now. As the game evolved, it was discovered that A different-looking bat was preferable. The 1729 cricket bat, which is on exhibit in the Sandham Room at the Oval in London, is considered to be the oldest bat still in use.

Cricket is one of the most well-liked sports in developed nations. Both domestic and international markets are seeing daily increases in demand for cricket bats and other related goods. Cane, apple wood, mango, rejain, and bejain woods, as well as willow clefts, are the raw materials needed to make cricket bats. Others include terry cloth, hydrogen peroxide, duco paint,

twine, synthetic glue, rubber grips, nylon straps, polythese sheets, cane handles, and nylon grips. Cricket is one of the most well-liked sports in developed nations. Both domestic and international markets are seeing daily increases in demand for cricket bats and other related goods. Cane, aple wood, mango, rejain, and bejain woods, as well as willow clefts, are the rawmaterials needed to make cricket bats.other includes.synthetic glue, rubber grip, duco paint, terrycloth, hydrogen peroxide, cane handle, nylon strap, polythese sheets etc.

The desired shapes and dimensions are first applied to the willow clefts. For finishing, the willow clefts are divided into plain bats that have no marketing on the grain side. The clefts with knots in the defective terry armour are chosen for completion . The cane handle made of care with the insertion of rubber sheet is fixed with synthetic gue after the clefts have been manually shaped. After completing the bats are machine pressed. With liquid ammonia and hydrogen peroxide, the pain bats are bleached. Linseed oil is applied to some plain, unbleached bats in order to strengthen wood. The damaged items are wrapped with poplin cloth before having duco paint applied to them. Other are fixed with parchment and twin-wrapped and dried. After completion the cane handle is coated with twine and the rubber grip is attached to the handle with celo tape. The stickers are applied to the bats sides before being packaged for delivery.

The cricket bat's internal gear configuration has not changed delivering. Despite popular belief, improvements in other games can be quite endearing. The bat's standard configuration hasn't altered much that much because different manufacturers hold their standard system in high respect. The limitations of the rules may be the primary cause of this obvious lack of progress. The guidelines do not, however, reveal that alteration cannot be made. As we have observed there has been significant modernization of cricket bats and grips over the past ten years to further improve bat execution by using various materials.

Cricket bats were first used in India in the 1920s. They were fashioned from Kashmiri willow trees. The bats are heavier than English bats and are hammered for six hours before usage.

On March 11, 2010, Mongoose announced Matthew Hayden as the brand's ambassador and debuted its collection in India. Former Australian Test player Stuart Law described it as "a half-brick on a stick." In the IPL's 2010 season, Hayden made use of the bat. The Worcestershire all-rounder Gareth Andrew hit 100 off 58 balls against Surrey in 2010 at the Oval, becoming the first player in professional cricket to do it with an MMi3.

The Big Hitter bat for the T20 format was introduced by Lekka Cricket in 2008. The Joker, a bat for the T20 format, was later introduced by Black Cat Cricket in 2009. They utilized a similar design to previous T20 bats, with the exception that the adult bat's width was decreased to 4 inches instead of the standard 3 inches.

According to the International Cricket Council's regulations, a bat cannot exceed 38 inches (965 mm) in length, 4.25 inches (108 mm) in width, and 4 1/4 inches (10.8 cm) in width at the widest point of the blade. The size and shape of the bat depends on a batsman's taste. It is made from some of the best wood in the world and then generously rubbed with linseed oil from opulent areas.

When buying a cricket bat, the pickup, size, and shape should be kept in mind above all else. If you are a strong driver of the ball and enjoy stepping out to play your shots, you should choose a bat with a sweet toe based on your style of play. When playing against someone, a high sweeter area is ideal if you want to cut and pull the ball and attempt more aerial shots. When buying a cricket bat, the weight and grip are two of the most crucial variables to consider. If you can get these two crucial elements right, you're set to go.

Traditional cricket bats have a round toe base, rounded edges, and a curved rear profile. Traditional bats have more obvious sinking, which is done to reduce the weight of the bat while still providing thicker edges and deeper expansions, improving its get. Cricket hats with sunken back profiles are those in which the wood from one or both sides of the bats spine has been hollowed away.

Modern cricket bats have a full back profile, a sharp edge and a flat for base. Several profiles feature full, hardly curved backs. Modern bats really have a traditional profile with an adjusted toe, adjusted edge and curved rear.

Researchers have attempted to develop contemporary substitutes for cricket bats made of willow tree wood because the English willow (*Salix alba* var. *caerulea*) tree population is declining throughout England. A study by Dr. Darshil Shah and Ben Tinkler-Davies of the University of Cambridge, which was published in *The Journal of Sports Engineering and Technology*, found that cricket bats made of bamboo provide strength comparable to that of a willow bat while being thinner and lighter than traditional willow bats. The bamboo bat that the researchers utilised was a custom-made prototype laminated bat that was created by joining layers of bamboo wood. The bamboo bat's sweet spot outperformed a control region in a test by 19%.

In areas where the willow tree does not grow, such as China and South-East Asia, where bamboo grows, substitutes for willow, such as bamboo, can enhance the global expansion of cricket. As a result, bamboo cricket bats would be significantly less expensive than traditional willow bats, making the sport more widely available. In areas where the willow tree does not grow, such as China and South-East Asia, where bamboo grows, substitutes for willow, such as bamboo, can enhance the global expansion of cricket. As a result, bamboo cricket bats would be significantly less expensive than traditional willow bats, making the sport more widely available.

According to a statement from the Marylebone Cricket Club, the present set of laws prohibit the use of bats made of bamboo because Law 5.3.2 of the Laws of Cricket specifies that "The blade shall consist only of wood..." This Law would have to be amended to allow bamboo bats because bamboo is a grass. The message went on to say that the subject of bamboo bats and other willow-alternatives would be covered at the following Legislation Subcommittee meeting.

1.2. OBJECTIVES OF THE STUDY

- 1) To study how cricket bats are manufactures.
- 2) To learn how cricket bats are design for grassroots level cricketers to international cricketers.
- 3) To understand the study in depth about bats.
- 4) To study about different types of bats and bat balance.
- 5) To Study the method of selecting the right bat.

1.3. SCOPE OF STUDY

- 1) The study's format will include information about Cricket bats.
- 2) Cricket is an exceptionally well known Sports.It's core game of india. In childhood every child has been thought to play cricket as their first sports in india.
- 3) Due to the low cost of labour, modern bats are typically handmade on the indian subcontinent (India or Pakistan). However, a few professionals in England, Australia and New Zealand actually manufacture bats, typically using a CNC.
- 4) The districts of Jammu and Kashmir, Punjab, Haryana, Gujarat, Uttar Pradesh, and Rajasthan are where traditional Indian cricket bats are produced. The industry's traditional equipment with modern innovation.
- 5) Despite the fact that cricket is a 500-year-old sport, the bat has not been the subject of many scientific studies.
- 6) Mostly grassroot cricketers are less aware about the importance of cricket bats and how the bats are selected.
- 7) This study will provide budding cricketers with a wealth of facts and knowledge.

1.4. LIMITATIONS OF THE STUDY

- 1) The research is just on cricket bats as well as for sportsman who are interested in cricket.
- 2) Since the project is based on a primary study, a lot of time was required for the survey and we have limited our study to mumbai.
- 3) A person who is passionate about cricket as well as an understanding relevance of cricket bats in sports.
- 4) The amount of data accessible for this study is limited because the majority of it was gathered through articles published on various websites
- 5) The audience's responses can be prejudiced.
- 6) There will be multiple choice questions relating to cricket bats.

1.5. METHODOLOGY

The study is the first of its kind which was employed on the „All about cricket bats“. Mainly focused on types of bats and its willow according to players batting style and body language and also mostly concentrated on the thickness and sweet spot of the bat in various condition that would ultimately assist them in improving the game. Consequently, the study's purpose is to analysis performance. Mostly concentrated on the thickness and sweet spot of the bat in various.

The nature of the study is entirely distinct from all other studies in terms of players performance and in terms of other significant sports. Therefore, none of the approaches used in earlier studies were appropriate for this particular sort of research or disclosed it.

Primary research

There are fundamental method for gathering data utilising core methods like quantitative. This includes a survey with MCQs, check boxes, paragraph replies, and questions on a linear scale. These questionnaires were primarily distributed to cricketers in order to obtain their responses and analyse the data.

Secondary Research -:

The information for the study was gathered from the internet, websites, journals, research papers, and books.

Chapter 2: Literature Review

2.1. Literature Survey

I have searched and collected various research articles and practical papers and then reviewed this paper based on my scope of present study. Following are some important papers which I have referred and cited to complete my project work .

Ashish Kumar Katiyar , Syed Tariq Murtaza et al. [1], A review was carried out to identify published work on cricket bat design and development of its manufacturing. The majority of research into cricket bat has traditionally been directed at the problem of maximizing the speed of the cricket ball after impact with the bat. As development and popularity of the game is increases by seeing this entire thing basis carpentry skills were brought to put up with. There has been a major transformation in cricket bats throughout the history. The cricket bat, a wondrous thing of control and power, has attempted to develop from its 1860's incarnation. In the geometry and style, cricket bat changes constantly and the bat manufacturer & producers look to be different themselves, driven by materialistic need to make new models for every season. It echoes a previous burst of creativity at the start of the last century, but this time the guardians of the rules, the MCC, have taken a dim view of all this new cleverness by the manufacturers. The MCC decided the trend would tilt the balance in favour of the batsmen too much, where ball, pitches and boundaries have remained unchanged. So they modified Rule 6, and allow only 10% of 'non-wood' material in the handle. But the necessity is the mother of invention so once again in the light of MCC's rule of cricket bat characteristics and in spite of regular attempts made to include new materials and techniques for the advancement and modification of a new recent development in cricketing equipments and this CONCLUSION: 6 Available online at www.lsrj.in META-ANALYSIS ON THE DEVELOPMENT OF CRICKET BAT OVER THE YEARS little development in its implement based on modern technologies as unlike most major sports would be dominant in the era of modern cricket.

Mr. Rajshekhar Chimmatt, Mr. Shreenidhi Kulkarni, [2], There is difference in life of the bat determined theoretically and ansys. the reason being the minimum thickness of 25 mm is considered for theoretical modeling and actual thickness is considered for FE model. The toe edge turns to be weak spot in in the cricket bat, and this spot has to be avoided for repeated impacts. In reality the point of impact of the ball are different each and every time than the once considered in this work. Hence the actual life of the bat turns out to be higher than obtained in this work.

David Curtis, Georgina Hurt, et al. [3], Results of this pilot study suggest that cricketers without a high level of experience should not use the tapping test to rate the potential performance of a bat. However, a further study with a larger sample that also includes elite level players and experienced bat makers is required so that we can investigate whether reliability can be improved with greater experience and skill. An exploration of the relative influence of sensory response will also yield further insights to this pilot study.

Ben Tinkler-Davies, Michael H Ramage, et al. [4], Through characterisation of laminated bamboo using a range of tests, different material properties of bamboo were compared and contrasted with properties of willow. Laminated bamboo was found to have a higher bending and compressive stiffness, maximum surface hardness and coefficient of restitution, whilst having similar vibrational properties to willow. Although the specific tensile strength was significantly lower than that of willow, it was not deemed to be a defining failure mechanism. In contrast, the specific compressive strength of both materials were not very different, indicating that a cricket bat formed from bamboo would have similar failure modes and loads to those of willow bats.

The results of this study indicate that a cricket bat may be made from laminated bamboo. Computational analysis demonstrates that the laminated bamboo bat has a larger sweet-spot that falls closer to the toe of the bat, in comparison to a willow bat. The major difference between laminated bamboo and willow for use in cricket bats is the density, with laminated bamboo having a significantly higher density. Bamboo bats of the same dimensions as traditional willow

bats are much heavier, while the modern game is played using lighter bats. Future work should address different dimensions and designs of bamboo cricket bats to find the optimum shape and size for a wide range of uses, from training bats to professionally usable bats with actual benefits. Finally, the use of laminated bamboo could enable cricket to become a more sustainable sport, in the face of decreasing willow supplies and an increasing demand for bats due to the global outreach of the game.

Ashish Kumar, Syed Tariq, et al. [5], The majority of research studies revealed that the problems start with the cricket bat has traditionally been directed from those problems that encounters maximizing the speed of cricket ball after impact with the bat, flexural stiffness and vibration control, surface hardness of cricket bat. But the current study gives a brief overview on history and research being carried out on cricket bat handles. Recent advances in technology and use of materials have motivated a number of changes in design of cricket bat handle. Advanced composite materials are used to stiffen the handle and is purported to improve durability. While some studies suggest these advanced materials have not affected performance and more work is needed to quantify their contribution. This left a door open for possibilities to design innovative cricket bats. These changes are however under the control of the MCC.

Ashish Kumar, Syed Tariq, et al. [6], The first solid Manau cane handles were used in 1853, they were deemed to cause too much vibration which made the bat painful to hold therefore rubber laminations were introduced in 1856, the same handle materials as cane wood that has the tenacity and high in strength with rubber to dampen down the shock of the ball hitting the bat are used to this day. Three years later in 1856, handles took the form they have maintained until now. The handles that are used now a day that is similar to those were used in the 1850's. However, the procedures adopted in this current study are believed to be a more thorough investigation than was previously published literature. Therefore this study will identify the

required materials and manufacturing process of handles which might offer an alternative or out-perform the cricket bat handle (Calamus Manan) that is currently used.

Shamshad Ali, Syed Tariq, et al. [7], The preceding study is intended to determine and set new geometrical parameters for a referenced cricket bat handle due to geometric variations found in the handle. For this purpose, the researcher went through a thorough literature review to find out the published and unpublished research work carried out by many researchers, to improve the performance and effectiveness of handle's design and geometry of cricket bat in

relation to geometrical parameters, which are prime concern to player's comfort. And it had been noticed and observed that little improvements had done into the structural design during the present century with different blade & handle materials and in accordance to that, their geometry shapes have been modelled. However, very less work found in comparison to other sports. The researcher made the comparison on basis of past work and prevalence of more traditional designs of cricket bat handle, and so far some new and typical geometrical parameters are considered and established for a referenced Cricket bat handle, which in turn would be used in a cricket bat with having a detachable handle (Murtaza, Ali, & Katiyar, 2016) employed for further research work.

Bilal Ahmad Dar, Imtiyaz-ul-Haq, [8], The cricket based industry will provide employment to large number of skilled, semiskilled and unskilled people. The industry has readily available raw material especially willow and poplar for manufacturing of cricket bats. Other allied sports goods item like cricket balls, gloves, leg guard, for which raw material in the shape of sheep skin hides is available in abundance in the valley, the matter is the only providing the necessary know-how. Realizing the scope of the industry, State Govt. Should take initiatives by providing the industrial unit holders such kind of facilities which will encourage them to producing more at least cost and also helps them to export more and more products to outside as well as ease their work. Therefore, cricket bat industry will jump into national and international arena and create a place for the industry in competitive international market.

M Habib Noorbhai, Russell C Woolmer, et al. [9], The recommendation from this study is that coaches should encourage young cricketers to use the coaching cricket bat as it is perceived to be a potentially significant training aid for enhancing their performance and the direction of their backlift when they use conventional cricket bats in match play. The coaching cricket bat may be a promising training aid to train young cricket batsmen (ages 5–11) in order to develop the potential for striking the ball with power and timing. The coaching cricket bat, together with the training drill of hitting the ball against the wall, may have a positive effect on the backlift used by young cricketers, particularly if used for a minimum of 4 weeks. However, our findings are not conclusive and further research needs to be conducted with the coaching cricket bat over a season among young cricket players. The main findings of this study showed that the novel coaching cricket bat might be a promising training aid that can be used to train young cricket batsmen (ages 5–11) in order to develop the potential for striking the ball with power and timing. Another finding of this study has also shown that the coaching cricket bat together with the training drill of hitting the ball against the wall may have a positive effect on the backlift used by young cricketers.

Sarkar, Ajay Krishno, [10], This research was dedicated to an analysis of cricket bat swing using a novel technological tool. It was concluded that tiny inertial sensors can contribute in the following ways: (1) The limitations of existing cricket batting research methodology (bulk tools of video and opto-graphic systems) was outlined by reviewing the literature including several other sports implement swings. (2) A miniature sensor methodology in cricket bat swing research is introduced. (3) Signal processing features on sensor data to extract the key parameters of interest for bat swing analysis was presented. The device level errors and minimization techniques and validation of the sensor data were documented. (4) Results from the straight drive and defensive strokes were presented. Those results indicated that bat orientation, speed, categorisation of ball-contact on the bat surface, bat-hand couple during drive, bat height at the end of drive, effect of backlift height over bat control were easily determined using sensor data. A straight bat swing was mathematically represented with a pendulum with a moving pivot and

was used to analyse the dynamics of the recorded bat swing acceleration data. The sensor profiles could be produced using the solution of the equation imposing the initial parameters of swing. It facilitates the identification of the variations of initial angular velocity, radius of rotation in sensor profiles. A cosine square function of time could be matched for the bat angle during straight drive bat swing. The results from this novel technology were validated by using the video confirmation as used by many researchers in cricket batting research and found promising. The proposed methodology of using accelerometers has the advantages of 260 being small in size, cheap, having easy handling and data analysis features, and has been demonstrated to be a promising vehicle to a cricket coach in training and skill development program. Furthermore, the real-time data outcome features facilitate a feedback aid to the batters and coach about a stroke play. Direct numerical data recording abilities of sensors could facilitate the recording of the elite batters stroke play as standard techniques. This stored information can be used in coaching and to measure skill enhancement, where the existing methodology uses the human memory and video records. In this research 1 sub-elite, 7 amateur, 14 novice batters were used as subjects. This investigation used more novice batters as participants as their batting movements are not well developed. This results in a much larger variation between batters and between each of their batting movements. The next steps of using elite and sub-elite batters will provide the outcomes of standard techniques for formulating batting template for coaching and training. However, the outcomes using the subjects in this research could be the foundation of level of skills judgment, consideration of variations in techniques, notifying possible errors areas and improvement measures to establish a batting expertise development program.

Sam Fisher, [11], The main objectives of this thesis were to experimentally and theoretically analyse cricket bat responses, discover the locations of the sweet spots and establish how alterations to the design could improve performance and comfort. This has been achieved and has enabled certain conclusions to be drawn.

- Using material selection diagrams, willow was found to be the ideal material for cricket bat construction due to its overall superior material properties when compared to other wood species.

- Handle construction was found to have an influence on flexural stiffness and increased flexibility reduced hand loads and the vibrational frequency, thus improving perceived comfort.

- Static deflection was found to increase following the removal of sections from the back of the bat.

- The location of the COP was found to be 0.18m from the free end and was unaffected by structural design or impact speed. The benefits of the COP could be maximised following the use of a wide grip or with a bat of reduced stiffness.

- The position of maximum COR was located 0.2m from the free end and was not influenced by structural design or impact speed. The COR could be increased with a wide grip and a bat that exhibited limited deflection during ball contact.

- The lowest nodes of the first three excited modes were located 0.3m, 0.18m and 0.12m respectively from the free end. Only the third mode was found to be affected by the structural design, although clamping type had a considerable affect on node and antinode positions for all of the excited modes.

- The location of the COP and COR were found to correlate and the position of the node of the first mode was proposed to cause the elongation of the high COR measured along the face of the bat.

- An FE model was constructed, which represented an experimentally analysed bat to establish the influence of structural design changes. It was proposed that a cricket bat 277 should be 0.08m shorter, 22% thicker and without scoops to maximise player comfort and post impact performance.

T. H. Masoodi, Hillal Ahmad, et al. [12], The main objective of this study was to determine whether bat manufacturing units operational in Kashmir were sustainable entrepreneurial ventures or whether they exhibit a declining trend in terms of economic viability. The study also aimed to document the main constraints that confront the cricket bat industry in order to devise

future strategies and research needs that can help to exploit the full economic potential of this indigenous wood-based industry. The present study was carried out in a bat manufacturing cluster, which is composed of about 70 units concentrated on the Jammu–Srinagar national highway in the valley of Kashmir (India). Results revealed that the cost of manufacturing cricket bats decreased with the increase in the size of the industrial unit, indicating the existence of “economies of scale.” In order to make the cricket bat industry economically sustainable, a holistic approach needs to be adapted by the government of this state. In addition to a comprehensive package of general investment incentives, the promoters of this enterprise should be given special capital investment subsidy so that bigger units with state-of-the-art machinery and scientific seasoning facilities for willow clefts could easily be set up. Provisions should be made to give cost-reduction incentives to the manufacturers so that they could have an advantageous initial leverage to face the competition of established brands from India and abroad. Most importantly, emphasis should be placed on growing large-scale scientifically managed plantations of *Salix alba* var. *caerulea*, which is most suitable for crafting cricket bats to international standards. For every tree that is felled, growers should be encouraged to replant at least five willow trees to ensure a sustained supply of quality raw material to the manufacturers on a long-term basis. Maintenance of trees on a scientific tree crop time line is of paramount importance, because trees neglected for only 1 year (during their lifetime) will have little or no commercial value at maturity. The trees should thus be debudded up to the kink height so as to get the knot-free timber for crafting cricket bats.

V.Hariharan , PSS.Srinivasan, [13], One of the most frequent questions asked by people interested in cricket bat history is how bats have evolved since Bradman's era [8]. Bats used by Sir Donald Bradman and Sir Jack Hobbs were much lighter than those used by most internationals. The weight was in the region of 0.96 Kg (2 lbs 2 ozs) to 1 kg (2 lbs 4 ozs). The shape constituted a very slim profile with thin edges not more than 1.27 cm thick. The meat of the bat was also much higher up the blade to get the feather light balance desired in this era. A classic example is the bat used by Aravinda De Silva of Sri Lanka his bat weighs in the region of 1.36 kg (3 lbs) and have a longer blade with a very short handle. Sachin Tendulkar of India is

another batsman who has a bat that is 1.36 kg in weight. Tendulkar's bats are standard short handle size and have a very large profile with extremely thick edges. Steve Waugh of Australian cricketer he uses a bat that is a standard short handle and weighs in at about 1.14 kKg (2 lbs 8 ozs). Many cricketers playing high-level cricket today would choose to use a bat of larger mass purely to make the ball travel further when hit. Those who use lighter bats generally deflect the ball or stroke it, rather than hit it hard. It is not uncommon for a player to have a selection of light bats for test matches and a couple of heavier and chunkier ones for one day players. Using this computational method the ball exit velocity is quantified. Ball exit velocity is determined for various impact locations. By changing the combinations of ball and bat velocities the region which produces maximum ball exit velocity is between the range of 0.1m and 0.17m Modal analysis is carried out to locate the node points and the region of location of this node points. Relationship between the nodes and the region which produces maximum Ball Exit velocity is established. It is found that region between the two nodes produces the maximum ball velocity. This region is called as sweet spot. This region is lies between the 0.12m and 0.18 m from the bottom of the bat. This value is very nearer to the location of the ball exit velocity at different impact condition as shown in the Table-4. This finite element models provide an excellent simulation of the bat-ball impact and can be used to investigate the ball exit velocity. This modeling procedure yields a credible methodology for bat designers to use finite element methods to characterize cricket bat performance.

Chapter 3: Conceptual Framework

3.1. Concept

Cricket bats are a particular piece of gear required to play the game. In order for players to deliver the cricket ball at a quicker pace, there are many different types of bats produced by various companies; the most of them are constructed out of high quality wood that is shock resistant and robust. Willow wood is typically used in the bat's production. A developed lumber called cricket bat willow is frequently used to line expansive ranches in wetland areas.

This particular variety of willow is used because it is light in weight, incredibly intense, and shock-safe, not entirely marked or fragmenting on the action of a cricket ball when struck quickly. The client frequently applies a protective layer on the bat's material, typically made of a flat-fronted willow-wood blade with a cane handle. By gripping the bat and contacting the ground with it, a hitter can use it to avoid being run out while making ground. The bat's length and breadth cannot exceed 38 inches (96.5 cm) and 4.25 inches, respectively (10.8 cm). The first time it is used is in 1624. Cricket bats can only be made from wood according to a 1979 legislation reform.

Willow wood is typically used to make bats. A developed wood that is frequently used to fill up vast ranches in wetlands areas. This particular variety of willow is used because it is light in weight, incredibly intense, and shock-safe, not entirely marked or fragmenting on the action of a cricket ball when struck quickly. The client frequently applies a protective layer on the bat's material.

Through a join, the cutting edge is connected to a long stick handle with a tennis racquet-like design. An elastic grasp often covers the handle. A wooden spring design is fused by bats where the handle meets the sharp edge. The obvious banality "the sound of cowhide on willow" has been heard a billion times by every cricket fan, and clearly, bats are made of that kind of wood.

However, the cutting blades used in cricket are specifically made from white willow, or more specifically *salix alba*, which is native to Europe, the Middle East, and Central Asia. Despite its small weight, this wood is strong and shock-resistant, meaning it can withstand the quick impact of a cricket ball without breaking.

However, freely, the technique is as per the following

Clefts, which are often the size of cricket bats, are produced in a willow tree's trunk. Their closures are covered in wax before being cut into a more realistic-looking bat shape, and they are then allowed to air-dry for up to a year. The clefts are now divided into four levels, with the bat being examined by a competent worker. Rules take into account the direction of the grain, its width, any flaws, and other factors. It's important to note that although while a Grade 1 bat may probably look dominant, there is no guarantee that it will perform any better than, say, a Grade 4 bat that is placed lower.

The bat is subsequently put through a mechanism called squeezing, where a machine progressively compacts it into shape. The handle is then attached, which is crucial in giving the bat its almost spring-like properties. The sharp edge is then grafted at the top. After the shoulders are taken off, the wood is adjusted more specifically. The challenging way, such as adjusting the toe and cataloguing unnecessary parts. The bat is cleaned with honey bee wax after the edges and face have been sanded down. Chemical that helps keep moisture out while letting linseed oil in. The handle is constrained by a string, and modern additions like the elastic hold and the creator's stickers are used.

Over time, a number of little deviations from the ideal plan have occurred, most notably with Dennis Lillee's remarkable aluminum edge used in the 1979 Ashes, at least until it was temporarily outlawed.

More recently, the Twenty20 explosion has given rise to a variety of bats, the most noteworthy

of which being the Mongoose. The oddly termed edge's extra-long handle and smaller hitting surface likely contribute to its increased bat speed and exceptionally good balance.

Most bats require beating in to allow the thin strands to strike a hard new cricket ball without damaging the bat and allowing full ability to be moved to the shot when first purchased because they are not ready for surefire use. Thumping in entails striking the surface with an excellent hammer or an old cricket ball. As a result, the risk of the bat cracking is reduced and the fragile strands inside are compressed. Crude linseed oil, which plugs the gaps between the filaments, may also be needed by the bat.

3.2. Cricket bats manufacturing process

The International Cricket Council had provided the specifications for the manufacture of cricket bats, as we had mentioned in the making of cricket bats. According to cricket rules, a cricket bat's length cannot exceed 38 inches, its width cannot exceed 4.25 inches, its total depth cannot exceed 2.64 inches, and its edge cannot exceed 1.56 inches.

The umpires now have a bat gauge in modern cricket so they can examine the loyalty of the bat at any time. Therefore, acceptance of the International Cricket Council's guidelines is now required of all participants. Cane and willow are the main materials used to make cricket bats. Cane is used to create the bat's handle, and willow is utilised to create the blade. The characteristics of willow wood attenuate shock. When the ball is struck hard to bat, it moves quickly. That stress is absorbed by the willow wood.

The process of making a cricket bat includes several steps in order to produce the best possible bats. Various processes are included in the manufacturing process, from planting willow trees to playing cricket on the field. English willow and Kashmir willow are the two main types of wood used to make bats in India.

Step 1:- Plating willow trees and cane

Wood is the primary raw material used in the manufacture of cricket bats. And because willow wood has shock-absorbing properties, it is the primary wood utilised in the manufacture of cricket bats. In wet locations, willow trees are planted. For the manufacture of the bat, mature trees are used. 15 to 35 years is the typical time it takes for a tree to reach maturity, when trees are felled for bat production. After removing the old tree, two new ones are planted. The bat was made in an environmentally responsible manner. Cane planting comes next. The grass family includes perennial plants called cane. Manufacturing cricket bats requires cane. Cane is used to make the bat's handle.

Step 2:- cutting trees

When willow trees are mature enough to be used for manufacturing, they are chopped properly in accordance with the specifications and measurements of the ICC. The sliced pieces of the tree are given a shape after being cut. The blades are then put in drying rooms to finish drying. Six months pass during this process. Rubber and wooden glue are used to build the cane handle.

Step 3:- assembling blades and handle

The cricket bat's handle and blade must be attached after the trees have been cut and the moisture from the blades has been removed. In blades that have been cut to a specified length, the handle is added. Then again, the workers use the machinery to give the blades shape. High-skilled individuals are needed for this.

Step 4:- shaping to shoulders and handle

The next stage is to give the shoulders and handle of the cricket bat shape once the handle and blades have been assembled. The shape of the bat's handle is first given a spherical shape by delicate pressing, followed by the shoulders and handles.

Step 5:- sanding

Sanding begins after the bat has been produced and blended. It takes several paper evaluations to complete this laborious process to a high standard. Finally, brush sanders are used to create a beautiful, smooth finish.

Step 6: Binding

Binding is the process of wrapping the bat's handle in the highest-grade twine. High-grade twine is used to bind the handle. The bat is installed in a device that is operated by a foot treadle; the handle is whipped with twine and brushed with a stick, providing quality at the joint's head and along its whole length.

Step 7: Polishing

The cutting edge is then delicately polished with a compound wax, straightening the wood and giving it a lustrous silk sheen. Before use and regularly throughout the season, crude linseed oil is applied to the surface of a traditional wooden bat. This has a protective effect on the wood and also lessens its sensitivity to environmental moisture variations that could lead to twisting or separating. Another important aspect is that it increases the surface rubbing between the bat surface and the ball, improving chance control. The player can see a heavily utilised surface, indicating that re-oiling is required. Instead of using bubbled linseed oil, raw linseed oil is used since it doesn't dry like bubbling linseed oil does, leaving the surface looking worn.

Step 8: Labeling, gripping and knocking

The next stage after such a process is branding. The sticker is attached to the blade during branding near the top of the bat, where the handle is positioned in the blade. According to the players, different company stickers were layered on the blade. For improved handle grip, the bat's handle is wrapped in rubber after labeling.

When making a bat, knocking in is a crucial step that must be completed for the bat to be playable. The bat's blade becomes stronger as a result.

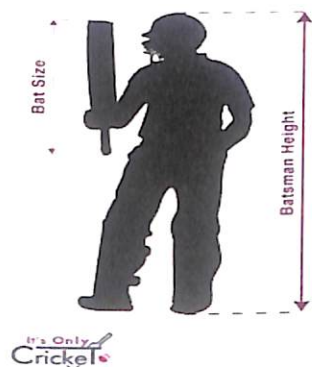
3.3. Dimensions of Cricket bats

The length of the bat may be up to 38 inches (965 mm) , the width up to 4.25 inches (108 mm), the overall depth up to 2.64 inches (67 mm), and the edge up to 1.56 inches, according to regulation 5 of the laws of cricket (40 mm). There is no standard weight range for bats, however they typically range from 1.2 to 3 lbs(1b 7 oz). More specific information was included in the laws of cricket's informative appendix B. In accordance with the monster bat incident of 1771, this standard was put forth.

The maximum length of the bat, which is still 38 inches (96.52 cm), has not changed since the 2017 amendment to the Laws, but additional specific stated that the bat's edge and depth cannot be greater than 1.56 inches (4 cm) and 2.64 inches (6.7 cm), respectively. The umpires are currently provided with a bat measure so they can check the legality of the bat whenever they choose.

There are many different sizes of bats available, and some manufacturers even have unique kinds. Kids' sizes 0 to 6, adolescent size Harrow, and adult sizes are frequently seen. The most popular adult size is SH (Short Handle), while long handle and long sharp edge options are also available. Kids get bigger as they grow, both long and wide. Although the majority of adult bats will have the maximum width permitted (4.25 inches), the average length of a cricket bat is 38 inches ,and very few bats ar longer than 35 inches.

Cricket Bat Sizing



Bat Size	Batsman Age	Batsman Height	Bat Length	Bat Width	Bat Weight
Junior 1	4-5 years	below 4ft 3"	25 1/4"	3 1/2"	1lb 11oz - 1lb 13oz
Junior 2	6-7 years	4ft - 4ft 6"	27 1/2"	3 1/2"	1lb 12oz - 1lb 15oz
Junior 3	8-9 years	4ft 6" - 4ft 9"	28 1/2"	3 3/4"	1lb 13oz - 2lb 1oz
Junior 4	9-11 years	4ft 9" - 5ft	29 3/4"	3 3/4"	2lb 1oz - 2lb 3oz
Junior 5	10-12 years	5ft - 5ft 3"	30 3/4"	4"	2lb 2oz - 2lb 4oz
Junior 6	11-13 years	5ft 2" - 5ft 5"	31 3/4"	4"	2lb 3oz - 2lb 5oz
Harrow	12-15 years	5ft 5" - 5ft 8"	32 3/4"	4 1/8"	2lb 5oz - 2lb 7oz
Light Short Handle	15+ and Adults	5ft 7" - 6ft 2"	33 1/2"	4 1/4" (max)	2 lb 5oz - 2lb 9oz
Medium Short Handle	15+ and Adults	5ft 9" - 6ft 2"	33 1/2"	4 1/4" (max)	2lb 8oz - 3lb
Heavy Short Handle	15+ and Adults	5ft 9" - 6ft 2"	33 1/2"	4 1/4" (max)	2lb 12oz - 3lb 4oz
Long Handle	Adults	6ft 2" and above	34 3/8"	4 1/4" (max)	above 3lb

Fig.3.1. Dimensions Of Cricket Bat

3.4. Types of Bat Handle:-



Fig.3.2. Types of bat handle

Rounded handle: Allows your lower hand to work more easily when taking aerial shots. As a rule of thumb, players who primarily attack with horizontal batting tend to prefer a rounded grip as it makes it easier to roll their wrists over the ball. Usually the choice of Asian players. For handicapped players who like to use their bad hands and want to feel bad on their grip.

Semi-Oval handle: This is a combination of oval and round grips, offering a slightly oval grip that is less noticeable than traditional oval grips.

Oval handle: Choice of many hitters around the world. The upper hand is usually known to aid in his control, take pressure off the lower hand, and help the hitter play with a "V". It provides a more direct feel and less torsion at impact resulting in less energy loss. Helps develop top hand dominant technique.

3.5. The Sweet spot of bat

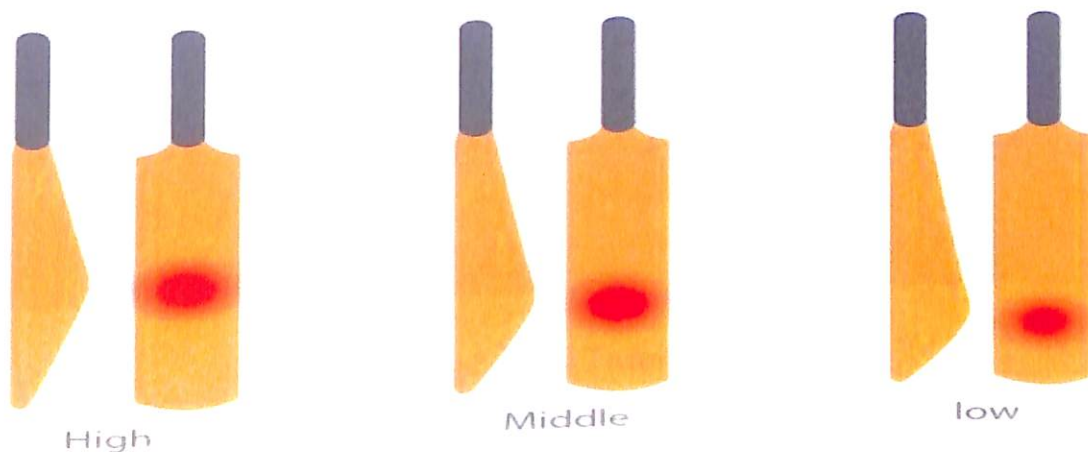


Fig.3.3. The sweet spot of bat

The sweet spot or center of the bat is most often the part of the bat where you want to hit the ball. Hitting the ball in the sweet spot will give you the most power from your shot. Center is determined by a profile running through the back of the bat.

High sweet spot: If you play a fast bouncing wicket, if you have a strong backfoot, touch his player, you will look for his spot high sweet.

Middle sweet spot: If you consider yourself a "total" batter, you're looking for his spot in the middle sweet. This means that if you enjoy front and back foot shots, you want to play all types of wickets and have the largest area in your sweet spot.

Low Sweet Spot: If you are a front foot player and play slow, low pitches, look for a low sweet spot. The low sweet spot is perfect for players who like to hit straight and go up.

3.6. Bat face



Fig.3.4. Bat Faces

Round face: This is the most common way to profile the face of a cricket bat. A round face is thought to reduce the chance of edge damage, allowing more rebound and the pin to stay centered on the racquet longer.

Flat face: This is a facial contour introduced in the early 2000s. Made to give the appearance of the big bats we know today. This allows bat makers to push the bat more easily to get a nice pin in the sweet spot. It takes a little while for the bat to "open", but once it does, the ball stays hit.

3.7. BAT PROFILES



Fig.3.5. Bat Profiles

Full Profile Minimal Concaving: With this club, very little wood is taken out in the rear of the club, so the wood stays where it really matters to ensure the maximum ping possible. , this form might fit. The pickups are still nice, well balanced and feel good in your hand, which is the shape most pros prefer, especially in his ODI/T20 format, due to the shot value you get with this profile.

Full spine: This bat is designed to ensure a lightweight pickup with slight indentations to control weight. This profile is recommended for players looking for a lightweight racquet that likes a straight spine down to the toes and has a sweet spot of medium to high. Great for players who play on their back foot and like to use their wrists to poke the field.

Duckbill: The duckbill profile adds thickness to the tip while helping capture a more balanced racquet. This is the bat profile preferred by many international players because of its balance and the amount of wood left in the bat in the hitting zone. Perfect for front foot players and slow, low English wickets. This bat is designed for larger bats to easily clear the rope.

Concave: For featherweight pickups, the ground are recessed through the back of the blade just enough to reduce weight while maintaining the intrinsic depth and mass of the wood through the core of the bat. A concave bat is one in which wood is hollowed out from either side of the backbone of the bat. Concave processing is done to provide thicker edges and deeper undulations and improve absorption while reducing the weight of the bat.

3.8. BAT LENGTH

Short blade 21 7/8 inch, standard blade 22 inch (regular length), long blade 22 7/8 inch. I recommend looking for a long blade only if he's over 6ft 3 tall. If you're looking for an incredibly light bat and a big profile, we recommend the Short his woods. The Standard Blade is our most popular blade length choice and matches the dimensions used to manufacture commercial cricket his bats.

3.9. BLADE PROFILE



Fig.3.6. Blade Profiles

Modern cricket bats have varying degrees of blade curvature (arc). The amount of bow on a bat is a personal choice, but it has some advantages.

Slight bow: This is a combination of a traditional bow and a heavy bow most common in the manufacture of cricket bats. The Indian sub-continental form is usually seen with a more pronounced arc, making the lead's suite lower in his spot, ideal for playing at slow, low pitches.

Traditional: Australian and New Zealand racquet makers typically make bats with less arc, so they have a higher sweet spot which is ideal for bouncy pitches.

Large bow: The large bow acts as a counterbalance, raising the cricket bat's center of gravity and assisting in shooting increase. It helps control the shot as the player's hands are placed further in front of the ball during contact. Works like a shovel for making higher (higher) shots, but with the risk of getting caught.

3.10. TOE SHAPES



Fig.3.7. Top Shapes of Bat

Square Toe: Square toes are commonly used by today's international players because they improve pickup and widen the sweet spot all the way to the toe. It also has less waste compared to round toes, which makes the toe box feel bigger.

Round Toe: The rounded toe shape is the most common toe shape used by gamers and helps prevent damage to the bat's toes, especially if they are constantly wrinkled.

Semi Square toe: The main reason for the half-square toe is that the toe is slightly offset, which helps minimize damage and shrinkage from tapping the crease.

3.11. How to protect your cricket bat

Cricket the bat plays a big role in cricket games. Each cricket fanatic must reproduce the components of their favorite players. Angles can include things like cricket bats, playing strategies, cricket grips, and size, among other things. However, cricket bats, which generally comprise bat brand, style, important specifications, and features, are the main key item that each cricket enthusiast purchases.

The cricket bat, though, is a necessary tool. Nobody wants to spend more money on another pair of cricket socks every week or month. In addition to playing cricket, one need take care of their cricket bats by protecting and maintaining them from any damage or cracks. The four basic methods for handling your cricket bats are listed below.

4 Possible Ways to Protect, Repair, And Maintain Your Cricket Bat:

- Thumping and Oiling
- Taping
- Toe-safeguarding
- Keeping up with Sock

Thumping and Oiling

The thump of your cricket bat provides security from its effects. Your cricket bats' cutting edges' moisture levels might be managed with the use of oiling.

Step-by-step directions for oiling and knocking in: Use a simple ball or wooden hammer to strike your cricket bat. Really enjoy banging the edges and face of your cricket bat before a match. Before using your cricket bats, try to lubricate them to reduce the risk of breaking.

Taping

Your cricket bats' break rate may increase since the two edges and face are essentially on the higher edge. But although tape is essential for your cricket bat, oiling and thumping in your best cricket bats is a way to protect your sock.

Step-by-step guidelines for Applying:

You will discover a few even breaks once the match or game is over, notwithstanding the bat. At that time, the fiber tape should be applied either to the entire playing surface or to the broken locations.



Fig.3.8. Fiber tape playing surface

Safeguard your cricket bat toe:

Even though there are frequently so many discussions about edges and faces, the major portion of the bat is still present, which is another form of insurance. If your bat strikes a fast cricket ball with little toe security, the risk of breaking increases and it can also impair the edge.

Guidelines for safety:

Applying a toe monitor to your cricket bat is an easy yet effective technique to protect your toe. This might ensure that your cricket bat lasts a long time.

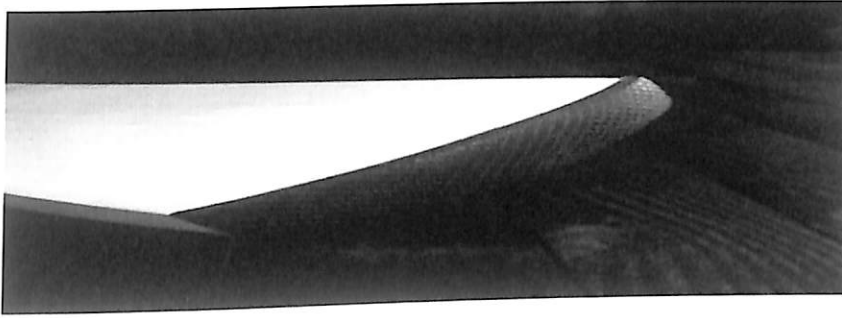


Fig.3.9. Toe Monitor

Deal with your cricket hat sooner or later:

The most difficult task is keeping up with your cricket, but in the long run, after use. By holding it correctly and effectively, you can give your but a life and care that are both generally fantastic. The most difficult task is keeping up with your cricket, but in the long run, after use. By holding it correctly and effectively, you can give your but a life and care that are both generally fantastic.

Instructions to Maintain:

Try to use bat wax or linseed oil every five to roughly a month and a half... Your bat's adaptability may increase as a result. Constantly maintain the hold of the incorrect sock position, for instance evenly. Put your hat in a dry, chilly place.



Fig.3.10. Bat Wax

3.12. Types Of Cricket Bats

English Willow Cricket Bat

The only willow that the flood of foreign cricketers chose was English willow. Every professional hitter wants to use the English willow bat, thus it has been mass-produced. Because it is the only willow that lends the cricket bat contraction and hardness, the English willow bat is well-liked. An indigenous species of willow in England is known as English willow. It is recognized as a white willow as well. English Willow bats come in five main grades (1–5), with grade one being the highest quality and having the straightest grains. However, they cost a little more than normal bats do.

Kashmir Willow Cricket Bat

Kashmiri willow is manufactured from Kashmiri wood, as its name suggests. In India, Kashmir willow, a highly prized wood, is used to craft cricket bats. Both in appearance and dependability, Kashmir willow bats differ from English willow bats. We can easily identify Kashmir willow bats from English willow due to their brownish color. The Kashmir willow bat is handcrafted,

This accounts for its slightly higher price. The Kashmir willow bat weighs incredibly little. Every beginner chooses to play with a Kashmir willow bat, which is driving the market's expansion. The Kashmir willow bat weighs incredibly little. Every beginner chooses to play with a Kashmir willow bat, which is driving the market's expansion.

Softball Cricket Bat

The softball cricket bat is solely used for casual local or gully cricket; it is not used in international cricket. This bat is made of premium wood or fiber and soft rubber. These cricket bats are not used by professional cricketers. A softball cricket bat costs less than an English and Kashmir willow. These cricket bats are used by kids to play at home or in gullies. But it might be the best equipment for youngsters to learn cricket at an early age. Cricket softball bats are now readily available for use. Although these bats need to be knocked in or oiled, unlike softball or tennis ball bats, power is not necessary to strike the ball.

Training cricket bats

A training cricket bat is generally utilized as a piece of cricket gear to aid in skill development. These bats can be built by a producer or with Kashmir willow or English willow since they are not made from a single willow. This cricket bat is utilized in professional cricket. These cricket bats are available in a range of widths and sizes. A training cricket bat typically has half the width of a standard cricket bat. Coaches can use these kinds of cricket bats as a weapon during practice sessions, which is quite effective. Similar to other professional cricket bats. During the learning period, cricket bats are additionally pounded in and greased.

3.13. How to buy a Cricket Bat?

The right cricket bat you use can make a huge impact in your performance. Check out some helpful advice on selecting a cricket bat so you can play your best.

Having the ideal tools won't make you a better player. However, equipping oneself with the greatest and most dependable tools can only help you up your game and demonstrate your abilities in the best light.

Cricket is a highly technical sport, and success frequently depends on which players have the finest tools. How do you pick a cricket bat, though? It can be confusing with all the various brands and types available.

Let's go through six factors that will assist you in making the greatest cricket bat choice.

1. Choose the Right Size for You

Various sizes are available for cricket bats. Although you might believe that a bigger bat is preferable, this is not. Large bats are harder to wield if you're a smaller player. It's important to match the bat size to your height when using a bat. To determine which size bat will be best for you, look up a height to size chart online. For reference, individuals between the heights of 5'3" and 5'5" often use a size 6 bat, while individuals over 6' typically use a long handle (LH) size bat.

2. Bat Type

Cricket can be played using a variety of balls, including tennis, foam, rubber, and leather. When buying a bat, keep in mind the kind of cricket ball you'll be using. Tennis balls are easy to handle. Tennis balls are such a lightweight ball that you don't need a bat that is excessively thick or hefty for those who play with them. However, rubber and leather balls are heavier. The strongest and heaviest cricket bat is designed for leather ballplayers. To apply the same force to these ball varieties, a thicker, more robust bat is needed.

3. Bat Weight

In addition to length, bat weight is a significant element that can significantly impact your performance. Bats that are heavier have more durability and may hit the ball harder. But for certain athletes, the added weight can be more difficult to manage. This may impair your bat control or prevent you from swinging the bat quickly enough to really strike the ball. Lightweight bats are simpler to use, demand less physical effort, and can increase your overall bat speed. Some people believe lighter bats are weaker and decay more quickly.

4. Willow Grade Differences

A distinct "grade" of willow is used to make several sorts of cricket bats. English willow and Kashmir willow are the two primary varieties of willow. Overall, English willow outperforms Kashmir because it is more dependable, durable, and "springy." English willow costs more, though. For individuals seeking to play cricket for the first time or on a budget, Kashmir bats are excellent. You can choose a cricket bat that suits you and your budget from our large range of bats at various price points. In addition to willow kind, grade should be taken into account. The grades are from 1 to 5, with 1 representing the highest level of construction, dependability, and quality. Naturally, Grade 1 is also the most expensive. When choosing the grade of the bat, take your commitment to the game, your budget, and your degree of talent into account.

5. Bat Based on Batting Style

When selecting a bat, you should also consider your personal hitting style. Also, don't forget to machine or hand knock the bat.

Drivers:- A "low" bat is for you if you mostly hit hard drives and straight shots. The "sweet spot" of these bats is concentrated lower on the bat, away from your hands. Your ability to hit the drives you want will be made easier by your positioning and the specific manufacture of the bat.

Although it won't improve your driving, it will feel fantastic when you hit the ball exactly on that low area.

Front foot batters:- Players that frequently use their front foot benefit from using a bat with a "sweet spot" that is directly in the middle, also referred to as a "medium" positioning. A medium bat is, as its name suggests, a combination of low and high bats. For general batters and batters that play off their front foot, this is a fantastic option.

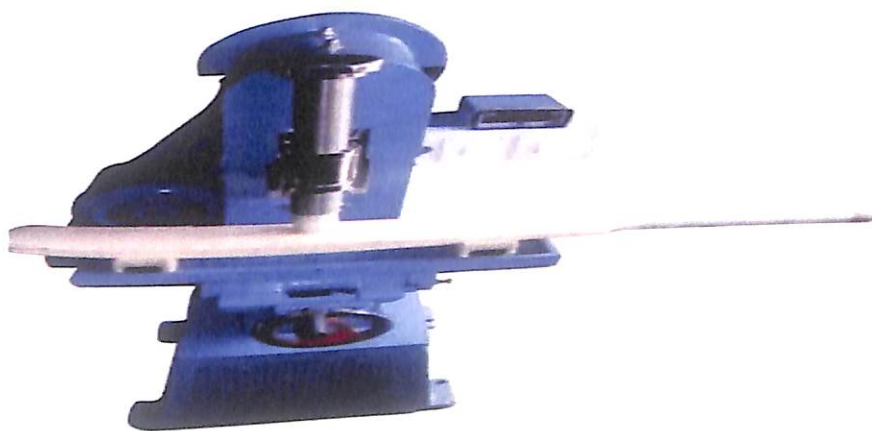
Hooks shots/cuts:- Do you like more elaborate photos like these? Do you tend to play more on the back foot? A "medium-high" or "high" bat would be appropriate in that case. These hits are made simpler and more effective by the "sweet spot positioning" 's up and in the direction of your hands. Due to their light weight and rounded bottoms, which are less likely to shatter, the Vintage and Retro series bats are more popular these days among young people.

6. Handle Type

The type of handle is the last item on the list. This is a crucial component of the bat, and it should come as no surprise given that you can't control the bat well if you don't have a secure grip. To prevent you from feeling the ball in your hands, the handle should also deflect the ball's grip. To prevent you from feeling the ball in your hands, the handle should also deflect the ball's contact and shock. Typically, handles come in two shapes: oval and round. Strong and giving you excellent bat directional control are oval handles. One drawback is that some people have trouble grasping it. With oval handle bats, the top hand usually ends up having the majority of the control. Bats with round handles are simpler to manage with either the top or bottom hand. For athletes that flick their wrists during batting, this is crucial. Round handles also make it simpler to secure a strong grip, which is important for power hitters.

PROCESS OF KNOCKING A BAT

The procedure of knocking in involves getting a cricket bat ready for usage. The bat becomes stronger as a result of the willow fibers being compressed. It is accomplished by striking the surface, edges, and toe of the bat with a mallet. Oiling and knocking-in both extend the life of the Bat.



Cricket Bat Machine Knocking

Have you ever purchased a brand-new bat with the phrase "ready to play" sticker and used it the following day in a game? If the answer is yes, you did the worst possible thing to your new bat. This is a novice error; you ought to have used the hit to sharpen the bat. Balls or a mallet can be used to knock manually or using a machine.

A lot of bats are already knocked. Several questions must arise in your mind as you consider this, such as how to knock with a bat. What are the benefits and drawbacks? What equipment is needed for the procedure? How can I tell whether my blade is prepared for use? You've come to the correct place if you have queries similar to these but can't find answers since this article will guarantee that all of your inquiries are answered.

Here is a comprehensive manual for breaking in your new bat.

Advantages of machine Knocking

Cricket bat machine knocking can be performed manually or using a machine designed for the same function. Before using a bat in competitions or any kind of matches, knocking is necessary because, during the manufacturing process, the bats are compressed to form a barrier to take hits from a leather ball. However, this compress is insufficient, so knocking is done to protect the bats and increase their longevity.

The barrier created by compression is strengthened by knocking, preventing the bat from breaking upon impact. In order to prevent the edges from straying outside the bat's grain, they must be rounded off during the knocking motion.

Disadvantages of machine Knocking.

But knocking a cricket bat doesn't have any particularly negative effects. Your bat could be damaged if suitable technique is not performed. For instance, many individuals hold their bats in the middle and use a mallet to strike the toe region of the bat, breaking the handle. The glue used to hold the handle together becomes less strong as a result of vibrations that pass through the toe and into the handle.

Cricket bat knocking machines, sometimes referred to as automatic knocking, cannot perform adequate banging if edges are not rounded off. To do this, knocking should be done in a circular manner using a hammer or mallet.

Also, it's crucial to avoid using a mallet to knock the region directly below the sticker because it's the most sensitive and doing so will cause more harm than good. It is important to vary the force of the mallet hits as you move from the toe of the bat towards the handle; hits at the bottom can be trickier than hits in the center.

Is the machine knocking enough to go on the ground?

The idea that bats knocked by machines are prepared for use is untrue. Although you can play with them, they will break or crack when a fastball strikes them.

Because the grains of the bat are squeezed at this point to strengthen it, manual knocking is often referred to as magical knocking. If the bat is not knocked properly, its performance is diminished. You cannot fully utilise machine knocking without manual knocking. While machine knocking will give you a decent punch, hand knocking will properly open the grains to their fullest extent and round the edges, which is not achievable with machine knocking.

Online sites making you fool by saying 5000 or 9000 knocks on every bat

As was already said, it is crucial to knock in your bat, but many websites online claim that pre-knocked bats are acceptable for use, which is false. Pre-knocking-in can aid in the knocking process, but it is undoubtedly insufficient. Some assertions made by websites online are rarely true. There is no way for you to verify these claims, but a descriptive bat that says "9000 knocks" does not always mean that the bat has been knocked in 9000 times.

As each willow is unique, only one standard can be utilised to perfect them all. The frequency of free knocks being given off the bat is merely a marketing ploy. Anything above this will simply harm the bat because in some good English willow even 3000 hand knocks are sufficient and give the best punch and open up the grains. It is not the number; rather, it is the knocker's level of expertise or experience.



Hand Knocking process

It's crucial to knock the bat's vertical midsection, or the area where the sticker goes, less forcefully than the toe. If the edges aren't manually knocked in, the ball will fall to the ground, which can be harsh. Some edges may slightly crack, but don't worry about that. You shouldn't bang the bat's back in. Oiling or knocking in the bat's splice is useless because in actual matches, this component is never used to strike the ball, and hitting it with a mallet will loosen the glue.

How do you know if a bat is knocked in?

Everyone agrees that it takes 6 hours to knock in a bat, but nobody ever does it all at once. Also, before knocking, the bat must be greased, then dried off. It takes several days to complete. The bat has not fully knocked until you notice that your grains have barely opened up. Even when knocking is finished, you should take the bat to batting practise to make sure it is practically ready to be utilized in games.

What's the right way of hand knocking?

Use a mallet while hand knocking or manually knocking. For maximum results, knocking in the bat should be done properly. The mallet should knock the bat in a circular motion, varying the force of each strike according to the area of the bat being struck. It is best to clever knock your bat

uniformly, beginning at the toe, knocking in a straight horizontal line (from the toe to the middle or from the middle to the toe), and continuing in the same manner as you approach towards the sticker. Never attempt to strike or knock the bats back.

How to oil a cricket bat?

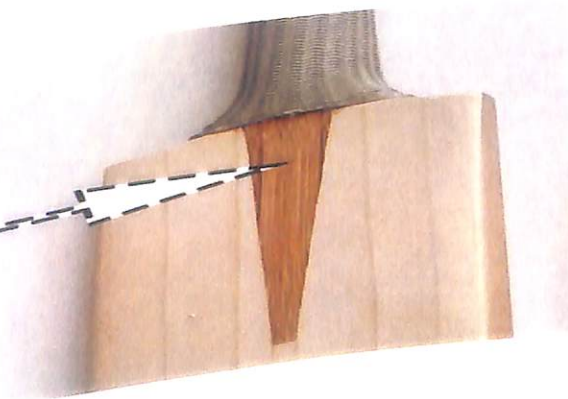
It's crucial to oil your willow before playing. The bat needs to be lubricated and then dried to get rid of any extra oil before the knock-in process can begin. The best technique to oil a bat is to take one tablespoon of oil, dip a cloth in it, and wipe the bat's face with the oil-covered cloth.

This will guarantee that the wood is oiled and eliminate any concerns you may have about too much oil. The scuff protector wears out after about a year, at which point you can oil that area as well. Be careful not to oil the stickers and the scruff protector.

Use very fine sandpaper to clean the surface before oiling, but don't go overboard. It is not recommended to oil the bat's handle or splice because doing so degrades the adhesive binding them together. Keep the bat horizontal with its face parallel to the ceiling when the oiling procedure is finished.

The following morning, reapply a very thin layer of oil to the bat and clean the surface with sandpaper. The bat should be left horizontally with its face parallel to the ceiling for a further 24 hours. A maximum of three times can be used to repeat this operation, but two should be plenty. Now that the bat is prepared for use, any remaining oil should be removed using fine sandpaper.

Splice



Chapter 4: Research Methodology

4.1 Primary Data:

The questionnaires were delivered as a Google form and disseminated to professional Cricketers, Cricket coaches, sports management students and people who are interested in cricket to collect primary data. To better understand about Cricket bats, around 10 questions were handed down to various groups of people in the form of a questionnaire.

4.2 Secondary Data:

The study's data came from a variety of sources, including websites, journals, research papers, books, and the internet. Secondary data was acquired from websites, including publications, journals and other sources. The majority of the data was gathered from articles that have been updated on the internet.

4.3 Nature

To achieve the project's goal, an investigative survey method was used. The material needed to meet the study's goals was acquired from a range of primary and secondary sources.

4.4 Type of Research

This study is descriptive in nature. It helps in breaking down large problems into more manageable ones and places a focus on coming up with fresh concepts and insights.

4.5 Research Design

Research design relates to the study's plan, technique and means for answering research questions. As a result, it is a design, a replication or a blue for completing a task. Professional cricketers, Coaches and Non-Cricketers of all ages have participated in the study. The sample was chosen using a convenient sampling approach, and an effort was made to include Cricketers, Coaches and Non- Cricketers of all ages with replies coming from both male and female genders.

4.6 Sampling Design

The descriptive examination arrangement is used in this research effort. We'll use a judgement and convenience inspection technique to get information about people views and opinions. This method is used because we are interested in examining orientation, age, or occupation discrepancies for cricket bats in the general population. For the purpose of directing this investigation, a planned survey is prepared and cricketers, coaches and non cricketers are subjected to testing.

4.7 Statistical tools and Technique

The information thus acquired will be examined using quantifiable techniques, such as pie charts

4.8 Sampling Size

It displays the numbers of people who need to be examined. Although large instances produce more reliable results than small ones, the sample size was capped to 67 respondents due to time and resource constraints. The responders have access to a variety of calling and pay groups.

Chapter 5: Data Interpretation

5.1. Techniques Used To Interpret Data

Pie Chart is used for interpretation of data , survey and analysis of responses received.

Numbers of total Respondents: 67

5.1.1 What is your Gender?

- a. Male
- b. Female
- c. Other

Gender
67 responses

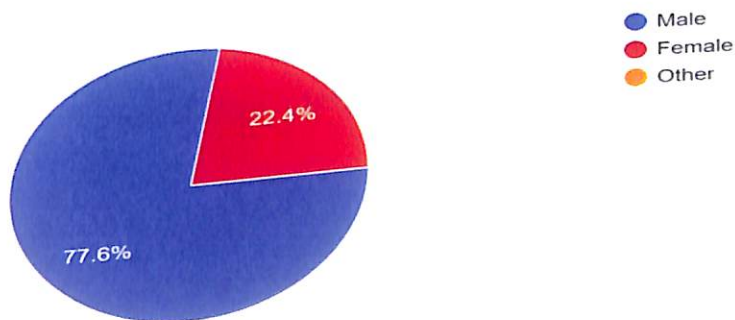


Fig.5.1. Gender Analysis Survey Chart

Gender was a key component of the survey. Male, Female and other were the available options for the respondents. Male viewers make up 77.6% of the entire audience. While 22.4% of the audience is made up of women. No votes have been received from other. There are 67 respondents overall, 53 men and 14 women, who have completed the survey. The study shows that there are more male viewers than female viewers.

5.1.2. What is your age group?

- a. 10-20 years
- b. 20-30 years
- c. 30-40 years
- d. 40-50 years
- e. 50 above

What is your age
67 responses

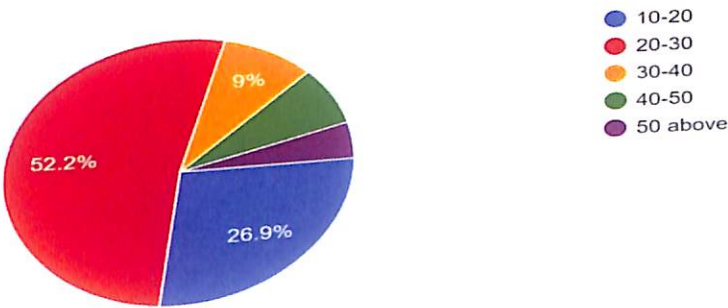


Fig.5.2. Age Analysis Survey Chart

The respondents age group was one of the important questions to ask because it was necessary to categorize which age group has answered to the particular questionnaire the most frequently. According to the graph above, the majority of respondents are between the age of 20 and 30. Ages 20 to 30 are represented by 35 of the 67 respondents. The age range of 52.2% of those surveyed is 20 to 30. Only 50 above 4.5% or 3 people answered the questionnaire. Which was the lowest of the options available. 26.9% of the population are between the age of 10 to 20 and 18 people were answered. 9% or 6 people have respondents between the age group of 30 to 40, and 7.5% or 6 people have respondents between the age group of 40-50. According to the study maximum participants the age of 20 to 30 replied to the questionnaire.

5.1.3. Which format of cricket and level do you play?

- a. Professional leather cricket
- b. Professional tennis cricket
- c. Just for entertainment purpose

Which format of cricket and level do you play?
67 responses

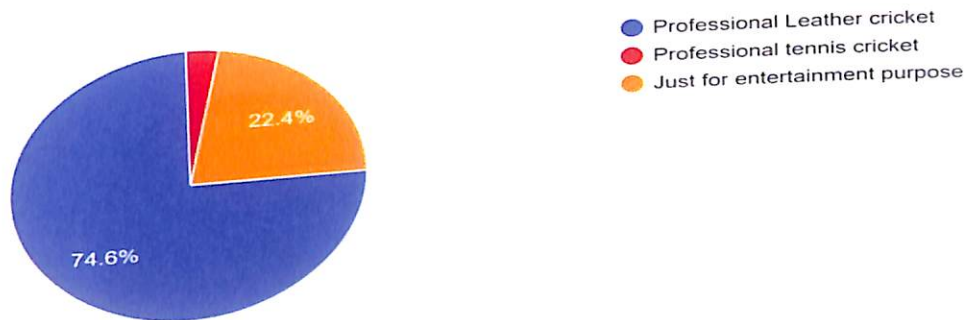


Fig.5.3. Cricket Format/Level Survey

In the above pie chart the question was asked to the respondents which format of cricket and level do you play?. As we can see the highest percentage is 74.6% are playing professional cricket. That is 50 people out of 67 respondents and the 22.4% with 15 people are just playing cricket for entertainment purposes and 3% of 2 people are professional tennis cricket players. According to the study maximum participants are professional leather cricket players.