CONCLUSION
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Popper’s and Lakatos’ concept of the methodology of science differ on certain crucial points. They both have common base or rather say Lakatos develops his concept of methodology of science from Popper’s concept of methodology of science. This thesis has attempted to critically analyze and compare the methodologies of both these philosophers to come up with the hard core problem of methodology of science.

The brief history of methodology of science is presented in this thesis. The first chapter of the thesis brings out the contributions to the methodology of science by early philosophers. Philosophers like Aristotle, Ibn-Sina, Ibn Al-Haytham, Al-Biruni, Al-Rahwi and Abu Jābir’s concept of methodology of science is analysed to understand the historic and evolutionary perspectives on methodology of science. There is a major shift in the way methodology is analyzed right from times of Frasis Bacon in the field of science. ‘Induction’ as the methodology of science was introduced by him in the field of philosophy of science and later improvements made by his followers and successors in this concept are analyzed. The concept and working of induction is also analyzed on the light of Hume’s critical rejection of induction. The probabilistic version of induction also analyzed. The discussions lead to understanding that that induction cannot be taken as a unified methodology of science. Popper’s falsifiability and Lakatos’ research programmes are consequently introduced as important methodologies of science. Kuhn’s paradigms and Feyerabend’s anarchistic ideas on the methodology of science is considered for
extensive study on methodology. In the brief theses methodologies and their stand on the theory dependent observation is studied.

The debate between theory free observation and the theory dependent observation is presented in detail. How the concept of pure observation loses against the theory dependent observation is further analyzed through different approaches. The psychological arguments; and arguments of Popper, Feyerabend and Kuhn against the concept of pure observation are presented to show the theory dependent nature of observation. The observation statements, the language through which one represents the perceptions are analysed. Popper’s concept, of ‘basic statements’ and its merit over the ‘protocol statements’ by Carnap and Neuroth, is given. It is in resonance with Popper, Lakatos and Feyerabend that the pure observations are not possible in science. Any observation depends on some theory.

Poppers concept of concept of methodology of science is presented and critically analyzed under three heads namely; foundational problems, methodological problems and axiological problems. Under foundational problems, Popper’s concepts; conjectures, refutations and the problem of demarcation are analyzed. For Popper there is no pure observation in science, science starts with a problem and a solution is proposed by the scientist in the form of a hypothesis which he calls a conjecture. For him the scientific knowledge is not absolute, it is only doxa, against the absolute idea of knowledge episteme. In his regard his arguments against Bacon’s concept that science has absolute knowledge, episteme which is different from a guess work, doxa.
For Popper the conjectures or hypotheses act as theories in science and their validity is tentative, they are regarded as true as long as they are not refuted.

He argues against the inductivist’s concept of a single logical method to arrive at theories and comes up with the negative appraisal of the theory. A conjecture is put forward and now it is logically possible to refute the conjecture comparing it with an observational instance and till a conjecture is refuted it is taken as a valid solution to the problem. This refutation becomes the basis for demarcation in Popper’s philosophy. A theory or a conjecture is to be claimed as scientific if it has the characteristic of falsifiability. When proposing a theory, there should be at least one observation instance such that, if the outcome of the observational instance goes against the theory, the theory should be rejected. For Popper, this criterion of falsifiability solves the problems of demarcation in science. An analysis of the foundational problems of science points out that, Popper’s demarcation criterion, ‘falsifiability’ is not adequate to explain the scientific nature of a complex theory. It is shown that the falsification of a theory may be due to the falsification of a sub theory which is used in the experimentation part of the theory. So the falsification of a theory cannot be due to the theory itself and this will be common in the case of a complex theory which has many sub theories.

Under the methodological problems the concepts like Degree of falsifiability, clarity and precision to give theory appraisal, bold conjecture, Measures to Test the Degree of Falsifiability and corroboration are given. A bold conjecture is
always preferred in science and the more a theory predicts the more is its degree of falsifiability. The theory with high degree of falsifiability stands against all the tests then that they are well corroborated. Criticism against the methodological problem of Popper is presented with respect to the inconsistency of the falsifiability criterion. Popperian distinction between ‘falsification and corroboration’ is logically sound but it loses its ground in the practical application because non-corroboration is not necessarily ‘falsification’. This point makes the basis of Popper’s demarcation problem inconsistent.

Under the heading axiological problems; concepts like, Progress of science, Ad hoc modifications, Auxiliary Hypothesis and growth and Verisimilitude are discussed. Progress of science depends on the process by which a falsification of a theory leading to a new problem and a new solution to the problem. This process goes on in science providing the growth in science. Ad hoc modifications and auxiliary hypotheses are not allowed to explain away the anomalies against a theory. The concept of verisimilitude is discussed in detail and in the criticism points out the problems associated with it. In real realm of science the degree of corroboration and verisimilitude concepts in Popper could not be found satisfactory. Popper’s theory could not give a satisfactory theory appraisal.

Towards the end the problems of Popper’s philosophy are put together to argue that it is not enough to explain the scientific process.
Lakatos philosophy is also presented under three heads; foundational problems, methodological problems and axiological problems. The foundational problems focus on how a historical account of methodology of science is developed in Lakatos. Lakatos develops his methodology of research programmes from Popper’s falsifiability. Lakatos identifies three notions of falsifiability in Popper. The dogmatic falsification, methodological falsification and sophisticated falsification are the three notions. He analyses all the three to praise the sophisticated falsification and from it he reaches his concept of research programmes. The components of a research programme; hard core, Auxiliary Hypotheses, Positive heuristic and negative heuristic, Protective Belt and Initial Conditions are discussed in detail. The roles of theory dependant observation and language of the theory are discussed. In the criticism of the foundational problems the irrefutability of hard core is critically analyzed.

Under methodological problems the concepts like, work within a research programme, Progressive and degenerative research programmes and testing the methodology against history are discussed. When a research programme provides corroborating novel predictions, it is considered to be progressive and if a research programme is not providing any corroborating novel predictions and if its auxiliary hypotheses and ad hoc modifications increases a lot then such research programme is called a degenerating research programme. In the criticism against the methodological part of research programme brings out the inability of it to distinguish between a progressive phase and degenerative phase of a research programme.
Under the axiological head the concepts like, Progress associated with Research Programmes and No programme is degenerated beyond hope are discussed. The progress in science takes place when one degenerating research programme is taken over by a new progressive research programme. The new progressive research programme must have more corroborating novel predictions against the old one, but the problem of Lakatos’ idea of progress rests with the concept that no research programme is degenerated beyond hope. He thinks it is rational to think that a degenerated research programme at any point of time can come up with a corroborating novel prediction to revive itself.

In the fifth chapter a comparative study of Popper and Lakatos is under taken. Here the comparison is done discussing the points on; Popper and Lakatos on Theory Dependent Observation, Demarcation of Problem: comparison of Popper and Lakatos, Popper’s metaphysical research programmes and Lakatos’ research programmes, comparing the methodologies of Popper and Lakatos, crucial Experiments: comparison of Popper and Lakatos and difficulties in methodology of science. The comparison of Popper and Lakatos on theory dependent observation brings up the argument that, as per Lakatos the theory dependent observations get a new meaning with the consideration of language of a research programme. Lakatos with this notion holds a better position to explain the role of theory dependent observation in the research programme. The demarcation criterion of Popper is not able to stand up to the test of historical checking and this problem is covered in Lakatos to an extent. His
research programmes are grounded in the historical reading of science. The progressive nature of the research programmes and the taking over of a degenerative research programme by a progressive research programme brings in the concept of scientific natures. For Lakatos, this process provides research programme the scientific status. This method consists of defects and in the end of the fifth chapter of the thesis an attempt is made to correct these defects in Lakatos theory. The comparison of Popper and Lakatos on crucial experiments reveals that Lakatos position is much stronger. Historical evidences give support for Lakatos in rejecting the idea of crucial experiment. There is no single experiment which if goes wrong, the theory in question is thrown away. The metaphysical research programme of Popper is shown as different from Lakatos research programmes by showing the difference sense in which Popper and Lakatos uses the term, ‘metaphysics'.

Lakatos’ research programme is an improvement of Poppers falsification. It is shown that Popper’s reluctance to take in the idea of series of theories working as a group is the deviation point of Lakatos from Popper. Finally it is argued in thesis that some corrective measures in the methodology of Lakatos can explain the methodology of science. Here the concept of tradition in Poppers philosophy is taken in and this concept goes well with Feyerabend’s consideration of science as one of many traditions of inquiry into knowledge. The Tradition is taken as the back bone of historical checking of the methodologies of research programmes. The criticism against the hard core of research programme is explained with the tradition. Tradition is what helps one to impose the concept that hard core is irrefutable. Lakatos’
reluctance to eliminate the degenerating research programme has to be removed. A degenerating research programme can be eliminated and the rationale that it may become progressive can be kept safe by suggesting that an anomaly with any progressive research programme can bring back an eliminated research programme because of its degeneration. This elimination of degenerated research programme which is not making any corroborating novel prediction makes the demarcation problem in science very clear. The progress of research programmes by the elimination of a degenerating research programme with a new progressive research programme constitutes the scientific character to the research programmes. If a research programme can be tested in this fashion it is considered as scientific and the tradition in which it includes also gets the scientific status.