INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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SHORT ABSTRACT

Design is considered as creative human activities which focus to improve living for all categories of people. Humans are weaving cloth through handloom and powerloom to fulfill their one of the basic needs in life. Handlooms have a long history beyond the available ancient history. Over the time, handloom improved through many inventions towards making powerloom available today primarily from industrial revolution. Whereas handlooms have many special features over powerloom like making tailor made fabrics for small quantity etc. These features are still fulfilling the special human needs through creative weaving by handloom which are not fulfilled by powerloom. Also, handloom sector is second largest employer after agriculture in India. It shows the number of people involved in the sector and its unique positioning in the textile sector. Exports of these handloom products have a huge opportunity in various countries of the world. Existing handlooms are very inefficient in production and tedious to weave, causes various work related musculoskeletal disorders to the weaver. It is found that very few research work have been carried out to improve directly to the weavers working conditions in compare to number of weaver affected in the handloom sector. In this research work, it has been studied to improve the handloom weaving through design intervention for commercial application useful in handloom cluster with higher productivity in reduced effort.

Existing handloom were studied through online and on field to know the state of art. Aim of initial study was to know working sequence of the loom by reviewing mechanism involved in different motion of the handloom and scientific study to improve efficiency of the handloom with ornamentation in weaving by low effort of weaver. There were people of research and academic institution who have initiated to improve the handloom. They majorly did this by imitating the mechanism from power loom. These semi-automatic handlooms with imitated mechanisms are very

difficult to operate manually as they were made heavier to run by power. Handloom is made up of wood in general, whereas mechanism made by wood material cannot sustain for long due to wear & tear. Also, there is a concern to get suitable wood now a day. Maintenance is another problem with wooden non standardized handloom due to lack of expert carpenters. All these issues cumulatively make existing handlooms inefficient for commercial use and non-likable by surrounding weavers. This same issues have been concluded by the subcommittee made by government, to resolve and finalize the definition of handloom over getting benefit of reservation of products which can be made by only through handloom and not by power loom. Electricity is not available all the time in majority of the weaving area, so power operated, pneumatically or hydraulically operated semi-automatic handlooms were not considered under this research. Production of handloom machine in mass was difficult in short time with wooden handloom. Modern manufacturing processes were not considered in existing design to produce the handloom in mass.

As a retrospective study, handloom census has been studied to get number of various types of handloom mostly used in handloom. A Fly shuttle frame handloom was taken for study as it is mostly used. Traditional handloom and existing semi-automatic handloom were reviewed through literature and by field study at Sualkuchi, Assam. 'Semi-automatic handloom for women' made by Das A under guidance of Prof V P Bapat from IIT Bombay and 'Jute weaving semi-automatic handloom' by Prof. Das A from IIT Guwahati were considered as base semi-automatic handloom to improve further in terms of efficiency and weavers comfort. All the mechanism involved in various motions was studied and compared with available alternative mechanism and selected the best suited mechanism for next process of design. As a next step, it has been designed and developed an alpha model for the semi-automatic handloom. All the mechanisms have been checked for their function and shape. After successful trial of alpha model, beta model designed by incorporating all the drawbacks found during various processes like material selection, manufacturing, inspection, maintenance, assembly, dis-assembly, packaging, transport etc. Picking motion by Burmese type picking mechanism has been synchronized with beat up motion with bottom pivot for sley oscillatory movement. Base structure has been made lighter with sheet metal design by shifting the pivot of sley at bottom instead of top in existing available semi-automatic handloom with Burmese type of picking mechanism, causes heavy structural frame of handloom. Gear mechanism for take up motion has been redesigned to compact shape and to avoid backlash problem in existing design. Paddle has been introduced for foot comfort in shedding motion. Adjustable seating system, treadle and beat up handle has been designed considering the repetitive movement of hand and leg. Spinning wheel, Creel, warping drum and jacquard also redesigned with sheet metal for proper synchronization with the newly designed semi-automatic handloom named as 'De sign Loom'.

This research established that the De sign loom is more productive with enhanced productivity, better human factor contribution and aesthetically pleasing form, much affordable, easy to manufacture and easy to use. Laser cutting process of sheet metal and computerized bending are preferred to avoid costly tool room operation. It has also substantially improved the quality and productivity during manufacturing of the loom. Also, all the related

accessories like jacquard, creel, warping drum were designed and developed in sheet metal. Also, it is modular type for using plain weaving as well as for ornamentation too with additional attachment. There is also provision to use Chaneki, an extra weft insertion device along with this loom with an additional frame.