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Furniture Design and Sustainability- A Design Intervention with an Approach for Promoting and Sustaining the Craft of Pattamadai Grass Mats

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Abstract

Usage of mats as a product has faced a backlash and has reduced in recent years with the lifestyle changes of people, households and the shift to a contemporary setting. This paper aims to find out the necessity of design intervention in the traditional Pattamadai mats craft of Tamil Nadu, woven using Korai grass, to inculcate it in the current interior spaces. Based on field work, the research involves the study of the craft, mat as a material, its market, evolution of its products over the years. This serves as an attempt to study the technicalities of 'load bearing' capacity of a Korai grass mat and characteristic study through various trial and error methods of mechanism, to develop a range of furniture. Experiments involving giving load to the mats for a recorded period of time, giving reinforcements, without altering the working pattern of the artisans and finding a fitting mechanism that will give the Pattamadai mats a new scope of direction will serve the purpose of the research. This will open up a realm of possibilities of usage of Pattamadai mats in a contemporary setting. This design solution will show how the craft can be elevated to a new level, bringing the age-old grass mats back to the interior spaces in style, sustaining and promoting the craft, paving a way for economic benefits for the craft cluster by raising the demand

Key words: Furniture Design; Pattamadai Mats handicraft; design intervention; load bearing capacity; Korai grass mats

Introduction

Pattamadai mats have been inside for long, limited to the use of traditional rituals by the Tamizhs. It was extensively used in the older times- to sleep, sit on it for dining, for pooja purposes or for relaxing in the verandas, in all cases, mats are being placed on the ground. There is an utmost need to bring them back in a contemporary mode, into the era of chairs, to fit it in today's lifestyle. This experimental research method carried out studies mat as a material, from tracing its history to bringing it up a notch above the ground. The research was carried out in three stages-

1. Finding the Gap- Initial study of 'Grass Crafts of India' was done to understand where the grass crafts stand overall- to arrive at a comparative conclusion of Pattamadai mats craft. Continued by the study of the Pattamadai mats craft, the cluster and the processes and its market segment was done to tap the gap.
2. Material properties of mat were studied followed by the trial and error methods in each step- initially with Power loom mats, then with Handloom and Jacquard mats which help in drawing out inferences to move further availing a better solution in the mat testing process.

3. To study the users interests and come up with a design solution for the interior spaces with the successful mechanism from the mat testing process.

Pattamadai mats are superfine mats woven with Korai grass and cotton yarn (as warp) and have recently developed varied product ranges which include foldable mats, table mats, hand fans, utility products like folders, handbags, wallets. Korai grass, primarily sourced from the Tamara Bharani and Kaveri river banks, are used to weave the mats intricately with a combination of plain colours, motifs, letters and numbers. This aspect differentiates it from other crafts, hence holds a GI tag. These mats are referred to as silk like for the way it feels. In India the craft and design sectors share a symbiotic relationship. Through craft the designer connects with the natural world and the collective past. Traditional craft skills are adapted to contemporary design (Sanjeev Kumar and Nandini Dutta2011)

Grass Crafts of India

A study of Indian grass crafts was done as the first step of research that shows the evolution of crafts over years. Attempts have been made by the craft clusters in designing furniture/ home decor items such as blinds, room dividers, stools, chairs with grass/ reed. Almost all the grass crafts that initially started as mat as a product or an art piece, have contemporised itself into today's utility products to increase the market and its sustenance. This analysis helps in finding the gap in the market of Pattamadai mats, pinpointing how the mats need to explore more, in order to cater to a larger market with different interests.

Method
Finding the Gap

Through the extensive primary and secondary market research conducted, there proved to be a need for a product diversification creatively to increase the use of mats and the reach in the market. The following points analyse the gap in the market and pinpoint opportunities that can be tapped to enter the market.

The GAP begins to be found here.

- Lack of transparency- Few artisans who make and sell mats on their own are also a part of society. They are also found to have retail outlets.
- Lack of Standardisation of Design- when the demand for the utility products are high, it is not making a mark due to the absence of one signature style/ design.
- Set Prototype is Missing
- Power looms are overpowering handloom products.

The SWOT analysis done shows how various bolded points can be curbed by design intervention. To bring the mats a notch above the ground, grass mats can be used as a load bearing material which is an aspect that has not been explored much or at all! This allowed to dive into a new phase of inventing an efficient mechanism to bring mats above the ground in various ways. The following experimental, trial and error testing methods were done in various ways with Power loom, Handloom and Jacquard mats.

Strength	Weakness	Opportunities	Threats
1. Health benefits of the material. **2.Many utility products coming up.** **3. GI tag** **4. Cultural connect & long term value.**	1. Labour intensive, time consuming. **2. Inflexibility towards new designs.** **3. Lack of cash flow.** **4. Less remuneration for artisans making them shift to other fields.**	**1. Scope for exports.** **2. Product diversification to target the right market.** **3. Promotion as an alternative for plastic products.** **4. Mass production by identifying new markets.**	**1. China's plastic mats, rubber mats, nylon mats & other alternatives.** **2. Alternatives for utility products.** 3. Cut throat price competition. 4. Fluctuating raw material cost.

Mat testing

There are various counts of mats available. The counts are determined by the number of warp threads per 1 foot and the korai is split finely according to the counts. The mats that are made up to 140 counts feel like a piece of cloth. So, more the number of warp threads- more the count- finer the mat is. Other counts are 30, 40, 50, 80, 100, 120. Out of all the counts, 50 counts Handloom/ Jacquard is selected for the furniture intervention keeping in mind the following reasons:

1. **Category**- 50 count mats fall under the 'Fine mats category' which is a fair option to portray the intricacy and the beauty of the Pattamadai mats handicraft.

2. **Strength**- As the Pattamadai mats involve plain weave, anything below 50 counts is not a safe option for the load bearing as the weaves are less closely packed.

3. **Cost-** The superfine mats have a high cost that makes it a less desirable option as the experimentation of furniture with mats is a new venture.

4. **Type-** The 50 counts mats that are double threaded is chosen over single threaded so as to have a superiority of strength.

Three types of mats were selected for testing the strength. 1. Power loom mat (Fig 1) 2. 50 counts handloom mat (Fig 2) [Handloom is the traditional method of weaving Pattamadai mats that takes a minimum 3 days to weave one mat. 3. 50 counts Jacquard [Electronic jacquard loom is the new machine introduced by RuTAG, IIT-Madras in 2017 to increase the productivity. This machine is capable of weaving fine mat i.e. 50 & 52ct.] (Fig 3)

 fig 1  fig 2  fig 3

Initially power loom mats were chosen for testing.

Table 1. Power loom Mat Testing with inference

Item	Description	Intention	Testing method	Observations	Inference
Power loom Mat	One power loom mat was stitched with nylon cord to a rectangular metal frame, from all four sides.	1. To observe and understand how mat as a material, reacts to taking load. 2. To test how is it bearing the load- horizontally and vertically (weave wise) 3. To test how stitching affects the mat when tied to a frame.	People of different weights ranging from 40 kgs to 100 kgs sat and laid on the mat in 3 different ways (fig 4,5,6)	1. Stitching creates a gap between the strands, some strands damage. 2. The grass strands are thick, hence strong. 3. No immediate gaps in the centre or sides while it takes load. 4. Mat as a material sags when load is applied.	1. Stitching the mat to the frame should not be preferred. 2. Alternate mechanism that does not involve an extra element (like nylon cord) will be preferred.

Power loom Table mat	A table mat was stitched with nylon cord to the metal frame of a stool. (fig 7,8)	To understand how the mat works as a certain furniture when constant weight is applied on it for a period of time.	Constant weight of 6 kgs applied on the surface for over 2 months. (fig 9)	1. The sag remains after applying constant pressure on it for a month. 2. Stitching creates a gap between the strands on the edges. 3. No gaps in the centre.	1. Some other mechanism like making loops of mats will not split the grass strands. 2. Giving an intentional sag while designing a furniture will elevate its properties.

1. Sit on the mat with folded legs- parallel to the length, parallel to the width (Fig. 4)

2. Sleeping position- parallel to the length (Fig. 5)

3. Sit with legs suspended from the frame (Fig 6)

Parallelly, to see the working on a furniture, it was stitched onto a metal stool's frame and tested.


fig 7

fig 8

Fig. 9 (Starting on January15, 2019 a set of books weighing about 6 kgs were kept on the surface for over 2 months, constantly.)

The next big challenge was to find a mode to test the 50 counts mat on. The testing mode will determine the design developed thereafter, for the furniture. It will determine whether the furniture will be used for aesthetic purposes/ generic utility products/ seating furniture pieces in particular.

Initially while the tests were carried out, the intention was to check if the grass strands have enough strength to hold the weight. Alongside the start of testing, brainstorming of the concept for the furniture design was on. The research proceeded in a way where the everyday traditional elements of Tamilnadu were picked, to find out the existence of easy chair/ armchair since the British times. (fig 10), that evokes a sense of nostalgia - a sense of connect- metaphorically as well as literally because one has contact of 3/4th of the body with the upholstery of the chair when used. Fig 11 explains how the form of easy chair is a suitable option for testing, functionality and relevant to the project.

Fig: 10 An old Easy chair with synthetic fabric as seat

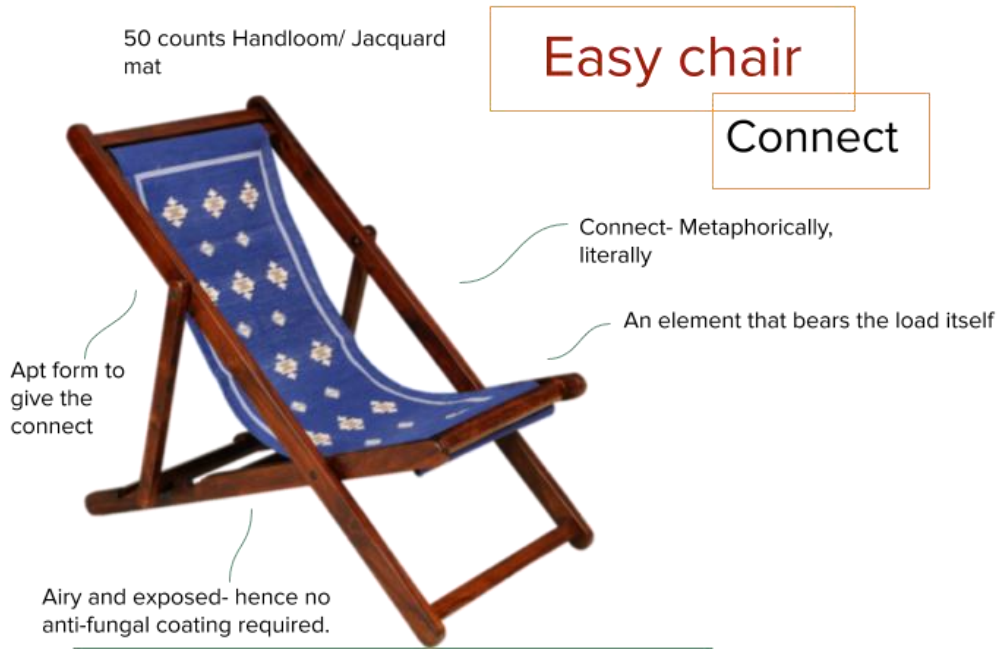

Fig: 11 How an easy chair is an apt form for mat testing.

A 50-count mat of handloom as well as of Jacquard were cut in 1' 3.5" by 5' size and were replaced by the easy chair's synthetic fabric. The edges were given cotton fabric piping to hold the grass in place and before cutting, a patch of glue was applied on the area which was about to be cut, as the cotton strands lengthwise get trimmed which loosens the grass. (fig.12 and fig. 13)

fig. 12 strands coming out of Jacquard mat in the absence of glue when a specific size was cut. fig. 13 Specific size cut out of 50 counts handloom mat.

Trial 1

Table 2. 50 counts Handloom and Jacquard Mat Testing and Inference- Trial 1

Item	Description	Intention	Testing method	Observations	Inference
50 counts Handloom and 50 counts Jacquard	Nylon fabric on the easy chair was replaced by 1' 3.5" by 5' mat of handloom and 1' 3.5" by 5' mat of Jacquard by RuTAG (IIT-M) Mechanism Description: **Trial 1**. Mats were cut in the specific lengths, Piping was given. Both ends of Mat breadths were looped in order to insert the rod of easy chair. (fig.14 and fig. 15)	1.To understand how the mat works with the easy chair mechanism when constant weight is applied on it for a period of time. 2. To understand the comfort level when a person uses it. (considering it is an apt form for the mat)	People of varied weights used it for two weeks. A person weighing 60 kgs. approximately used it for over two weeks. (2-3 hours daily on an average) (fig. 16)	1. The mat gives a high level of comfort to the person using it. 2. It takes the shape of a person sitting and also gives an airy feel. 3. The pressure, tension is observed at four points. (fig.17) 4. After 8-10 hours of usage there was a gap found in between the strands and it kept increasing over two weeks. (fig. 18)	1. The mat will preferably be used as a single piece for the shape and comfort it gives to the user. 2. A different mechanism or a sort of reinforcement will be given to the mat to stop the mat from widening the gap between strands. 3. Following were thought of: a. giving a fabric lining to the mat, extending the lining to form a loop. b. giving a fabric loop with reinforcement of fabric straps on either ends lengthwise for support.

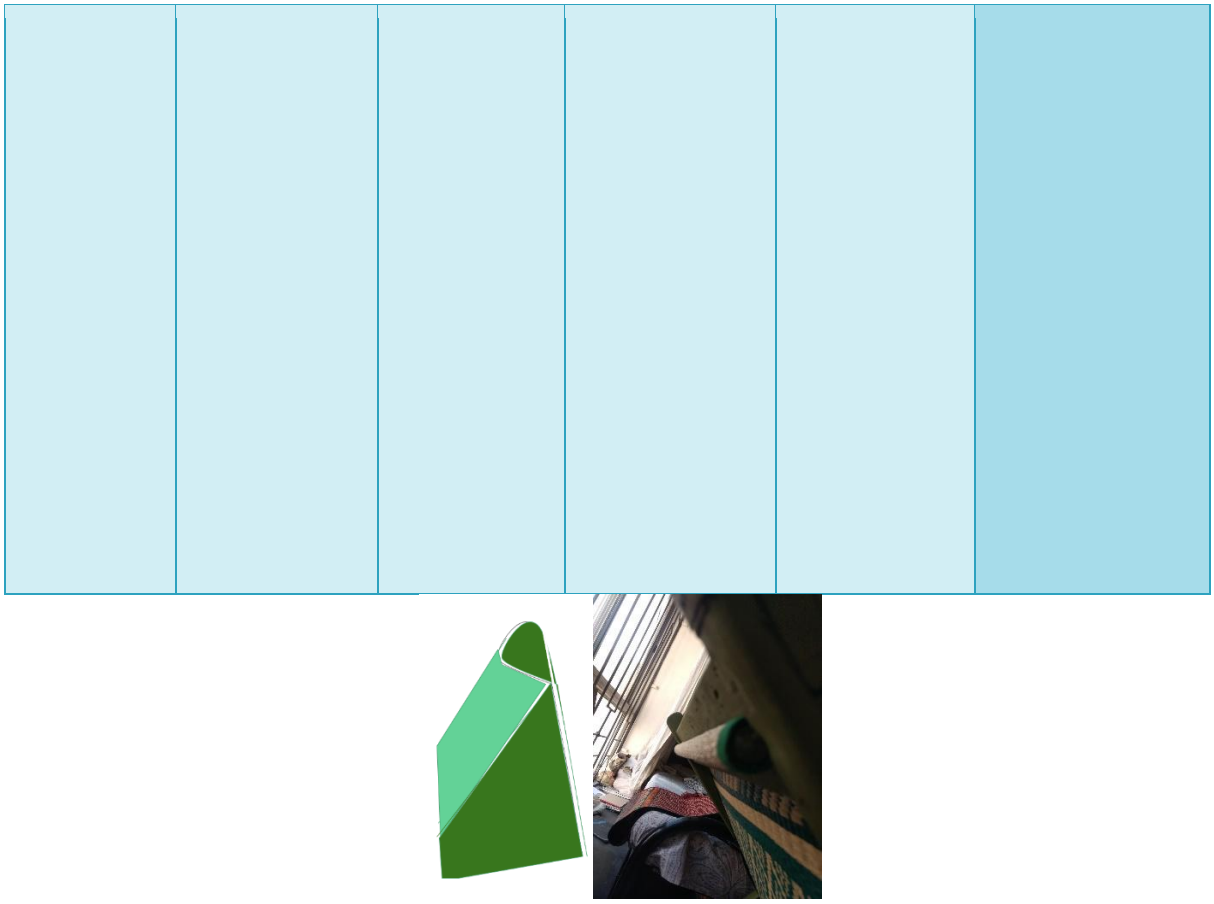

fig.14 and fig.15 Mat breadths looped to insert the rod.

The aim is to give a feeling of 'connect' to the person. People of varied weights used it for over two weeks. A person weighing 60 kgs used the chair every day for an average of 2-3 hours per day.

fig: 16 People using the chair

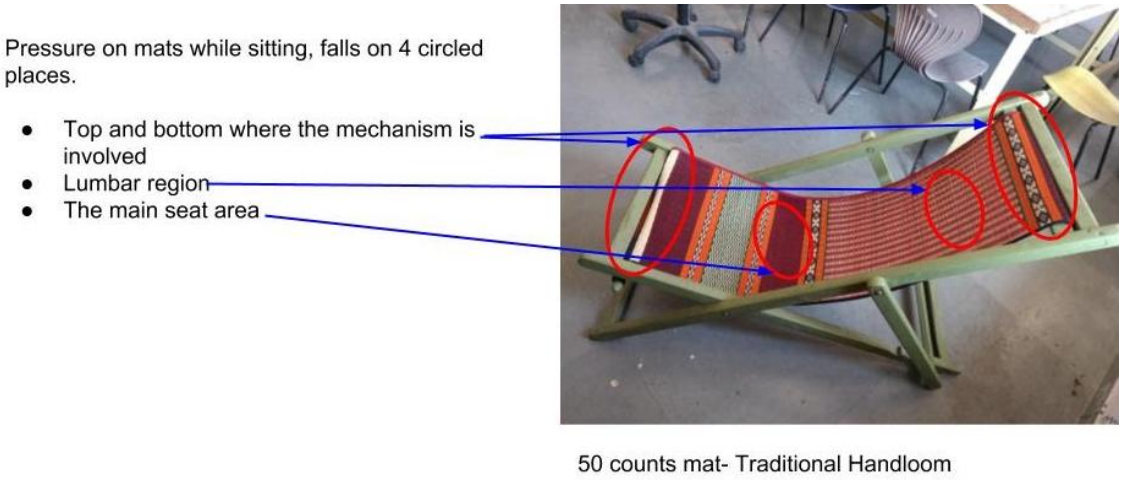

fig.17

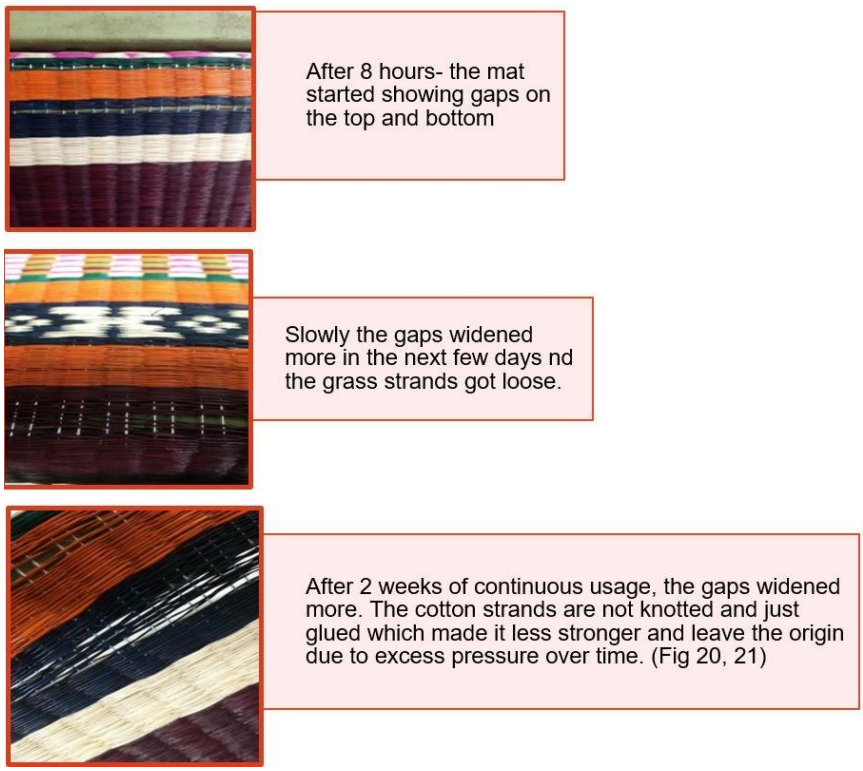

fig.18 Status of gap in mat-strands over 2 week

fig. 19 The loosened cotton strands

Trial 2

Table 3. 50 counts Handloom and Jacquard Mat Testing and Inference- Trial 2

Item	Description	Intention	Testing Method	Observation	Inference
50 counts Handloom and 50 counts Jacquard	Mechanism Description: **Trial 2**. Instead of looping the mat ends, muslin fabric loops were attached to the edges of the mat and a 2-ply muslin strip connected both the edges of muslin loops on the mat. (Fig 20, 21, 22)	To reduce the pressure on the ends of the mat, shifting it to fabric.	People of varied weights used it.	1. This failed in the first try as the pressure was directly applied on the edge of the mat (on piping) splitting the grass strands and fabric loop in one go. This happened as the cotton threads which were cut off with the mat acc. to dimension were not knotted from one end.	Changes in the Mat making process- 1. Stronger tightening of the weft- while on the loom before knotting. 2. Making the mat on the loom itself according to the dimensions. This will ensure that the mat is knotted well from all sides and be stronger and there won't be a need to cut the mat.



(Fig 20, 21, 22)

The learnings from this trial led to the next changes as per the inferences.

Trial 3

Table 4. 50 counts Handloom and Jacquard Mat Testing and Inference- Trial 3

Item	Description	Intention	Testing method	Observations	Inference
50 counts Handloom and 50 counts Jacquard	Mechanism Description: **Trial 3**. Attach fabric straps, looped on both sides, end to end, stitched on the mat length wise. (with 5 ft length and the extra folded behind and stitched for extra strength) - this new mat was made on the loom dimension wise. (fig 23, 24)	To reduce the splitting in between grass strands, to shift the pressure from the grass strands to fabric.	People of varied weights used it. (fig 25)	1. This did not create any immediate gaps in the mat. 2. The furniture was used for an average of 4 hours a day for over 6 months- successfully without any gap in grass strands. 3. The centre of the width side has a depression as the person sits because it is not looped in the centre. (fig. 26)	1. This method works out well, not creating any gaps. 2.The loops on the either ends will have a continuity of fabric to support the centre.

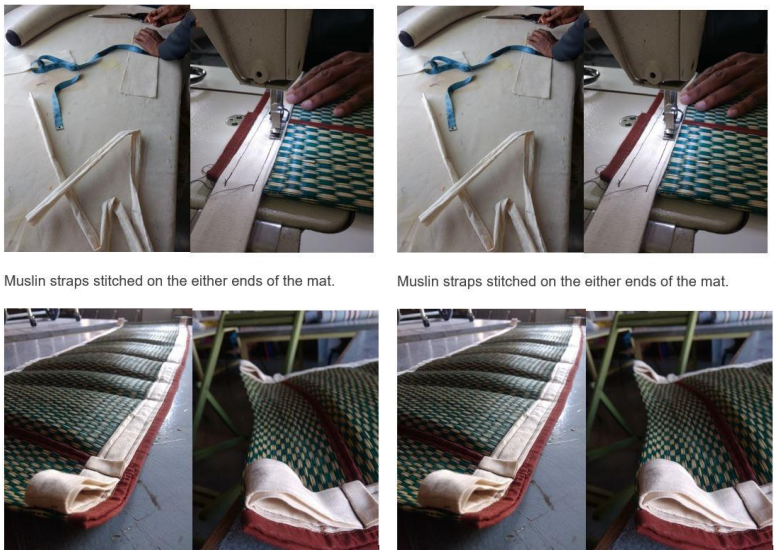

Fig 23, 24: 4 ply Muslin straps stitched on the either ends of the mat, looped at the ends.

Fig 25: People using the chair with the 3rd mechanism.

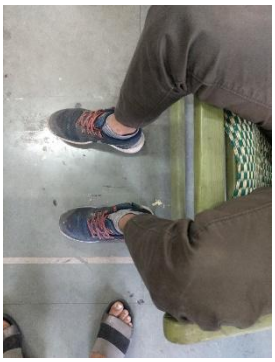

Fig 26: A slight depression in the centre when load is applied on the mat

Results

Trial 3- loop mechanism is finalized based on the tests and maximum efficiency the mat can offer. The mat for furniture should be of dimensions 6.5’ length and 1.5’ width. A relaxing chair requires a clear length (usable length) of 3.9’ length. If the entire 6.5’ is used, the remaining length is looped back and stitched which will act as a reinforcement. The initial tests of load bearing on Power loom mats showed how the mats react generally to load. This gives the confidence to test on the handloom and Jacquard mats further, that are thinner strands of a single Kora grass, woven intricately. Considering the inferences, the relaxing chair, *‘Oivu’* was developed after the design processes of finding inspiration, sketching, detailing, making mock-ups and finally prototyping. (fig. 27.)

Fig 27. *Oivu*, Relaxing chair design.

Oivu (literally meaning relaxing, in Tamizh) adds lines of sleek wooden elements with the age-old mats to the interior space. Bringing out the richness of the craft, it serves as a comforting chair and an art piece in the space— be it a living room, bed room or in a hotel lobby. The mats can be alternated by other Pattamadai mats once over used or to give different looks to the space. The wordings, lettering, motifs and colours on the mat are completely customisable that keeps the usage of the furniture open to any kind of space/ mood the space has to offer.

Discussion

This mechanism opens a realm of possibilities for designing furniture with mats. The SWOT analysis justifies how design intervention is necessary to curb the gap in the market. Generally, the life span of a grass mat is up to 8-10 years when used on the floor in traditional means. The life span of the load bearing mat on a furniture is estimated to be a minimum of $1/10^{th}$ time of the general use, without extra reinforcements giving it a minimum of 1 year. Giving Pattamadai mats a new perception enhances the mats in the eyes of people, giving it a new lease of life.

Conclusion

The mechanism for Pattamadai mats opens a wide range of opportunities that it can cater in the furniture design market. The demand for the mats will increase indirectly. The age old Pattamadai grass mats will enter modern spaces and be a part of today's lifestyle. This is happening without changes in the looms or mat making process, easing the way for the craft clusters. That is, mat is being taken as the raw material and not the kora grass. This will make the design process simpler. Relaxing chairs can be taken as a start as it can pave the way for more products— swings, room dividers, curtains/ blinds, usual chairs, standalone shelves to name a few. The growth of a craft is not always equal to the cash income the craft clusters get. This step can further alleviate the standards of the craft, in the eyes of global market— promoting it as well as taking care of its sustenance through a healthy growth.

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