Design Interventions for the Sustainable Livelihood of the Bamboo Craft Community

Abstract
Bamboo is a plentifully available material in India’s North-Eastern Region (NER), comprising eight states. Bamboo craft serves as a crucial source of livelihood in these states. Meghalaya, one of the NER states, has a centuries-old tradition of practising the woven bamboo craft. The state is somewhat isolated from mainstream developmental activities, leading to a persistently unchanged livelihood structure over generations. The absence of infrastructure and limited technological access has empowered these communities to exercise increased autonomy, thereby preventing them from participating in the country’s circular economy. The paper delves into the challenges faced by bamboo craft communities, exploring issues related to their practices, livelihoods, and culture. It also shares the experiences and insights gained from a three-year-long collaborative design intervention project called Shken.in.

Keywords
Bamboo craft
Communities
Participatory design intervention
Process of making Molds

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Background

The North Eastern states, often referred to as the “eight sisters”, encompass the hill states of Meghalaya, Nagaland, Manipur, Arunachal Pradesh, Tripura, Mizoram, Assam, and Sikkim. Together, they form a diverse, multi-ethnic community of Indians, hosting more than 100 ethnic tribes. These tribes are adept in craftsmanship and handloom traditions, each with distinct aesthetic sensibilities. The communities are dispersed across various states, with some residing in remote mountainous areas nestled among the foothills.

Living harmoniously with nature is intrinsic to their lifestyle. The social structure is well-defined, with the village headman playing a pivotal role in managing village affairs. The states share extensive international borders, fostering cross-cultural influences from neighbouring countries such as Myanmar, China, Bangladesh, and Bhutan. The entire region boasts an extraordinary diversity of tribal groups: Arunachal Pradesh has 26 major tribes, Nagaland has 16, and the states of Meghalaya, Assam, Manipur, Mizoram, and Tripura each have nearly 12 tribes. Despite being relatively isolated from other Indian regions, each state is industrially less developed but possesses abundant natural resources, including forests, mines, and biodiversity.

A status report by the Northeast Development and Finance Corporation (NEDFi) on the Handloom and Handicraft sector in North Eastern India presents compelling facts, underscoring the crucial role of handicraft development for the economic growth of the region.

- Every 14th person in the North Eastern region depends on handloom and handicraft products for their livelihood.
- Approximately 80% of craftsmen's income is derived from the handloom and handicraft sector.
- More than 90% of the livelihood for nearly 60% of the craftsmen community is linked to the handloom and handicraft sector.
- The raw material contributes to about 30% of the product's value (ranging from 42% at the highest to 5% at the lowest).
- The extent of value addition, as a percentage of prices earned by craftsmen, is approximately 32% (with only one third constituting the craftsmen's earnings, and nearly two thirds distributed between expenses and overhead, including middlemen, transport, marketing, display, promotion, etc.).
- The difference between the average price earned by craftsmen and the selling price in the local market is more than 35%.

The second most significant economic activity in these hill states, after agriculture, is handloom and handicrafts. Secondary data highlight the distribution of handicraft clusters in the north-eastern states.
Design-led Interventions in an Identified Cluster: A Case Study

The project focused on the craft community in the Syntein cluster, situated in the East Khasi Hill district of Meghalaya. This cluster serves as the hub for a rural community consisting of nearly 800 craftsmen across five villages. Their craft bamboo products cater primarily to the local needs of the community. These products encompass fish baskets, conical baskets for transporting livestock, baskets designed for vegetables, firewood, and grains, as well as decorative items such as bamboo flowers and wooden sculptures sold at weekly markets (Fig. 1). The weaving styles, patterns, and techniques employed by the craftsmen have undergone evolution, adaptation, and transmission from one generation to the next. Craftsmen inherit distinct weaving styles specific to their village and the products they create. The art of basket-making is passed down through observation and practice, with craftsmen acquiring tacit knowledge from their peers. Drawing upon generations of inherited expertise, these craftsmen intricately weave products utilising various weaving styles, including the spiral weave, one-on-one weave, one-on-two weave, and double-walled weave.

Despite possessing valuable and unparalleled skills, these bamboo craftsmen face underutilization of their expertise as the demand for their woven products remains confined to the local market.

![Current products made by local craftsmen at Syntein. Ph. Mandar Rane.](image)
In light of this circumstance, the Directorate of Commerce and Industries (DCIC), Government of Meghalaya, approached the authors to conceptualise a model aimed at enhancing the well-being of the bamboo craft community.

A Perspective Towards Craft

Despite significant efforts by government agencies and stakeholders to improve the livelihoods of craftsmen in North Eastern India, the impact of these initiatives remains limited. This can be attributed to the conventional and uninspired approaches taken in these interventions, revealing a communication gap between stakeholders and the craft community that needs to be addressed through design, innovative techniques, and sustained guidance. The absence of a co-creation approach is evident in most interventions, resulting in a one-sided perspective. Manzini (2006) underscores the importance of social actors possessing specific design knowledge and skills, including an understanding of the comprehensive macro-picture of changes and the micro-contextual characteristics and dynamics of the local context. These design skills are crucial for promoting and enhancing co-design processes in new contexts and addressing emerging challenges. Vezzoli (2023), in the proceedings of Life Changing Design, highlights the co-creation of tacit knowledge through material exploration and engagement. The discussion revolves around how experiences with materials and experimentation can generate new insights, inspire sustainable design solutions, and facilitate practices aligned with the principles of a circular economy, particularly significant in developing countries such as India. The Ahmedabad Declaration on Industrial Design for Development, signed in 1979, acknowledges the importance of preserving and leveraging cultural systems through design. It emphasises that designers in developing countries should address regional needs by incorporating indigenous skills, materials, and practices while integrating modern techniques and technology. Drawing on David Pye's arguments in *The Nature and Art of Workmanship*, craftsmanship is defined as workmanship using any method or tool where the final output cannot be preconceived, and depends on the judgement, dexterity, and care of the craftsperson. This is contrasted with "workmanship of certainty", which can produce exact preconceived outputs in mass quantities. Turkle and Papert (1981) parallel this concept with "soft" and "hard" approaches to problem-solving, where the soft approach involves negotiable and concrete reasoning, akin to a craftsperson contemplating before taking action. The hard approach is characterised by abstract thinking and systematic planning, dissecting problems into parts and designing solutions accordingly.
Methodology Adopted

Formation of a Team

The IIT design team, consisting of three faculty members and two highly skillful Master craftsmen, specifically appointed and trained to impart training to other less skilled and knowledgeable craftsmen. This provided the opportunity to assess the current state of bamboo craft practices within identified craft clusters of Meghalaya.

Identification of Craftsmen

The mobilisation of craftsmen was facilitated by the support of the DCIC team, which consistently assisted the design team in translating dialogue into the local language of the craftsmen. A brainstorming workshop, held at the DCIC office in Shillong, involved 80 participants, including craftsmen, entrepreneurs, and professional designers working with the crafts community. Interviews, discussions, and photo documentation were utilised to gather information on existing products, and contact details were collected for subsequent interactions. A total of 50 craftsmen participated, including 35 women and 15 men.

Skills Assessment and Craft Product Issues

Insights from the brainstorming session and documentation aided the design team in understanding existing skills. Meticulous observation revealed traditional weaving patterns and knowledge related to raw-material availability, seasonal working patterns, and challenges in bulk production at the grassroots level. Craftsmen across clusters demonstrated diverse skills and weaving styles, passing down tacit knowledge through generations. Despite the beauty of traditional bamboo products, there is a lack of standardisation, and they do not align with contemporary needs. Craftsmen often face the challenge of selling their products quickly for daily wages, limiting sales and income. Skilled craftsmen’s products struggle to meet the demands of urban markets where they could fetch better prices. One entrepreneur expressed frustration over the craftsmen failing to fulfil bulk orders, resulting in poor-quality products being rejected.

The role of Stakeholders

The stakeholders in this project include the IIT Team (comprising Design faculty and Master craftsmen), DCIC officials, craftsmen, and retailers. The IIT Team assumes a pivotal role in strategy planning, design conceptualization, and the creation of an ecosystem. The DCIC team plays a crucial role in mobilising craftsmen and sponsoring the project. Craftsmen are the direct beneficiaries of the project, and their active participation is central to its success. Their skills, knowledge, and craftsmanship are essential components that contribute to the project’s objectives of uplifting livelihoods. Retail-
ers serve as vital entities by providing insights into market trends, demand dynamics, and valuable product information.

Floating Fund

To address the issue of delayed payments by retailers, a floating fund (Seed fund) concept was suggested to DCIC. This fund, promptly arranged, was incorporated into the norms of developmental activities, operating on a substitution basis.

What to Design

Insights from the brainstorming session guided the design team in determining strategies and product selection to enhance wages and address production issues. Visits to retail outlets in Mumbai and interviews with users revealed a high demand for craft products in contemporary lifestyles. Online marketing proved prevalent for handicraft products, particularly for functional items such as fruit baskets, roti/bread baskets, dust bins, laundry baskets, trays, and lampshades. These utilitarian products, usually imported from China, Vietnam and Malaysia, were identified as potential replacements. The design team envisioned a valuable transformation through new product development and the creation of marketing channels through retail and online platforms. Products selected for design and development based on urban market demand included roti/bread baskets, waste paper baskets, laundry baskets, lighting shades, fruit baskets, and gift hamper baskets.

Prototype Development

The design team, collaborating with master craftsmen, created prototypes of the new bamboo-craft product ideas sketched by designers. An inclusive and participatory approach was adopted, focusing on the processes of making bamboo products, allowing for the design and development of specific tools and product-specific moulds. Considerations such as standardisation, transportation viability, and modularity were explored during development.

Training Workshops

Training workshops were designed to teach craftsmen how to make craft products. Master craftsmen demonstrated the use of moulds and tools, effectively transferring tacit knowledge through practical application.
Production workshops were conducted to observe and supervise the steps involved in making bamboo products, noting the time taken for each activity. Data collected during these observations was used by the design team to redesign processes that affected production.

Tie-up and Handholding

The design team established ties with two retailers to purchase craft products from the community and sell them in urban retail outlets. A cluster manager was identified to maintain ongoing relationships with retailers through email and calls, ensuring sustainability beyond the project’s completion.

A Sustainable Model

The project envisioned an ecosystem, adopting a holistic approach towards a sustainable model of design, development, and entrepreneurship (Shende, 2016). The model encompasses sequential activities that commence with need identification, followed by skill assessment of the craftsmen, product planning and strategy, design development, innovation in the process, training workshops, marketing strategy and branding, and an effort to establish craft collectives and entrepreneurship.
Design Interventions

The project team aimed to explore Indigenous Knowledge Systems (IKS) (Plessis, 2005), encompassing the existing skillsets of the craftsmen and their livelihood patterns. Collaborating with craftsmen, the design team endeavoured to design and develop a new range of contemporary craft products catering to urban and modern lifestyles. Rangnekar (2005), overseeing the “Aid to Craftsmen” development program in Asia, emphasised the importance of innovation not just in the product appearance but also in the process of product development. The key principle was to innovate without compromising local identity and tradition.

The design and development process commenced by identifying a range of products that combined functionality with modern lifestyles. After a market survey of retail outlets, shortlisted products included roti (Indian flat-bread) baskets, wastepaper baskets, laundry baskets, fruit baskets, planters, and woven lampshades. Conceptualization involved sketches and ideas aligning the craftsmen’s skill set with the intended products. The introduction of moulds in the product-making process became a significant design intervention, ensuring consistency in shapes, sizes, and overall finishes. The roti basket, developed for urban households to store flatbread, serves as a detailed case example.

The initial prototype for the roti basket, designed using the craftsmen’s traditional spiral weave, was created by a master craftsman from the design team. The craftsmen in the Syntein village replicated the prototype, resulting in visually similar but varying sizes and finishes. To address this, moulds were introduced for standardisation. The introduction of moulds in the bamboo craft sector represented an innovative departure from traditional practices. Historically, only a select few self-motivated craftsmen utilised moulds made of wood for crafting traditional baskets, particularly those without undercut shapes (Ranjan, Iyer, & Pandya, 2004). The use of moulds, especially for unconventional shapes, was not commonplace in the bamboo craft community.

The moulds were initially crafted from plywood plates, turned nylon discs, and a nut bolt. Subsequently, laser-cut moulds were adopted for faster production, ease of iteration, and cost-effectiveness. The final design of the laser-cut moulds brought several key features to the forefront, enhancing the overall efficiency and effectiveness of the craft production process:

- Accuracy and precision
- Ease of production
- Ergonomics and light weight
- Replicability and cost-effectiveness
- Collapsibility: The collapsible nature of the moulds emerged as a significant advantage. This feature facilitated easy transportation of the moulds from cities to villages in flat-pack form. The collapsibility also allowed for convenient storage and assembly in the craft community’s workshop.
- Roti Basket-Specific Design: The unique requirement of an undercut-shaped mould for the roti basket was successfully addressed. The collapsible nature of the mould proved instrumental in releasing mould parts upon completion of the basket, simplifying the extraction process.
The first iteration of the roti basket’s rim construction initially consumed 5 hours Fig. 3, prompting an exploration of alternatives. Ultimately, the design was altered by extending the woven part to eliminate the need for a rim Fig. 4, reducing the time to half an hour. The shape of the mould plates was adjusted, and a disc was added on top to ensure the required surface contour for the complete woven basket. The collapsible nature of the mould facilitated the easy release of mould parts upon completion of the basket Fig. 5. The design team’s iterative process and thoughtful adjustments aimed to streamline production, enhance efficiency, and maintain alignment with the traditional craft while meeting contemporary needs.

Fig. 3
Initial design of roti basket with rim. Ph. Mandar Rane.

Fig. 4
Final roti basket with folded woven surface. Ph. Mandar Rane.
Various other products were developed during the project, as illustrated in Fig. 6. Each product presented a unique set of challenges. Intentionally, the costs of the moulds were kept low to facilitate widespread distribution to various bamboo craft clusters in different villages. The goal was to encourage craft communities from different villages to create similar products using their traditional weaving patterns.

After finalising the design, dimensions, finishes, and treatment of raw materials, workshops were organised in the villages to train the craftsmen in producing the designed products. The workshops included a basic introduction to reading product drawings, methods and techniques of pre-treating bamboo, using measures and proportions of treatment solutions, and post-finishing and dyeing techniques.
Why a Mould?

To ensure consistency in quality and standardisation in size of the products, the IIT design team decided to introduce productivity-enhancing means through the introductions of easy to make moulds, jigs and fixtures. The development of the moulds and workstation was undertaken keeping the following factors in mind: 1. Ease of fabrication of moulds, that are durable and can be fabricated at the village level using locally available materials and processes. 2. Introduction of easy-to-understand assembly methods. 3. Consideration of human factors in terms of safety and human comfort during use. 4. Development of processes for steam bending bamboo strips using standard components that are readily available on the market. The first set of four moulds were designed, one each for the roti basket, the laundry basket, the lamp shade and the paper basket. This formed a very crucial exercise in achieving the desired shapes and forms for the new product range that had been developed. It also ensured the desired volumes of production within a competitive price range to meet the expectations of a large urban market. All the products that were developed had a unique identity of the region and the craft cluster. They incorporated design features that drew upon the skill sets that the different artisan communities presently processed. During the training program, they found ready acceptance by the craftsmen. The “easy-to-make” moulds, jigs and fixtures helped to enhance the quality and quantity of production while preserving locally available fabrication skill sets and processes. It introduced a method of intervention in the handicraft sector that can enhance the market potential of these high value hand-made products. The design team coined the term “Restricted Technological Intervention (RTI) Method” for this novel approach.

Reflection on the Intervention

1 The participatory design approach involved understanding the Indigenous Knowledge System (IKS) of the community, including their material culture and skills. This understanding was used to design contemporary products with minimal and acceptable technical intervention, i.e., the introduction of moulds.
2 The introduction of moulds standardised the production process, enabling craftsmen to achieve desired shapes and dimensions in the hand-woven bamboo products.
3 The consistency in shape reduced the likelihood of rejection in the urban marketplace, particularly for utilitarian products.
4 The moulds served as tools, guides, and external support for building specific shapes, contributing to a faster production rate with precision. They were reusable and easily shared within the community.
5 The introduction of moulds did not alter the traditional weaving practices of the craftsmen, leading to high acceptance among the community.
6 A split mould was designed for the roti basket to support its undercut shape, providing a novel experience for the bam-
Craftsmen expressed a desire to have moulds for their traditional baskets, seeing the potential to enhance production and improve livelihoods.

Computer-Aided Design (CAD) drawings were employed to laser-cut PMMA to make the moulds. This allowed the creation of a range of baskets with various shapes. The dimensional adjustments facilitated the exploration of new shapes such as ovals, hexagons, and triangles based on the original basket drawings.

Significance of the design intervention

Design interventions are notably present in various craft sectors, including pottery, textiles, carpet making, and bamboo crafts. These interventions are typically planned and supported through welfare schemes defined by government agencies and non-profit organisations. However, the outcomes of such schemes often focus primarily on product development rather than addressing the overall process.

The sustainable entrepreneurship model (Shken.in) places significant emphasis on the “process of developing the product”. It adopts a strategic and holistic approach to establish a viable ecosystem. This progressive and adaptable model can be implemented anywhere with the collaboration of the right stakeholders. The community actively embraced the intervention of introducing moulds as an integral part of the process for developing new products. In their feedback, they expressed a desire for the design team to create moulds for the products they traditionally crafted, highlighting the practical impact and acceptance of the design intervention.

Discussion

The project commenced with a request for a design intervention aimed at uplifting the craft community in various clusters. Craft products, with their traditional shapes, looks, and surface finishes, reflect the unique skills and extensive nature of the craftsmen. The geometry of the baskets directly correlates with their usage for local needs in village communities. Craft clusters exhibit distinct skill sets matched with specific basket structures for strength and load-carrying capacity. The evolution and transfer of woven styles, patterns, and techniques occur regionally, often influenced by neighbouring countries.

Basket weaving, which deals with 3D shapes, presents challenges distinct from fabric weaving, which remains 2D. Mechanisation is far from feasible due to these challenges. The tacit knowledge of basket weaving is passed down through generations, emphasising observation and practice. The finesse in woven baskets depends on the craftsmen’s attitude and pride. However, communication between designers and craftsmen remains challenging, with most decisions falling into the hands of craftsmen.

In response to this challenge, the project introduced moulds into the craft product-making process. Moulds were not a new con-
cept in the North-Eastern part of India, where craftsmen in Assam and Nagaland historically used moulds for traditional baskets such as the “Jhappi” and “Khonama”. The Khonama basket, in particular, holds cultural significance, and the consistent shape is vital to its value. The use of moulds ensures the passing down of skills from generation to generation, maintaining the iconic nature of the basket.

The project’s moulds underwent various trials in terms of material selection, fabrication processes, collapsibility, usability, and ease of construction. The goal was to create moulds that were not only effective but also acceptable to craftsmen in the craft-making process. The craftsmen not only accepted the moulds but also began to request designs for their traditional baskets.

The trials conducted during the project lay the groundwork for a potential language that exploits the possibilities of moulds and woven-surface folding techniques. Establishing a formal communication medium between designers and master craftsmen could open up new possibilities for forms in bamboo woven baskets. This could lead to the creation of a shared language and culture between designers and the bamboo craft community, fostering a collaborative and innovative environment for future projects.

**Conclusion**

In conclusion, the strength of interventions in the traditional handicraft sector lies in adopting a holistic approach to identify the role of designers as creative social catalysts. The project demonstrated the importance of consciously deploying a participatory approach, co-creating products with craftsmen who could recognize opportunities for new products using their existing skills.

The intervention in Meghalaya contributed to an understanding of the Indigenous Knowledge System (IKS) of the craft community. It provided designers with the opportunity to share technical know-how, specifically the use of collapsible moulds, while retaining the craftsmen’s bamboo weaving skills. The design intervention introduced new methods of building products, incorporating shape novelty and achieving consistency and precision through the use of moulds. Importantly, these products proved to be acceptable in urban marketplaces.

The project showcased the potential of design interventions to not only enhance the product development process but also to empower and uplift traditional craft communities. By fostering collaboration and knowledge exchange, designers can play a pivotal role in preserving cultural heritage, promoting sustainable entrepreneurship, and creating innovative solutions that bridge tradition and modernity in the handicraft sector.

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