



KNOTTING TECHNIQUE AS A SUSTAINABLE SOLUTION FOR TEXTILE WASTE MANAGEMENT AND HUMANITARIAN SUPPORT

Professional paper
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ABSTRACT: The increasing generation of textile waste and the growing environmental and humanitarian challenges of modern society have highlighted the need for sustainable and resource efficient solutions. Traditional textile techniques offer valuable opportunities to address these issues through the principles of reuse, repair, and responsible resource management. Among these techniques, knotting stands out as a simple, accessible, and sustainable method that requires minimal tools and allows the effective utilization of textile waste materials. This paper examines the potential of the knotting technique as a sustainable approach within the textile sector and its application in humanitarian contexts. The technique enables the transformation of discarded textiles, fabric scraps, and used clothing into functional and durable products such as rugs, bags, baskets, mats, and decorative items. In addition to reducing textile waste, knotting promotes material reuse, extends product lifespan, and supports circular economy principles. By encouraging creativity, waste reduction, and the production of durable and repairable products, it contributes to environmental protection while simultaneously offering social and humanitarian benefits.

Keywords: Knotting technique, textile waste, sustainability, humanitarian support, traditional textile techniques.

TEHNIKA ČVOROVANJA KAO ODRŽIVO REŠENJE ZA UPRAVLJANJE TEKSTILNIM OTPADOM I HUMANITARNU PODRŠKU

APSTRAKT: Rastuća proizvodnja tekstilnog otpada i sve veći ekološki i humanitarni izazovi savremenog društva istakli su potrebu za održivim i resursno efikasnim rešenjima.



Tradicionalne tekstilne tehnike nude dragocene mogućnosti za rešavanje ovih problema kroz principe ponovne upotrebe, popravke i odgovornog upravljanja resursima. Među ovim tehnikama, tehnika čvorovanja izdvaja se kao jednostavna, pristupačna i održiva metoda koja zahteva minimalan broj alata i omogućava efikasno korišćenje tekstilnog otpadnog materijala. Ovaj rad ispituje potencijal tehnike čvorovanja kao održivog pristupa u tekstilnom sektoru i njenu primenu u humanitarnim kontekstima. Tehnika omogućava pretvaranje odbačenog tekstila, ostataka tkanina i stare odeće u funkcionalne i dugotrajne proizvode, kao što su prostirke, torbe, korpe, podmetači i dekorativni predmeti. Pored smanjenja količine tekstilnog otpada, čvorovanje podstiče ponovnu upotrebu materijala, produžava životni vek proizvoda i podržava principe cirkularne ekonomije. Podsticanjem kreativnosti, smanjenja otpada i izrade trajnih i popravljivih proizvoda, ova tehnika doprinosi zaštiti životne sredine, a istovremeno pruža značajne društvene i humanitarne koristi.

Ključne reči: Tehnika čvorovanja, tekstilni otpad, održivost, humanitarna podrška, tradicionalne tekstilne tehnike.

1. INTRODUCTION

The world today faces two major problems, one is the increasing number of humanitarian crises, and the other is the increasing amount of textile waste. On the one hand, the world is facing an increasing number of humanitarian crises caused by wars, natural disasters, poverty, unemployment, climate change, pollution and epidemics [1]. These crises, are events or a series of events that pose significant threats to the health, safety, or well-being of a community or large group of people, affecting millions of people worldwide [2]. As a result, millions of people are left without essential textile products such as clothes, blankets, bedding, and other textile items necessary for their safety and dignified life.

On the other hand, the fashion industry, especially the concept of fast fashion [3] creates huge amounts of textile waste that end up in landfills even though many of these products can still be reused or recycled. Excessive production and consumption not only pollute the environment, but also represent an irrational use of resources [4,5,6].

Although these problems seem unrelated, they are actually closely related and can have a common approach in solving them. The contradiction that arises indicates the need for more efficient management of textile resources and their targeting to those who need them most.

2. TRADITIONAL TEXTILE TECHNIQUES AS A PATH TO A SUSTAINABLE FUTURE: KNOTTING TECHNIQUE

In conditions of increasing environmental challenges and an increasing amount of textile waste, modern society is looking for new solutions for sustainable production and



consumption. Interestingly, some of these solutions are not new, but originate from traditional textile techniques that have been used in everyday life for centuries [7,8,9]. Today, they represent a significant source of inspiration for the development of a sustainable textile industry. Traditional methods of textile production are characterized by low energy consumption, minimal waste generation and high durability of products [10]. Among them are hand weaving, patchwork, rag braiding and knotting, knitting and repairing stitching [10,11]. These techniques allow for maximum use of materials and greatly increase the longevity of textile products.

Unlike the concept of fast fashion, which encourages mass production and short-term use of clothing, traditional techniques are based on the principles of reuse, repair and responsible use of resources. That is why they can contribute to reducing textile waste and preserving the environment [10].

In addition to the environmental benefits, these techniques also have a significant humanitarian dimension [10]. By applying them, useful textile products can be created from reused materials, which can then be used in humanitarian crises, caused by natural disasters, armed conflicts or mass migrations, often create a need for quick, accessible and sustainable solutions to provide basic living conditions. In such situations, the knotting technique is a practical and efficient way to utilize available resources and reduce waste.

This technique is distinguished by the fact that it requires a minimum number of tools. In most cases, only hands and textile material are sufficient, which makes it accessible to people of different ages and skill levels. In addition, knotting is easy to learn, as it is based on the repetition of simple knots that can be quickly mastered.

One of the greatest advantages of this technique is the possibility of reusing textile waste. Fabric scraps, old clothes or unused textile products can be given a new life by making functional objects such as bags, mats, baskets, decorative elements and other useful products for everyday use.

Products made with the knotting technique are durable and long-lasting. Thanks to the strength of the knots, they can withstand daily use without easy damage. If damage does occur, such products are easily repaired by retying or replacing a certain part, which further extends their lifespan.

With its simplicity, economy and environmental value, the knotting technique is an excellent example of a sustainable approach in the textile industry. It not only contributes to the reduction of textile waste, but also encourages creativity, the reuse of materials and the creation of functional, durable and repairable products [11].

3. APPLICATION OF THE KNOTTING TECHNIQUE

The knotting technique has a wide range of applications in the production of both functional and decorative textile products. Due to its simplicity, flexibility, and ability to utilize recycled materials, it can be adapted to different purposes and user needs.

The knotting technique is widely used in the creation of rugs and mats. Durable floor coverings of various forms, sizes, and patterns can be constructed by attaching fabric strips

using a series of knots. These products are particularly valued for their strength, comfort, and ability to incorporate textile waste into a new functional form.

The technique is also commonly used to create bags, baskets, and storage containers. These devices offer practical ways for organizing home things while also encouraging the reuse of unwanted fabrics. Depending on the material and knot structure, products can range from lightweight decorative pieces to strong containers appropriate for daily usage.

Knotting can also be used to create home decor items such as wall hangings, cushions, table mats, tablecloth (Fig. 1 a) plant holders, and decorative ornaments. The technique's adaptability enables designers and craftspeople to experiment with various colors, textures, and patterns, resulting in one of kind handmade goods.

The knotting technique is equally appropriate for the fabrication of humanitarian and community-support objects. Using recycled fabrics, communities can make rugs (Fig 1 b), blankets, sitting mats, bags, and other useful items that can be provided to disadvantaged groups or utilized in emergencies. Because the technique requires minimal tools and training, it can be implemented in workshops (Fig. 1 c), educational programs, and social initiatives aimed at promoting sustainability and self-sufficiency.

Furthermore, knotting can be used in modern textile design and ecological fashion. Belts, jewelry, hats (Fig. 1 d), keychains, and decorative embellishments for garments can be made from textile leftovers, helping to reduce waste and promote circular design practices. The knotting process, with its various uses, demonstrates how ancient textile expertise can be converted into creative and sustainable goods. Its capacity to combine functionality, durability, inventiveness, and environmental responsibility makes it an invaluable tool for both personal use and larger social and environmental efforts.

The images shown in Figure 1 are products created by students within a workshop organized by Faculty of Technology, Goce Delcev University, Stip, on the topic Textiles in Humanitarian Crises and Reviving Traditional Textile Techniques.



Tablecloth (a)

Rug (b)



Workshop (c)

Hat (d)

Figure 1: Products created by students at a workshop organized at the Faculty of Technology, Goce Delcev University, Stip

3.1. Making a rug from rags using the knotting technique

1. **Materials and tools.** To knit a rug, you need a needle and strips of fabric. Make fabric strips by cutting and tearing the fabric or old cloths along the warp or weft yarns. Cut a hole at each end of your fabric strips, as indicated in figure 2.



Figure 2: Preparing fabric strips

2. **Connect the strips.** Insert one strip with the end with the hole through the hole of the other. Insert the other end of the first strip into its hole. Hold ends of the both strips which are without holes and pull them apart, figure 3.



Figure 3: Connecting the strips

3. **Make the first knot.** Hook the needle onto the strip on the left side. Place your finger under the place where the two strips are connected. Wrap the strip with the needle around your finger and over the other strip, Figure 4. Thread the needle through the loop you made.

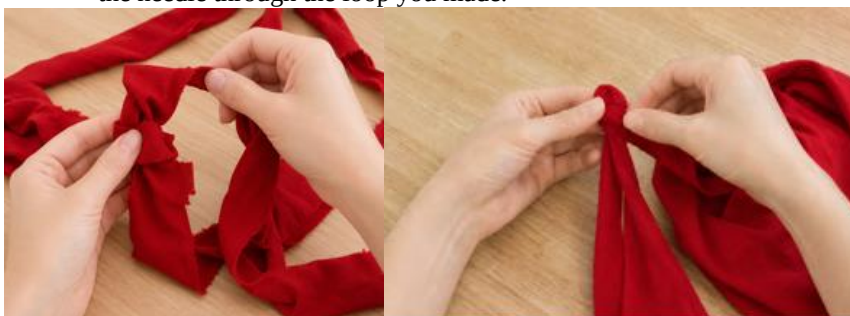


Figure 4: Making the first knot

4. **Make a several knots.** Take one tail of the strip and pull it through the first loop. It's similar to crochet, but you use your needle rather than a hook. Repeat this process through the loop you just made until you have four or five loops, as shown in the Figure 5.



Figure 5: Making several knots

5. **Make a circle.** Bring the first knot next to the last making a circular. The tail with the needle should be on the left side and the other tail on the right side. The right tail is crossed with the first knot, the needle put through the hole of the first knot. Join the first and the last knot in the circle. Keep doing that round and round, Figure 6.



Figure 6: Making a circle

6. **Finish your rug.** Turn the rug inside out. Tie the two ends of the strips together, and thread the excess through the loops, Figure 7.



Figure 7: Finishing the rug

4. CONCLUSION

Traditional textile processes are an invaluable resource for tackling contemporary environmental and social issues. Among them, the knotting process stands out as a simple, accessible, and ecological approach for effectively reusing textile waste while producing long-lasting and practical items. Its capacity to repurpose unwanted materials into useful things like rugs, bags, baskets, and humanitarian supplies proves its practical relevance in the context of a circular economy. The technique involves few materials, can be learnt quickly, and is appropriate for individuals of all ages and skill levels, making it a viable approach for community-based initiatives, educational programs, and humanitarian efforts.



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Furthermore, knotted items are long-lasting, repairable, and adaptable to a variety of applications, helping to reduce resource consumption and lengthen product life cycles. The workshop activities presented in this paper confirmed that traditional textile knowledge can successfully be integrated into modern sustainability practices. By combining creativity, environmental responsibility, and social engagement, the knotting technique contributes not only to reducing textile waste but also to strengthening community resilience and supporting vulnerable populations. Therefore, the revival and wider application of traditional knotting techniques can play an important role in promoting sustainable textile production, preserving cultural heritage, and developing practical solutions for future environmental and humanitarian needs.

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