Academia Open
Vol 10 No 1 (2025): June
DOI: 10.21070/acopen.10.2025.11399 . Article type: (Business and Economics)

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Academia Open
Vol 10 No 1 (2025): June
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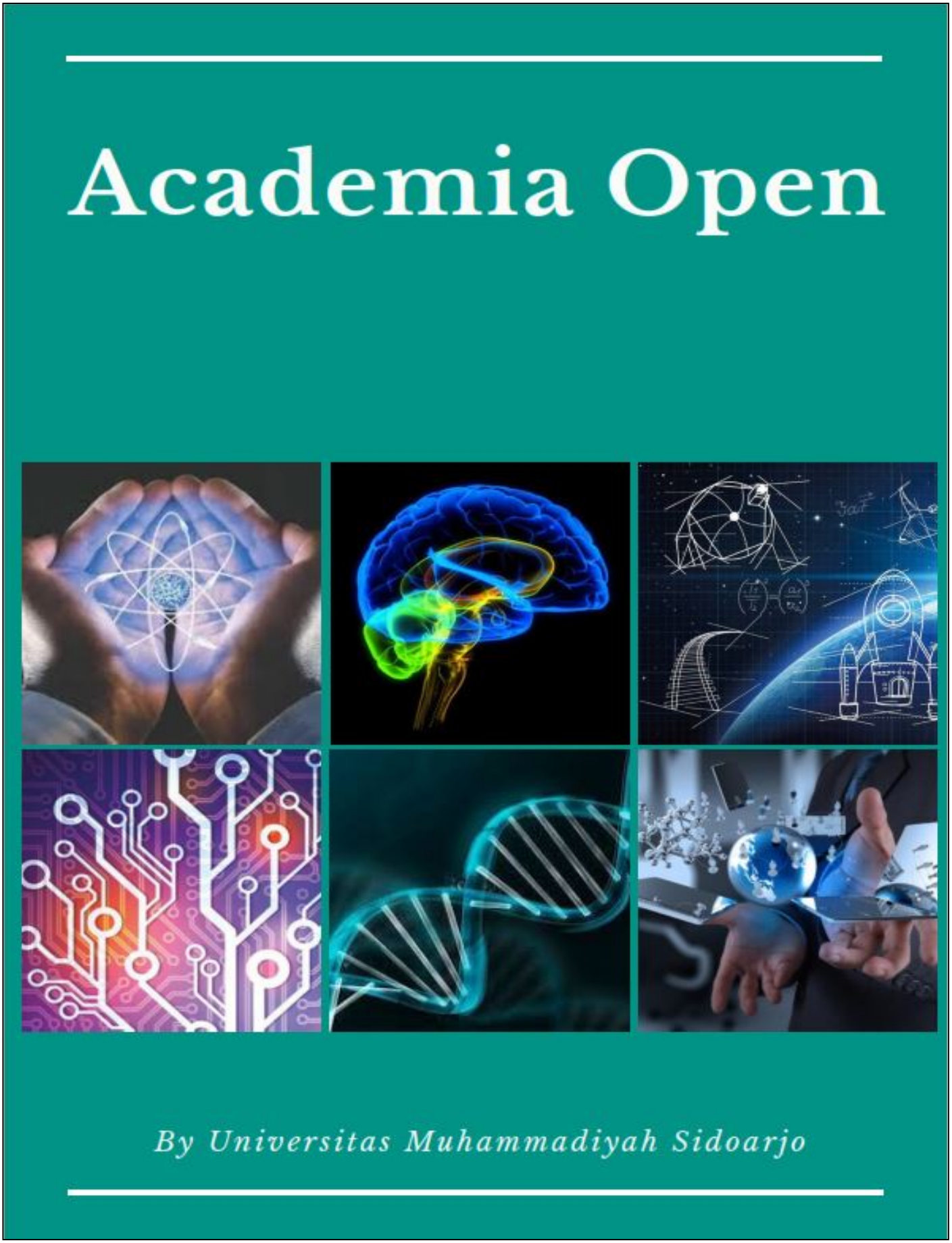

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Academia Open
Vol 10 No 1 (2025): June
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Digital Integration and Legal Innovation in Qashqadaryo Folk Crafts

Integrasi Digital dan Inovasi Hukum dalam Kerajinan Rakyat Qashqadaryo

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Abstract

General Background: Folk crafts are a vital component of Uzbekistan's national heritage and an important sector for regional socio-economic development. **Specific Background:** In the Qashqadaryo region, there is a growing movement to integrate traditional handicrafts with modern digital technologies and intellectual property (IP) frameworks. **Knowledge Gap:** However, few studies have examined how digital tools like 3D modeling and IoT are being practically applied in crafts, and how artisans interact with patenting systems. **Aims:** This study investigates the synergetic modernization of folk crafts through digitalization and IP protection to enhance production efficiency, design innovation, and market competitiveness. **Results:** Field data, trend modeling, and correlation analysis reveal systemic barriers such as low digital literacy, limited IP awareness, and insufficient infrastructure. Nevertheless, emerging initiatives—such as regional innovation hubs and blockchain-based IP systems—demonstrate growing institutional support. **Novelty:** The paper introduces a holistic "synergistic approach" combining digital design, smart production, and legal safeguards, tailored to the cultural and economic context of Uzbek artisans. **Implications:** Findings support the creation of targeted policies and educational programs, positioning folk crafts within the digital economy and ensuring their sustainable, legally protected development in global markets.

Highlight :

- Digital Integration: Introducing 3D modeling and IoT boosts production efficiency and design quality in traditional crafts.
- Legal Protection: Patenting crafts as intellectual property strengthens ownership and market competitiveness.
- Regional Empowerment: Innovation hubs and artisan training improve skills, preserve heritage, and drive local economies.

Keywords : Folk Crafts, Digital Technology, Intellectual Property, Patenting, Innovation

Published date: 2025-06-19 00:00:00

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Introduction

As a result of comprehensive measures being implemented in Uzbekistan to develop national handicrafts, folk decorative and applied arts, and to provide all-round support to specialists in this field, the number of folk artisans in our country has increased eightfold in recent years, the number of apprentices has grown ninefold, and the number of people employed in the sector has reached 250,000 [1].

In particular, significant efforts are being made in the regions to further develop the applied art of folk artisans, including the creation of catalogs of national folk craftsmen, the organization of international exhibitions and competitions, and the inclusion of folk artisans in the tourism register. At the same time, it is necessary to take additional measures to fully utilize unused opportunities of family entrepreneur-artisans through a community-based approach, to further expand the system of experience exchange among artisans, and to find new markets for handicraft products [2].

The system for involving the regional population in the field of folk crafts is being improved, with reforms steadily continuing to teach young people vocational skills in local communities based on the traditional “master-apprentice” model, ensure their employment, reduce poverty, and develop handicrafts [3].

In this regard, two key presidential decrees have been adopted: the Resolution No. PQ-55 of the President of the Republic of Uzbekistan dated December 20, 2021, *“On additional measures for the development of family entrepreneurship and the expansion of income sources for the population”*, and the Resolution No. PQ-77 dated December 30, 2021, *“On further improving the system of support for handicraft activities”* [4].

These resolutions aim to create employment opportunities for the population, finance their projects, develop the handicraft sector, and support the activities of artisans. They stipulate the allocation of preferential loans at an annual rate of 14% to members of the “Hunarmand” Association for purchasing equipment, spare parts, and raw materials for production needs, as well as for establishing handicraft development centers, “master-apprentice” schools, building or purchasing home-museums and workshops, for a period of up to 3 years, and for replenishing working capital for up to 18 months. These measures have led to noticeable positive changes in the field of folk handicrafts [5].

The digitalization of folk crafts represents a modern form of the development of digital handicrafts that can be observed today. Evaluating the development of folk crafts in the region based on trend models and studying issues related to folk craftsmanship are among the most pressing matters of the present time [6].

Review of Relevant Literature

The economic challenges of developing folk crafts and the issues of digitalizing national handicrafts in the regions particularly through the advancement of applied arts have been studied by several foreign economists. Notably, Basco has explored aspects of this area, while Banalieva, Eddleston, Zellweger, and Steier have examined the positive aspects of family-based handicrafts in the national economy from the perspective of institutional approaches and corporate governance, highlighting their unique characteristics [7].

Within Uzbekistan, scholars such as A. O‘lmasov, D.T. Yuldashev, and O.M. Pardaeva have investigated the theoretical model of the relationship between family business and regional development. Their research focuses mainly on the advantages of folk crafts within the context of family business. However, these works do not fully explore the economic and social nature of digitalization in folk craftsmanship[8].

At present, the ongoing work in the field of digitalizing folk crafts and identifying future prospects highlights the need for more serious scientific research and in-depth analysis of the issue [9].

Research Methodology

The approach chosen in the present research is considered multidisciplinary and data-oriented in order to investigate the modernization of regional folk craft experiences with the combination of digital technologies and the maintenance of the legal rights to intellectual property. Both qualitative and quantitative research methods were used to investigate not only the technological change, but also legal-institutional frameworks that influenced artisans in Qashqadaryo region. In an attempt to determine the effects of 3D modeling and Internet of Things (IoT) products in handicraft, the study employed empirical analysis along with the trend modeling and correlation analysis. Such mathematical instruments made it possible to determine the developmental trends, making it possible to construct the predictions concerning future growth potential within given industry. Observations in the field were supplemented by interviews and questionnaires administered to artisans, master-apprentice pedagogues as well as organizational representatives of crafts associations at the regional level. Also, legal texts Presidential Decrees No. PQ-55 and PQ-77 were studied in order to get an idea about the role of the state in facilitating

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innovation and intellectual property rights in crafts. The study also explored a comparative study of the practices in patenting and digital transformation on the one hand, and on the other hand the local practices and the international practices based on a broad source of academic literature and region reports on policies. It was specifically focused on the evaluation of the degree to which artisans: have access to digital tools, the process of registering patents and their awareness of the concepts of intellectual property. Moreover, the practical pilot projects in Karshi, Shahrisabz, and Kitob were investigated to have an overview of the concerns and training of engaging modern technology with the traditional crafts. The mixed-method approach allowed making a holistic assessment on both social and economic and technological aspects of the modernization of crafts in a regional format.

Analysis and Key Findings

There are several systemic issues in the modernization of folk craft technologies using a synergistic approach and in patenting regional handicraft products as intellectual property. Key barriers include a lack of knowledge among artisans and small entrepreneurs in the field of intellectual property, the complexity and cost of obtaining patents, and insufficient access to consultation services. To address these issues, it is necessary to:

Organize regional patent training sessions,

Provide subsidies for patent-related costs, and

Expand the network of patent advisors [10].

In the crafts sector, artisans face major challenges with adopting modern technologies and digital sales platforms, as well as the limited spread of eco-friendly production and innovative design practices [11]. Solutions include:

1. Enhancing the master-apprentice system with digital skills,
2. Hosting practical workshops on 3D design and e-commerce,
3. Creating a regional brand such as “Qashqadaryo Handmade”, and
4. Promoting products through global digital marketplaces.

It is also proposed to:

1. Establish regional innovation centers (in Shahrisabz, Karshi, and Kitob),
2. Implement a “Digital Skills for Artisans” program,
3. Develop a system for “eco-certification and geographical indication (GI) labeling”, and
4. Include patents and trademarks in state support programs, such as subsidies and tax incentives.

Digital transformation, as a key direction of the modern economy, demands innovative approaches in the crafts sector. Traditional craft production must be integrated with:

1. 3D modeling,
2. IoT (Internet of Things) devices,
3. AI-based design algorithms,
4. Blockchain-based IP registration, and
5. Cloud-based virtual craft studios [12].

The aim of integrating 3D and IoT technologies into the crafts sector is to modernize traditional production, enhance product quality, increase production efficiency, and ensure global competitiveness [13].

Through 3D modeling, artisans can improve design and quickly produce customized orders. IoT technologies enable digital monitoring, efficient resource use, and automation of production. At the same time, identifying existing limitations such as underdeveloped technological infrastructure, low levels of digital literacy, and limited financing will help develop targeted strategies to overcome them.

Overall, the integration of digital technologies creates a scientific and practical foundation to adapt folk crafts to innovative development and ensure their sustainable and systematic growth in the digital economy. The research emphasizes the importance of protecting intellectual property rights for craft products in Qashqadaryo and explores both the opportunities and limitations of applying 3D modeling and IoT in the field of folk craftsmanship. These technologies simplify product design, enable custom and mass production, and automate processes while highlighting the need for improved infrastructure, education, and investment for effective implementation [14] .

Opportunities

The integration of digital technologies, especially 3D modeling and IoT devices, into the field of handicrafts offers

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the possibility to fundamentally modernize the production process. With the help of 3D technologies, it is possible to quickly and accurately design products, prepare personalized orders, and produce models on a large scale. IoT devices enable real-time monitoring of raw material quality, environmental parameters, and technological operations during the production process. This helps improve product quality, ensures efficient use of resources, and enhances production efficiency.

Challenges

There are certain limitations in implementing digital technologies in the field of handicrafts. First and foremost, there is a lack of necessary technical infrastructure and high costs associated with introducing 3D and IoT technologies. Low levels of digital literacy among local artisans and limited skills in using modern software also hinder effective implementation of these technologies. Furthermore, a conservative attitude and cautious approach toward technological innovations within traditional craft culture slow down the process of innovation integration.

Simplifying and Expanding Intellectual Property RegistrationIt is necessary to simplify the process of registering product copyrights and to create opportunities for online registration through government service agencies. Mobile applications and online platforms should be established to streamline these procedures.

Establishing a System for Patenting Handicraft ProductsClear procedures must be defined for patenting local products and registering them as intellectual property.

Awareness and Promotion of Intellectual Property RightsIt is essential to conduct awareness campaigns and provide understanding of intellectual property rights among artisans. This includes:

1. Organizing seminars, training sessions, and informational events;
2. Opening advisory centers on intellectual property rights.

Disseminating information about local and international legislation, and informing artisans about the possibilities and ways of protecting their products.

Establishing Special Intellectual Property CentersA specialized regional intellectual property center should be established for the handicrafts sector. These centers would:

1. Provide consultations on registering intellectual property, obtaining patents, and protecting them;
2. Assist in registering local product trademarks and designs.

Enhancing Government Support and Protection MechanismsTo encourage the patenting of handicraft products, incentives should be created, including reducing or subsidizing registration costs. Tax incentives should be provided for trademark registration.

Diagram Description

This diagram illustrates the step-by-step process of patenting products as intellectual property. The first stage requires the creation of an original product or technology. In the second stage, it is checked whether the innovation meets the requirements for patentability. In the third stage, a prepared patent application is formally submitted. Finally, in the fourth stage, patent rights are protected and maintained. Distinct graphic symbols and colored blocks are used for each stage, reflecting an organized and systematic approach to the patenting process.

Essence of the Synergistic Approach in National HandicraftsThe essence of the synergistic approach lies in modernizing folk craft technologies through the integration of various sectors traditional handicrafts, modern design, digital technologies, environmentally friendly production, and marketing strategies. This approach harmonizes the strengths of each sector to achieve innovative and functional outcomes.

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Vol 10 No 1 (2025): June
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Figure 1. *Protection of Intellectual Property Rights in the Development of Folk Craft Technologies in Qashqadaryo*

In particular, by preserving traditional styles in handicrafts and integrating 3D modeling, eco-friendly materials, and e-commerce platforms, a new generation of products is being developed. As a result, craft technologies not only adapt to modern demands but also become competitive in international markets.

Patenting products as intellectual property primarily ensures the legal protection of created innovations, technical solutions, or new products. A patent is an official document that grants the author or inventor exclusive rights to their developed product for a certain period. To obtain a patent, the product must meet the criteria of novelty, inventive step, and industrial applicability [15]. Accordingly, a patent gives the owner the right to use, sell, license, or prohibit others from using the invention for commercial purposes, thus protecting innovation and maintaining a competitive edge in entrepreneurship.

On the other hand, the patenting procedure includes several stages: identification of the intellectual property object, examination of patentability, preparation and submission of the patent application, and finally, official patent registration. Through this process, the developed product is legally recognized as belonging to its creator and forms a mechanism to prevent illegal copying or counterfeit use. Additionally, patented products often become valuable parts of a company’s assets, playing an important role in attracting investment and increasing competitiveness in the global market.

When analyzing the integration of digital technologies (3D, IoT) in the field of handicrafts in Qashqadaryo region, it is evident that there is potential for forming an innovative infrastructure. Modern craft centers are already operating in areas like Karshi and Shahrisabz, and certain workshops have introduced laser engraving and modern design equipment. Regarding openness among local artisans, young craftsmen and small enterprises are showing interest in learning technologies such as 3D design and digital pattern creation. The use of digital marketing (Telegram, Instagram) for product promotion is gaining strength. Initial steps have been taken to digitally preserve cultural heritage initiatives have emerged to create digital catalogs and 3D models for traditional products such as Shahrisabz carpets, Kitob ceramics, and Koson wood carvings [16].

To further develop the integration of digital technologies (specifically 3D technologies and IoT Internet of Things)

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into the handicraft sector in Qashqadaryo region, the following key measures should be implemented:

1. **Organizing digital literacy and technological training programs for artisans**, including short-term courses and seminars on 3D modeling, 3D printing, and the use of IoT devices in handicrafts. For example, a special “Digital School for Artisans” should be established in Qashqadaryo.
2. **Subsidizing digital equipment and software**, including state grants or low-interest loans for purchasing 3D printers, laser cutters, and IoT devices. For instance, in Dehqonobod, a program should be launched to provide 3D printers and IoT monitoring systems on preferential terms to ceramic product manufacturers.

Conclusion and Recommendations

In conclusion, the expected outcome is the revival and development of traditional crafts that have existed in our country for centuries but are gradually disappearing in recent years. This includes preserving and passing down our national heritage to future generations, promoting our national identity, customs, and traditions to both local and international audiences through handicraft products. It also aims to create employment opportunities for the population in underdeveloped and remote mountainous regions of our republic. Even without advanced technologies, it is possible to produce handicraft products using locally available raw materials (such as wool, silk, leather, clay, wood, metal, etc.), thereby providing a source of income for local communities.

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