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THE ROLE OF THE REGULATORY DOCUMENTATION SYSTEM IN IMPROVING WASTEWATER TREATMENT TECHNOLOGIES IN THE TEXTILE AND DYEING INDUSTRIES (A CASE STUDY OF ENTERPRISES IN TASHKENT)

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Abstract. This article examines the role of the regulatory documentation system in the construction sector in the design and construction of wastewater treatment facilities for textile and dyeing enterprises. It analyzes the interrelationship between the Urban Planning Code, Cabinet of Ministers Resolution No. 577, Construction Regulation QR 05.04-23, and environmental standards, and compares these instruments with those of Russia (SP 32.13330.2018), the European Union (2022/2508), and China (GB 4287–2026). The analysis identifies a lack of industry-specific requirements for designing on-site wastewater treatment facilities in construction standards and proposes the development of corresponding urban planning norms and rules.

Key words: construction regulatory documents, urban planning norms and rules, construction regulations, on-site wastewater treatment facility, textile industry, wastewater, international experience, Tashkent.

INTRODUCTION

Wastewater from textile and dyeing enterprises contains high concentrations of dyes, surfactants, and complex organic compounds that cannot be completely removed by municipal biological wastewater treatment facilities. Consequently, discharging such wastewater into municipal sewers without pretreatment is prohibited, and enterprises are required to have on-site wastewater treatment facilities [1; 2].

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In practice, this requirement is not fully met. In 2024, samples collected from 115 enterprises discharging wastewater into the Salar, Bektemir, and Bo‘zsuv treatment facilities in Tashkent showed that pollutant concentrations exceeded permissible limits in 44 cases (38%); the construction or reconstruction of 38 on-site treatment facilities was planned [3]. Therefore, the proper design and construction of on-site wastewater treatment facilities is a pressing issue that should be governed by the regulatory documentation system in the construction sector.

The aim of this study is to assess the role of the construction regulatory documentation system in the design and construction of wastewater treatment facilities at textile enterprises and to substantiate directions for its improvement.

MATERIALS AND METHODS

The study systematically analyzed Uzbekistan’s current urban planning and construction regulatory documents, their hierarchical levels, and their interrelationships. These documents were compared with relevant regulations of the Russian Federation, the European Union, and China. The practical situation was assessed using official data from regulatory authorities.

RESULTS AND DISCUSSION

1. Hierarchy of regulatory documents. The Urban Planning Code occupies the highest level of Uzbekistan’s construction regulatory documentation system [4]. Cabinet of Ministers Resolution No. 577 of October 6, 2022, systematized construction regulatory documents and, effective January 1, 2023, classified urban planning norms and rules (ShNQ), construction regulations (QR), and cost-estimation and resource standards into separate categories [5]. Under this resolution, construction regulations are not considered technical regulatory documents; authority to adopt and amend them is vested in the Ministry of Construction, while urban planning norms must be reviewed at least every three to four years [5]. Documents relevant to wastewater treatment facilities are presented in Table 1.

Table 1. Regulatory documents relevant to on-site wastewater treatment facilities

Level	Document	Requirement relevant to on-site treatment facilities
Code	Urban Planning Code (2021) [4]	General framework for urban planning activities
Law	Law No. O‘RQ-784 (2022) [2]	Definitions of “on-site treatment facility” and “municipal environmental standard”
Government resolution	Cabinet of Ministers Resolution No. 577 (2022) [5]	Categories and status of construction regulatory documents
Government resolution	Cabinet of Ministers Resolution No. 11 (2010) [1]	Prohibition on discharging dye-containing wastewater into sewers without pretreatment
Government resolution	Cabinet of Ministers Resolution No. 14 (2014) [6]	Procedure for developing wastewater discharge standards
Construction regulation	QR 05.04-23 (2023) [7]	Construction, testing, and acceptance of external networks and facilities

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2. Role and limitations of QR 05.04-23. Construction Regulation QR 05.04-23, "External Water Supply and Wastewater Networks and Facilities," was approved on November 14, 2023, replacing the former QMQ 3.05.04-97 [7]. It applies to the construction, expansion, and reconstruction of external networks and wastewater facilities in settlements and at industrial and agricultural sites; therefore, it also applies to on-site treatment facilities at enterprises [7]. However, the regulation primarily establishes procedures for construction and installation work, testing, and acceptance of facilities. The quality of treated wastewater is determined not by this regulation but by standards approved by environmental authorities for each enterprise for a five-year period [6; 7].

As a result, a gap has emerged between construction standards (how to build a facility) and environmental standards (the required quality of treated wastewater): industry-specific design parameters and technological process schemes for on-site wastewater treatment facilities at textile enterprises have not been established.

3. International experience. In the Russian Federation, the design of external sewerage networks and facilities is governed by the code of practice SP 32.13330.2018. It was approved by Order No. 860/pr of the Ministry of Construction dated December 25, 2018, and replaced the 2012 edition [8], demonstrating the periodic updating of construction standards based on SNiP 2.04.03-85. In the European Union, best available techniques (BAT) conclusions for the textile industry were adopted through Decision (EU) 2022/2508; permit emission limits must not exceed the applicable BAT-associated emission levels, such as 40–100 mg/L for chemical oxygen demand (COD) in discharges to receiving waters [9]. In China, the unified GB 4287–2026 standard for the textile industry takes effect on September 1, 2026 [10]. The comparative results are presented in Table 2.

Table 2. Comparison of regulatory systems

Criterion	Uzbekistan	Russia	European Union	China
Main document	QR 05.04-23 [7]	SP 32.13330.2018 [8]	Decision (EU) 2022/2508 [9]	GB 4287–2026 [10]
Document type	Construction regulation	Code of practice	BAT conclusions	Mandatory national standard
Textile-specific requirements	No	General, not industry-specific	Yes	Yes
Most recent update	2023	2018	2022	2026

4. Directions for improvement. Based on the analysis, the following measures are proposed: (1) develop dedicated urban planning norms and rules (ShNQ) for designing on-site wastewater treatment facilities at textile and dyeing enterprises, including a recommended process scheme comprising pH neutralization, coagulation or electrocoagulation, and advanced oxidation stages, together with design calculation parameters; (2) amend QR 05.04-23 to require acceptance of an on-site treatment facility before an industrial enterprise is connected to the municipal sewerage system, thereby enforcing the prohibition established by Cabinet of Ministers Resolution No. 11 [1] at the construction stage; (3) link the ShNQ parameters to the technological indicators set out in Cabinet of Ministers Resolution No. 14 [6]; and (4) use the three-to-four-year review period specified in Resolution No. 577 [5] to update the standards regularly in light of international regulatory documents [8; 9; 10].

CONCLUSION

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The study shows that although the construction regulatory documentation system establishes procedures for constructing on-site wastewater treatment facilities at textile enterprises, it does not contain industry-specific requirements for their design. QR 05.04-23 primarily regulates construction, installation, and acceptance, whereas treatment performance is governed by separate environmental standards. This regulatory gap is also evident in practice: in 2024, pollutant concentrations exceeded permissible limits at 38% of the enterprises inspected in Tashkent. The experience of Russia, the European Union, and China demonstrates the need for regular updates to construction and technical standards and the inclusion of industry-specific requirements. The development of dedicated urban planning norms and rules (ShNQ) for designing on-site treatment facilities at textile enterprises, aligned with environmental standards, is proposed.

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