Regtech Development: How Technology Is Changing Governance with Market Compliance in The Era of Digital Finance

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Abstract: In the era of digitalization of financial services, regulatory compliance has become one of the key drivers for sustainable development of organizations. RegTech (Regulatory Technology) represents a new generation of technology solutions focused on automating, optimizing and improving the efficiency of compliance processes. This article discusses the development of RegTech, its key tools and its impact on financial institutions in the context of digital transformation.

Introduction: In the 21st century, the digital economy has become an integral part of the global landscape, which requires continuous development and improvement. The integration of financial technologies into everyday life transforms habitual behavioral patterns and has a significant impact on economic processes. The need for the digitalization of the financial market is driven by the desire to increase the efficiency and transparency of operations, as well as to expand access to financial services. However, the introduction of new technologies is associated with the emergence of specific risks, which actualizes the question of the role and place of the regulator in the process of digital transformation. Transformation should involve not only financial market participants, but also regulators themselves, who should adapt their methods and tools to the new realities. Harnessing the power of digital technologies for supervisory purposes is a key aspect of ensuring the stability and efficiency of the financial system.

Regulation of digital technologies in the financial sector requires a balanced and comprehensive approach, taking into account both potential benefits and possible risks. The legal framework should be designed to foster innovation and development of the digital economy, while protecting consumer rights and preventing abuse. Regulation and supervision of financial institutions remain critical components of maintaining the stability of the financial system in the context of digital transformation.

As a response to the challenges of digitalization, regulators are actively implementing SupTech and RegTech technologies aimed at automating and optimizing supervisory and compliance processes. The use of these technologies can improve the efficiency of supervision of financial institutions, promptly identify potential risks and ensure regulatory compliance in a rapidly changing technological landscape.

Today's financial markets are undergoing rapid change due to digitalization, decentralization and data growth. In this environment, traditional methods of risk and compliance management are becoming ineffective. Against this backdrop, RegTech - technologies for automating and optimizing regulatory processes - is developing. According to Professor Douglas Arner: "RegTech promises not only to increase efficiency, but also to radically transform the approach to financial regulation" [1] [1].

According to a number of researchers, the activation of the introduction of RegTech technologies was observed after the global financial crisis of 2008. This crisis served as a catalyst for the tightening of regulatory

requirements and increased control over financial market participants by regulators in various countries. The post-crisis period was characterized by a significant increase in the volume of regulations and requirements, which led to the need for many companies to expand their staff to monitor changes in legislation.

The regulators themselves also faced challenges as they were faced with an increased volume of information to process and monitor, which resulted in increased time expenditures. At the same time, the increasing complexity of technological innovations and the transformation of financial instruments have demanded more efficient and advanced monitoring and control tools from market participants.

Currently, there is a process of forming a generally accepted definition of the term RegTech, considered as a new class of digital technologies (see Table 1). Most academic papers associate RegTech with the application of innovative technologies to achieve certain goals, but the specific formulation of these goals varies from author to author. RegTech is used by both regulators and companies, with unified technologies based on common sources of digitized information and data flows. RegTech is thus a comprehensive approach to automating and optimizing financial compliance processes for both regulators and regulated entities.

Source	Key aspects of the RegTech definition
Arner D.W. (2017) [1]	Innovative technological solutions to improve or radically transform financial regulation.
Institute of International Finance (2016) [2]	Technologies that improve the efficiency and effectiveness of regulatory and compliance processes.
CB Insights (2017) [3]	Technology solutions and software designed to optimize compliance processes and ensure regulatory understanding and compliance (broadly defined). Technologies that enable compliance, risk management and implementation of controls, with the ability to be fully automated through AI, machine learning and blockchain (narrowly defined).
Ernst & Young (2019) [4]	Applying advanced technologies to analyze large data sets to address compliance challenges.
Вершицкий А.В., Вершицкая Н.А. (2020) [5]	Technologies designed to ensure prompt and effective enforcement of mandatory requirements, as well as preventive authorized intervention in the activities of controlled entities.
Понаморенко В.Е. (2020) [6]	Technology solutions that provide responsive, flexible, easily integrated, reliable, safe and cost-effective solutions that meet regulator standards.
Barefoot J.A. (2020) [7]	Digital technologies applied to financial regulation, differentiated into: 1) SupTech - supervisory technologies for regulators; 2) Technologies for use by financial organizations in accordance with laws and regulations.
Центральный банк Российской Федерации (2021) [8]	Technologies used by financial institutions to improve compliance with regulatory requirements.
Institute of International Finance (2021) [9]	Utilize new digital technologies to address compliance challenges more efficiently and effectively.

Table 1 – Definition of RegTech in the Context of Various Studies

Thus, RegTech (from the English Regulatory Technology) is a set of technological solutions aimed at providing more effective compliance management. It includes such technologies as artificial intelligence, machine learning, blockchain, cloud computing and big data analytics [10]. As Professor Jason Barberis notes: "RegTech is a natural evolution of FinTech and reflects the transition from the digitalization of services to the digitalization of regulation" [1]. [1].

A number of factors determine the desire of financial institutions to integrate regulatory technologies into their activities. Dynamic changes in the regulatory environment and the high costs associated with ensuring compliance with regulatory requirements actualize the need for effective solutions. In this context, the role of companies specializing in the development and implementation of RegTech tools is increasing. It is important to note that technological

transformation requires adapting the internal control system of financial organizations to new operating conditions.

With the rapid digitalization of the financial sector and tougher regulatory requirements, there is a growing need for technological solutions capable of ensuring timely and effective compliance. Regulatory Technology is a set of innovative tools aimed at automating and optimizing regulatory processes. These technologies are widely used in the areas of compliance, risk management, reporting and interaction with supervisory authorities. For a deeper understanding of the potential and applied significance of RegTech, it is advisable to consider its key areas of development.

1.Automation of compliance processes. Modern RegTech solutions increasingly utilize artificial intelligence (AI) and machine learning (ML) technologies to automate routine compliance tasks. Tools for KYC (Know Your Customer) and AML (Anti-Money Laundering) are particularly active, enabling real-time:

 - detect suspicious transactions,

 - track anomalies in customer financial behavior,

 -conduct automatic identity verification using biometric data.

For example, the ComplyAdvantage platform uses ML to monitor transactions in more than 100 countries, and Onfido, a leader in digital identity, provides verification services with facial and document recognition. This enables financial institutions to reduce risk and accelerate customer onboarding processes.

2. Reducing compliance costs. With increasing regulatory complexity and stricter requirements for financial institutions, compliance costs have become one of the most significant budget items. According to a Deloitte report, automation with RegTech can reduce compliance operational costs by up to 50%, especially in areas such as:

- regular reporting to regulators,

- control over cross-border transactions,

- checking for compliance with sanctions lists.

Large banks such as HSBC and Barclays have already implemented RegTech tools, allowing them to reduce their transaction monitoring staff and reallocate resources to more strategic areas.

3. Transparency and reporting. Professor Dirk Zetzsche, a researcher in the field of financial regulation, emphasizes that "technology reporting is the path to full regulatory transparency, minimizing risk and

increasing trust" [10]. Regulators, especially in EU countries, encourage the implementation of automated reporting systems, including Regulatory Reporting APIs, which allow:

 - re-deliver data in real time,

 - generate reports without manual intervention,

 - avoid human errors and manipulations.

An example is the AxiomSL platform, which is used by banks to prepare Basel III, EMIR, MiFID II and other regulatory reporting.

4. Cyber risk management. As the volume of digital transactions increases, so does the threat of cybercrime. RegTech helps organizations not only detect fraudulent activities, but also prevent data leakage, which is especially important in the era of GDPR and similar regulations.

Darktrace, using AI, simulates attacker behavior and detects anomalies in IT systems before they lead to an incident. According to a PwC study, organizations that have implemented RegTech cybersecurity tools are 37% faster to detect leaks and regain control of the system.

5. Integration with FinTech and SupTech. RegTech's interaction with FinTech and SupTech (Supervisory Technology) opens up new opportunities for both the private and public sector. SupTech are technologies that regulators use to:

 - monitoring the market in real time,

 - analyzing big data,

 - preventing systemic risks in the banking sector.

For example, the Dutch Central Bank (DNB) is actively using SupTech solutions to analyze the reporting of banks and insurance companies, and the UK Financial Conduct Authority (FCA) has developed an experimental Regulatory Sandbox, where FinTech companies test their RegTech solutions in a real regulatory environment.

Kazakhstan is also seeing a growing interest in SupTech. Kazakhstan's Agency for Regulation and Development of the Financial Market is developing digital tools for monitoring the banking and microfinance sectors, which promotes synergies between private RegTech platforms and state supervisory systems.

Examples of well-known RegTech companies and the tools they offer include:

1.IdentityMind Global: provides anti-fraud and risk management services focused on the field of digital transactions.

2.Trunomi: specializes in managing customer consent for the use of their personal data, ensuring compliance

with data protection legislation.

3.Suade: offers solutions that enable banks to provide the necessary regulatory reports without disrupting the existing information system architecture.

These examples demonstrate the diversity of RegTech solutions aimed at automating and optimizing various aspects of compliance in the financial sector.

In the context of the dynamic development of the digital economy, RegTech is becoming a key driver for transforming compliance management in the financial sector. An analysis of promising areas of RegTech development allows us to highlight the following key trends:

Category	Аспект	Описание
Advantages	Improved responsiveness to changes in the regulatory environment	RegTech solutions provide rapid adaptation to new regulatory requirements, enabling financial organizations to stay compliant in a dynamic environment.
	Minimize risks associated with human factor and errors	Automation of compliance procedures significantly reduces the likelihood of human error, increasing the accuracy and reliability of compliance with regulatory requirements.
	Improving customer experience by optimizing KYC/AML procedures	RegTech helps accelerate customer identification and verification (KYC) and anti-money laundering (AML) processes, which enhances customer convenience and increases customer satisfaction with the services provided.
Challenges	Significant financial costs of implementation	Implementing RegTech requires a significant investment in software purchases, integration with existing systems and staff training, which can be a significant barrier for smaller organizations.
	Need to modernize IT infrastructure	Integrating RegTech solutions often requires adapting existing IT infrastructure, which can be a complex and resource-intensive process requiring the involvement of qualified specialists.
	Lack of unified standards and RegTech regulation	The lack of clear RegTech standards and regulation creates uncertainty, makes it difficult to select optimal solutions and can increase the risks associated with the use of untested or unreliable technologies. This can lead to difficulties in ensuring compatibility and interoperability between different solutions.

Table 2 - Advantages and challenges of RegTech implementation in the financial sector

According to the World Economic Forum report, "in the next five years RegTech will become a key driver of reforms in the regulation of global financial systems" [11]. [11]. The European Banking Authority also notes that RegTech "not only optimizes the supervisory process, but also creates the basis for risk-based supervision" [12] [12].

Thus, RegTech is an important tool for business adaptation to the digital economy and constantly changing regulation. It not only reduces operational costs, but also increases sustainability and financial transparency. The future lies with those companies that manage to integrate RegTech into their digital transformation strategy.

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