How secure is Tenge?

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Abstract: The prevalence of counterfeit currency poses a significant threat to both national and global economic systems. The Tenge, a relatively young currency, was first issued in November of 1993 as the national currency of The Republic of Kazakhstan. In this paper, primary focus has been placed on the security of the Tenge against counterfeiting. The legislative regulation that is implemented by the government of Kazakhstan, security elements on the banknotes themselves, and educational initiatives designed to help the public to correctly identify counterfeit Tenge are all critically analysed. A visual analysis of the Tenge's many security features is also performed, with a table highlighting what security features different denominations of Tenge exhibit. According to the findings of this study, the Tenge is adequately safeguarded against counterfeiting. This conclusion is reached by highlighting the strengths of law enforcement agencies both locally and internationally, as well as the numerous security mechanisms that are included on banknotes. However, this paper suggests that more should be done to educate the public about how to correctly identify counterfeits. This article serves as a resource of anti-counterfeiting strategies employed for both the prevention and detection of counterfeit Tenge.

Keywords: counterfeit money, currency, banknotes, money circulation, protective elements, legal regulation.

Introduction

A well-established financial instrument, currency, enables the exchange of commodities and services. For a currency to qualify as an acceptable means of exchange, it must possess intrinsic value and be denominated in units that are universally acknowledged. Additionally, it is possible for a currency to be universally acknowledged as a means of payment or to be regarded as a legal tender, depending on the explicit specifications of a governing body. Presently sanctioned by the Kazakhstani government and the National Bank of Kazakhstan, the Tenge is the official tender of the Republic of Kazakhstan. The research aim of this article is to assess the security measures and vulnerabilities of the Tenge currency against counterfeiting. In order to assess this, this article will examine the Tenge's printing security, the legal enforcement in Kazakhstan, and public education of counterfeit currency detection to determine the overall security level of the Tenge.

Literature review

The tenge, the currency of Kazakhstan, was introduced almost two years after the country's independence. Although initially hesitant to renounce the planned new rouble zone [1], on the 12th of November 1993, Nursultan Nazarbayev, the President of Kazakhstan, issued an official statement, "About introducing the national currency of the Republic of Kazakhstan" [2]. The Tenge, the nation's first currency, was officially introduced on the 15th of November 1993 and succeeded the place of the Russian Ruble at an exchange rate of 1 Tenge for every 500 Rubles [3]. Prior to these dates, due to the absence of currency production and printing facilities in Kazakhstan, a group of currency designers travelled to England on August 27, 1992. It was in England that the first Tenge notes were printed at a London-based minting firm Harrison & Sons and the first Tenge coins were produced in Germany [4]. The Banknote Factory of the National Bank of Kazakhstan was ultimately established in 1995, with the purpose of producing and distributing currency inside the country.

One of the crucial attributes of a national currency is trust from a country's citizens. In order to instil this assurance, it is essential for us to verify the authenticity of the banknote in our possession, confirming that it is really a legitimate note and not a fraudulent imitation. Counterfeiting currency is a global phenomenon, and Kazakhstan is not an exception. As noted by McKinney and others, counterfeiting can substantially and harmfully undermine the financial basis and fundamental structures of national economic systems, and in certain instances, this erosion can furthermore affect global markets [5]. Therefore, it is imperative to establish effective strategies to combat counterfeiting in order to dissuade and minimise the negative effects that criminal activities can have on an economy. Counterfeit currency poses an economic, social, and political threat to Kazakhstan. Counterfeiters frequently utilise advanced techniques and technologies to produce highly authentic forgeries, making it challenging for authorities to identify them. Kazakhstan is in perpetual conflict with counterfeiters as the state seeks to develop advanced detection technologies, implement anti-counterfeiting measures for currencies, and devise innovative strategies to combat major criminal organisations that

specialise in counterfeiting. Efficient resolutions necessitate a strong network of partnerships between the business sector and the law enforcement community. Detecting and preventing counterfeit Tenge can be a costly, time-consuming, but a necessary measure taken.

As Monnet asserts, central banks have the responsibility of ensuring the integrity of the money supply and that there are three primary measures to conserve it: training and education of security features, law enforcement, and updates and enhancements of banknote features [6]. The National Bank of Kazakhstan (NBRK) is responsible for overseeing and regulating these operations in Kazakhstan. Despite numerous endeavours by NBRK, counterfeiting of money continues to occur in Kazakhstan. According to the 2022 annual report, the National Bank and other banks discovered a total of 386 counterfeit banknotes. The number of identified counterfeit currency notes in 2022 had a 24.7% decline in comparison to 2021. By the conclusion of 2022, the rate of counterfeit banknotes was at around 0.5 per one million genuine banknotes in circulation. Compared to other nations, the number of counterfeit banknotes in Kazakhstan is quite minimal (15 counterfeits per million in EU and 4 counterfeits per million in Russia) [7].

Extensive studies have been conducted on the security of currencies, namely the U.S. Dollar, the Euro, and the Pound Sterling, but not all banknotes are equal in their anticounterfeiting measures. Therefore, this study aims to analyse the security of the Tenge note – an understudied currency- and observe any strengths or weaknesses it possesses. It is in mind that this paper can be used as a repertoire for the anti-counterfeiting measures taken from both the prevention and detection of the Tenge.

Research methods

This study follows Monnet's conceptual framework, which outlines security mechanisms aimed at safeguarding the integrity of currency systems. The three barometers regarding Tenge security will be analysed based off Monnet's framework: *legal enforcement, printing security (digital detection and reissuances), and public education awareness (visual detection)* [6]. Furthermore, a visual analysis will be conducted on a dataset of Tenge banknotes provided by the National Bank of Kazakhstan.

Findings and Discussion

Legal enforcement:
Regarding in-state criminal proceedings, engaging in the production, ownership, distribution, and trade of forged currency are all illicit activities that are subject to legal penalties. Article 231 of Chapter 8 of the Penal Code of the Republic of Kazakhstan, titled "Criminal Offences in the Economic Field", explicitly forbids the offence [8]. The penalty is subject to variation. Engaging in activities such as producing or storing counterfeit banknotes and coins issued by the National Bank of the Republic of Kazakhstan, state securities, or other securities denominated in the currency of Kazakhstan or foreign currency, with the intention to sell them, is a crime that can result in imprisonment for a maximum of five years, along with the possibility of property confiscation. Repeated commission of identical offences by a group of individuals, on a large

scale, and involving the transmission beyond the state border of the Republic of Kazakhstan, will be subject to punishment by imprisonment for a period of five to ten years, as well as the confiscation of property.

Since 1992, Kazakhstan has been an Interpol member and accommodates a National Central Bureau (NCB). The NCB facilitates the integration of Kazakhstani domestic law enforcement agencies with international counterparts and the General Secretariat through Interpol's highly secure global police communications network. NCBs actively pursue the acquisition of pertinent information from other NCBs to facilitate the investigation of criminal activities or individuals inside their own jurisdiction. Additionally, they engage in the exchange of criminal data and intelligence with other nations to provide support and aid and engage in collaborative efforts involving cross-border investigations, operations, and arrests [9].

Furthermore, in 2010, Kazakhstan formally endorsed and consented to the International Convention for the Suppression of Counterfeiting Banknotes and its Protocol. However, Kazakhstan has made a reservation stating that it will only cooperate with other countries' central bureaus through the Prosecutor General of Kazakhstan on matters related to mutual legal assistance, prosecution, and extradition. This decision was made in accordance with the law "On the Ratification of the International Convention against Counterfeiting Money and its Protocol" in 2010 [10]. The International Convention is a crucial global agreement that addresses the issue of fighting the counterfeiting of banknotes. Consequently, Kazakhstan's adherence to this global agreement will enable its law enforcement authorities to enhance their capacities in locating and surrendering individuals who have evaded criminal prosecution in foreign jurisdictions.

Printing Security:

Presently available Tenge banknotes are in denominations 200, 500, 1000, 2000, 5000, 10000, and 20000 Tenge, while the coins are valued at 1, 2, 5, 10, 20, and 50 Tenge. Since 1993, the appearance of the national currency has undergone many changes. In 2006, the National Bank of Kazakhstan introduced a new series, which has gained recognition as one of the most secure in the world today [11]. Currently, the Tenge has 19[1] tiers of security, positioning it among the world's most safeguarded currencies [12].

The ubiquity of digital image technologies, such as colour printers and graphic scanners, has helped facilitate the manufacturing of counterfeit banknotes by criminals [13, 14]. To counteract this, the National Bank of Kazakhstan issues currency withdrawals and updates. This is an effective measure against counterfeiting as the new designs and features are not easily mimicable by counterfeiters and is therefore important to keep updating. The Tenge has had three major issues (1993, 2006, 2011). There have been further issues of individual banknote denominations on 10 different occasions and there is also a new series to be issued between 2023 and 2025 [12].

Individuals may not initially focus on the specific details and precise attributes of banknotes for identification. Instead, they tend to rely on general features such as the size, background colour (the primary colour), and texture found on the banknotes [14]. However, as previously mentioned, counterfeiters often employ sophisticated printing methods and technologies to create realistic forgeries so that visual detection is often difficult. Therefore, it is important that the Tenge has more security features detectable by machine reading as opposed to being merely

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[1] As of December 2023, the new commemorative Tenge series has been equipped with extra security features, bringing the total number of security elements to 19.

detectable via visual identification. For safe and secure financial transactions, devoid of the risk of counterfeit banknotes, an effective and reliable verification mechanism is required [13].

A study conducted by Sarfaz and others in 2019 considered currency verification systems authenticating paper currency utilizing support vector machines (SVM). Analysed were counterfeit and authentic banknotes using Scanning Electron Microscopy (SEM) and X-Ray Diffraction (XRD) techniques. This study found that the effectiveness of the SVM algorithm in distinguishing between genuine and fake Tenge notes was 100% accurate, and it outperformed the results of the majority of state-of-the-art currency verification procedures [13]. Automated systems for paper currency identification are crucial in several applications, including automated teller machines and automated cashier machines [14].

Figure 1. Chart displaying the security features found on various Tenge banknotes. Data adopted from NBRK.

	Watermark	Windowed Thread	Gold Intaglio	Latent image	See-through feature	Optically variable ink	Iridescence	Element for people with weak vision	Transparent window	Intaglio print	Foil	Security thread	Spark (R)	Iridescence image	Holographic stripe	Ink with colour shifting effect	Holographic drawing
Al Farabi series																	
Banknote value and issue																	
200	+	+	+	+													
500	+	+	+	+													
1000	+	+	+	+													
2000	+	+	+		+												
5000 (1998)	+	+		+	+												
5000 (2001)	+	+			+	+											
10000	+	+			+	+	+										
Baiterek series																	
200	+	+	+		+			+									
500	+	+	+		+			+									
1000	+	+	+		+		+	+									

2000	+	+		+	+	+	+	+								
5000	+	+		+	+	+	+	+								
10000	+				+	+		+	+							
Kazakh eli series																
500	+		+		+			+		+	+	+				
1000	+				+	+		+			+	+				
2000	+				+			+			+	+	+	+		
5000	+			+	+			+			+	+		+		
10000	+			+	+			+	+		+	+				
20000	+				+			+	+		+	+			+	
Commemorative series																
2000 (Asian winter games	+	+		+	+			+				+				
1000 (OECD 2010 chairmanship)	+	+			+			+					+			+
1000 (Islamic organisation presidency)	+	+			+		+					+				
1000 (Kultegin monument	+	+	+		+	+						+		+		
5000																

Public Education:

The third component of this paper's working measurement for Tenge security, public education - the role the informed public can play in the detection of counterfeits at the mouth of the problem-, appears to be an outlier in Tenge security. As listed above in *table* 1, Tenge notes exhibit a variety of features that can be used for visual identification by citizens, these include the use of intaglio printing that can be felt by touch and various uses of optically variable ink that change colours when tilting, indicating a genuine note [15]. However, it is unclear to what extent the general public is aware of these features and if they can correctly identify genuine from counterfeit notes.

An important problem is in the lack of knowledge among Kazakhstani inhabitants on the fundamental attributes that determine the genuineness of a banknote [16]. Seldom do individuals who receive counterfeit items report the incident to the authorities or the bank. If an individual knowingly tries to get rid of a counterfeit bill in the same manner they acquired it, despite recognising obvious indications of its falseness, it might be interpreted as the act of selling counterfeit currency. The key determinant of success or failure for a counterfeit is in the way they are perceived. If a counterfeiter can create a document that is viewed as genuine by the receiver, then the counterfeiter has achieved success, regardless of the banknote's quality [17].

The Nation Bank of Kazakhstan has published a fair number of online materials that are accessible to Kazakh citizens. However, it is indeterminate how many Kazakh citizens frequent such resources and whether the information published is suffused into the everyday knowledge of Kazakh citizens while handling paper currency. Furthermore, it is unclear as to whether this information is afforded to proprietors of businesses and services in the form of public awareness campaigns so vendors and vendees can correctly identify genuine and counterfeit counterparts.

Due to the strength of the two other components that constitute Tenge's security within this paper's working framework, - law enforcement and printing security – perhaps public education is not seen as a priority by the Kazakh government and the National Bank due to the other two components being so successful. Funding allocated for the security of the Tenge might be allotted to printing security and law enforcement, although the exact data regarding this is not published by the National Bank of Kazakhstan.

Conclusion

In this article, we have critically examined Tenge security from the perspective of legal regulation, printing security, and public education. Based on the outcomes of this analysis, this study strengthens the idea that the Kazakhstani Tenge is a robust currency that possesses multiple essential security characteristics. The Tenge meets two of the three barometers selected for analysis. Firstly, producing, possessing, distributing, or dealing with counterfeit money are all illegal crimes that demonstrate the strictness of the financial legal regulations within Kazakhstan's borders. Furthermore, because of its commitment to international agreements, Kazakhstani law enforcement is better equipped to track down and apprehend criminals who have managed to elude justice in other countries. Secondly, the Tenge is equipped with a myriad of anti-counterfeiting aspects and materials that are extremely difficult and expensive to accurately emulate. The integration of these security elements has led to the Tenge receiving several awards for its security and earning the reputation as the most secure banknote worldwide. However, a security concern that is not fully addressed by the government of Kazakhstan is the lack of education on how to correctly identify counterfeit Tenge. Based on this, we recommend a substantial public education programme aimed at businesses to fill this gap in security. This paper hopes to have contributed to a void in the literature that exists surrounding the security of the Tenge, an insufficiently studied currency. Conversely, there is a limitation to the study. By observing the security of the Tenge through the prism of only three measurements, this study lacks a potential comprehensive overview of the Tenge security as other important considerations were omitted from the methodology.

Conflict of interest
There are no conflicting interests to disclose.

The contribution of the authors. Sembekova B.R., Daubassova S.Sh., Erkebaeva N. A. equally contributed to the design and implementation of the research, to the analysis of the results and to the writing of the article. All authors contributed valuable comments and had a significant role in shaping the study.

References

1. Melliss, C. L., Cornelius, M. New Currencies in the Former Soviet Union: a Recipe for Hyperinflation or the path to price stability? – London: Bank of England. –1994. – 108 p.

2. Указ Президента Республики Казахстан от 12 ноября 1993 года № 1399. О введении национальной валюты Республики Казахстан. [Электронный ресурс] – URL: https://adilet.zan.kz/rus/docs/U9300001399 (дата обращения: 25.12.2023

3. Burke, J. J., Okulova, X. The effects of devaluation of the tenge upon the Kazakhstan economy // EILF Journal of Law & Economics. – 2009. – Vol.1. – P. 1-35 (2009).

4. Kerimbek, G., Moldashbayeva, L., Jrauova, K., Satymbekova, K., Imanbaeva, Z. Stages of formation and development of the national currency of the Republic of Kazakhstan // Scientific journal Reports of NAS RK. – 2019. – Vol. 2. – P. 122-128.

5. McKinney, Ralph E. Jr., Shao, L. P., Shao, D. H., & Rosenlieb, Duance C. Jr. The evolution of financial instruments and the legal protection against counterfeiting: look at coin, paper, and virtual currencies // University of Illinois Journal of Law, Technology & Policy. – 2015. – Vol.2. – P. 273-314.

6. Monnet, C. Counterfeiting and inflation // ECB Working Paper. –2005. – Vol. 512. – P. 1-22.

7. Report, National Bank of the Republic of Kazakhstan for the year 2022. [Electronic resource] – URL: https://nationalbank.kz/en/news/godovoy-otchet-nbk (accessed: 25.12.2023).

8. Penal Code of the Republic of Kazakhstan dated 03.07.2014 No 226-V 3PK. [Electronic resource] – URL: https://adilet.zan.kz/rus/docs/K1400000226 (accessed: 25.12.2023).

9. Kazakhstan. [Electronic resource] – URL: https://www.interpol.int/en/Who-we-are/Member-countries/Asia-South-Pacific/Kazakhstan (accessed: 25.12.2023).

10. Закон Республики Казахстан от 8 ноября 2010 года № 347-IV О ратификации Международной конвенции по борьбе с подделкой денежных знаков и Протокола к ней. [Электронный ресурс] - URL: https://adilet.zan.kz/rus/docs/Z1000000347 (дата обращения: 25.12.2023)

11. A Winning Note. [Electronic resource] - URL: https://www.imf.org/external/pubs/ft/fandd/2016/09/currency.htm (accessed 27.12.2023)

12. New banknotes series «Saka style». [Electronic resource] - URL: https://nationalbank.kz/en/page/money-guide (accessed: 25.12.2023).

13. Sarfraz, M., Bux Sargano, A., Ul Haq, N. An intelligent system for paper currency verification using support vector machines // Scientia Iranica. – 2019. – Vol. 26. – P. 59-7.

14. Mirza, R., & Nanda, V. Paper currency verification system based on characteristic extraction using image processing // International Journal of Engineering and Advanced Technology. – 2012. – Vol. 1(3). – P. 68-71.

15. Security features of the national currency – tenge. [Electronic resource] - URL: https://nationalbank.kz/en/news/zashchitnye-elementy-na-banknotah-nacionalnoy-valyuty---tenge (accessed 25.12.2023).

16. Как отличить настоящую банкноту от поддельной. [Электронный ресурс] - URL: https://kapital.kz/finance/90591/kak-otlichit-nastoyashchuyu-banknotu-ot-poddel-noy.html. (дата обращения: 28.12.2023).

17. Kaminska, A. Don't copy that: Security printing and the making of high-tech paper // Convergence. 2019. – Vol. 25(4). – P. 590-606.

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Теңге қаншалықты қорғалған?

Аңдатпа. Жалған валютаның таралуы ұлттық және әлемдік экономикалық жүйелеріне елеулі қауіп төндіреді. Теңге, салыстырмалы түрде жаңа валюта, 1993 жылдың қараша айында Қазақстан Республикасының ұлттық валютасы ретінде қолданысқа енгізілді. Берілген мақалада теңгені қолдан жасаудан қорғау мәселелеріне баса назар аударылды. Атап айтқанда, бұл қылмыстың Қазақстан Республикасында құқық қорғау органдары тарапынан қудалауы және құқықтық реттелуі, банкноттардың қорғаныш қасиеттерінің жеткіліктілігі және халыққа жалған ақшаны анықтауға арналған білім беру бастамалары сыни тұрғыдан талданды. Сонымен қатар, теңгенің қорғаныш элементтеріне визуалды талдау жүргізіліп, талдау негізінде теңге жалғандықтан жеткілікті деңгейде қорғалған деген тұжырым жасалды. Ұлттық және халықаралық деңгейдегі заңнаманың оң тұстары мен құқық қорғау органдарының жалған ақшаны таратуға қарсы жұмысы, сондай-ақ банкноттардың көптеген қорғаныс элементтерімен жабдықталуы ұлттық валютаның қорғаныс кепілдері болып табылады. Дегенмен, жалған ақшаны анықтау бойынша халық арасында ағартушылық жұмысты кеңінен жүргізу керектігі туралы ерекше атап өтілген. Берілген мақалада қарастырылған мәселелер жалған теңгенің алдын алуға және қарсы күрес жүргізуге бағытталған стратегиялардың ақпарат көзі ретінде қолданыла алады.

Түйін сөздер: жалған ақша, валюта, банкноттар, ақша айналымы, қорғаныш элементтері, құқықтық реттеу

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Насколько защищен Тенге?

Аннотация. Распространенность поддельных валют представляет значительную угрозу как национальной, так и глобальной экономической системе. Тенге, относительно новая валюта, была введена в ноябре 1993 года в качестве национальной валюты Республики Казахстан. В данной статье основное внимание уделяется вопросам защищенности тенге от подделок. А именно, критически анализируются правовое регулирование данного преступления в Казахстане, разбираются защитные свойства банкнот и образовательные программы, способствующие населению выявлять фальшивые тенге. Вместе с этим проводится визуальный анализ функций безопасности национальной валюты, определяющий, разнообразные функции безопасности,

имеющиеся у разных номиналов национальной валюты. В данной статье делается вывод о том, что тенге должным образом защищен от подделок, в частности указываются сильные стороны работы правоохранительных органов внутри страны и за рубежом по вопросам преследования поддельных банкнот, а также множество функций безопасности банкнот. Тем не менее, в статье предлагается уделить больше внимания для просвещения общественности о том, как правильно идентифицировать подделки. Эта статья служит источником стратегий борьбы с контрафакцией, используемых как для предотвращения, так и для обнаружения поддельных тенге.

Ключевые слова: фальшивые деньги, валюта, банкноты, денежное обращение, защитные элементы, правовое регулирование.

References

1. Melliss, C. L., Cornelius, M. New Currencies in the Former Soviet Union: a Recipe for Hyperinflation or the path to price stability? – London: Bank of England, 1994. – Vol.26.

2. Decree of the President of the Republic of Kazakhstan "O vvedenii nacional'noj valyuty Respubliki Kazahstan" dated November 12, 1993 No. 1399. Electronic resource] - Available at: https://adilet.zan.kz/rus/docs/U9300001399 (accessed: 25.12.2023)

3. Burke, J. J., Okulova, X. The effects of devaluation of the tenge upon the Kazakhstan economy. EILF Journal of Law & Economics, 1, 1-35 (2009).

4. Kerimbek, G., Moldashbayeva, L., Jrauova, K., Satymbekova, K., Imanbaeva, Z. Stages of formation and development of the national currency of the Republic of Kazakhstan. Scientific journal "Reports of NAS RK ", 2, 122-128 (2019).

5. McKinney, Ralph E. Jr., Shao, L. P., Shao, D. H., & Rosenlieb, Duance C. Jr. The evolution of financial instruments and the legal protection against counterfeiting: look at coin, paper, and virtual currencies. University of Illinois Journal of Law, Technology & Policy, 2, 273-314 (2015).

6. Monnet, C. Counterfeiting and inflation // ECB Working Paper. – Frankfurt a. M.: European Central Bank, 2005. – No. 512.

7. Report, National Bank of the Republic of Kazakhstan for the year 2022. [Electronic resource] - Available at: https://nationalbank.kz/en/news/godovoy-otchet-nbk (accessed: 25.12.2023).

8. Penal Code of the Republic of Kazakhstan dated 03.07.2014 No 226-V 3PK. [Electronic resource] - Available at: https://adilet.zan.kz/rus/docs/K1400000226 (accessed: 25.12.2023).

9. Kazakhstan. [Electronic resource] - Available at: https://www.interpol.int/en/Who-we-are/Member-countries/Asia-South-Pacific/Kazakhstan (accessed: 25.12.2023).

10. Law of the Republic of Kazakhstan "O ratifikacii Mezhdunarodnoj konvencii po bor'be s poddelkoj denezhnyh znakov i Protokola k nej" dated 08.11.2010 No 347-IV. [Electronic resource] - Available at: https://adilet.zan.kz/rus/docs/Z1000000347 (accessed: 25.12.2023)

11. A Winning Note. [Electronic resource] - Available at: https://www.imf.org/external/pubs/ft/fandd/2016/09/currency.htm (accessed 27.12.2023)

12. New banknotes series «Saka style». [Electronic resource] - Available at: https://nationalbank.kz/en/page/money-guide (accessed: 25.12.2023).

13. Sarfraz, M., Bux Sargano, A., Ul Haq, N. An intelligent system for paper currency verification using support vector machines. Scientia Iranica, 26, 59-71 (2019).

14. Mirza, R., & Nanda, V. Paper currency verification system based on characteristic extraction using image processing. International Journal of Engineering and Advanced Technology, 1(3), 68-71 (2012).

15. Security features of the national currency – tenge. [Electronic resource] - Available at: https://nationalbank.kz/en/news/zashchitnye-elementy-na-banknotah-nacionalnoy-valyuty---tenge (accessed 25.12.2023).

16. Kak otlichit' nastoyashchuyu banknotu ot poddel'noj. [Electronic resource] - Available at: https://kapital.kz/finance/90591/kak-otlichit-nastoyashchuyu-banknotu-ot-poddel-noy.html. (accessed 28.12.2023).

17. Kaminska, A. Don't copy that: Security printing and the making of high-tech paper. Convergence, 25(4), 590-606, (2019).

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