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THE ADVANTAGES OF LEGALIZING CRYPTOCURRENCY MINING FOR THE DEVELOPMENT OF RUSSIAN REGIONS

AS VANTAGENS DA LEGALIZAÇÃO DA MINERAÇÃO DE CRIPTOMOEDAS PARA O DESENVOLVIMENTO DAS REGIÕES RUSSAS

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Abstract
Purpose: To analyze the process of legalizing cryptocurrency mining in the Russian Federation in the context of rapid technological and economic globalization. Methodology/approach: The study employs semantic analysis of scientific publications, as well as systematic and graphical modeling methods to assess the possibilities for legitimizing mining practices in Russia. Originality/Relevance: Cryptocurrencies, emerging from the globalization of the world economy and the development of IT technologies, represent a new financial phenomenon that national legal systems struggle to regulate. Industrial mining is proposed as a potential key to addressing the issue of "gray" (unregulated) mining, promoting industry expertise at the intersection of finance, IT, and energy sectors. Key findings: Creating specific zones and regulatory conditions for cryptocurrency mining can stimulate further industry development. Addressing the issue of gray retail mining requires systemic regulation, legal consolidation of terminology, and inclusion of mining as a production activity within the National Classification of Economic Activities. Theoretical/methodological contributions: The

Resumo
Objetivo: Analisar o processo de legalização da mineração de criptomoedas na Federação Russa no contexto da rápida globalização tecnológica e econômica. Metodologia/abordagem: O estudo emprega a análise semântica de publicações científicas, bem como métodos de modelagem sistemática e gráfica para avaliar as possibilidades de legitimação das práticas de mineração na Rússia. Originalidade/Relevância: As criptomoedas, surgidas da globalização da economia mundial e do desenvolvimento das tecnologias de TI, representam um novo fenômeno financeiro que os sistemas jurídicos nacionais têm dificuldade em regulamentar. A mineração industrial é proposta como uma chave potencial para abordar a questão da mineração "cinza" (não regulamentada), promovendo a expertise do setor na interseção dos setores financeiro, de TI e de energia. Principais conclusões: A criação de zonas específicas e condições regulatórias para a mineração de criptomoedas pode estimular um maior desenvolvimento do setor. Abordar a questão da mineração de varejo cinzenta requer regulamentação sistêmica, consolidação

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theoretical contribution lies in advancing research on mining legalization in Russia. The practical contribution is the potential application of proposed measures to address social and economic challenges in Russian regions.

Keywords: National Legislation. Industrial Mining. Gray Retail Mining. Legalization of Mining. Social and Economic Development of Russian Regions.

jurídica da terminologia e inclusão da mineração como atividade produtiva na Classificação Nacional de Atividades Econômicas. Contribuições teóricas/metodológicas: A contribuição teórica reside no avanço da pesquisa sobre a legalização da mineração na Rússia. A contribuição prática é a aplicação potencial das medidas propostas para enfrentar os desafios sociais e econômicos nas regiões russas.

Palavras-chave: *Legislação Nacional. Mineração Industrial. Mineração de Varejo Cinzenta. Legalização da Mineração. Desenvolvimento Social e Econômico das Regiões Russas.*

1 INTRODUCTION

The globalization of the world economy and the development of IT technologies in the financial sector provided for the emergence of a new type of money – cryptocurrencies – and their subsequent rapid spread around the world (Hang and Chen, 2022). So, the first crypto currency (BTC, bitcoin) was created a little more than ten years ago – on Jan. 3, 2009. However, by now, transactions with cryptocurrencies are being carried out on exchanges, in exchange offices and on many resources on the Internet (Demchenko and Tormozova, 2023). The total capitalization of crypto-currencies has already reached 1.5 trillion US dollars, while the capitalization of the stock market equals to 94 trillion US dollars, even though the first joint-stock company and the first stock exchange in the world appeared simultaneously – in 1602 – and in one country – the Netherlands (Biais et al., 2023). However, national legislation and society itself are not able to keep up with the active development of information technology (Heubeck, 2023). As a result, the problem of excessively rapid growth of the crypto industry is coming to the forefront of the economic agenda of many countries around the world.

2 THEORETICAL BASIS OF THE STUDY

2.1 Literature review

The impact of cryptocurrency mining on the environment has become a topical topic for many researchers and practitioners. Several studies of cryptocurrency mining have been conducted from the perspective of environmental protection. One of these focuses on carbon footprint associated with cryptocurrency mining in Indonesia, as it uses a large amount of electricity (Putranti, 2022). The authors analyze the carbon tax policies impact and mitigation measures through regulation of cryptocurrency mining activities. It is argued that carbon tax policies can be implemented through regulatory actions to further develop the cryptocurrency sector, with less adverse impacts on the economy and environment.

Another study devoted to the analysis of the situation in both the most and the least sustainable countries (Náñez Alonso et al., 2021) analyzes factors affecting cryptocurrency mining, including energy prices, energy production methods, temperature, regulations, capital, research and development. These factors can be used to determine whether cryptocurrency mining is sustainable or not. If cryptocurrency mining is sustainable, the negative environmental impact may be lower. Safety of mining is also examined for cryptocurrency mining using renewable energy sources as a source of electricity (Gundaboina et al., 2022). The authors conclude that renewable energy sources and reduced environmental impact can also benefit the miners, as these are more affordable than conventional electricity. Economic estimation of climate damage caused by bitcoin mining is found to demonstrate closer resemblance to that of digital oil than rather digital gold (Jones et al., 2022). Some of the research above demonstrate the negative impact of cryptocurrency mining, which is a big challenge, and thus requires mitigation measures and policy development to establish governance mechanisms helping to maintain the climate in the cryptocurrency industry and preventing its negative consequences.

Research into cryptocurrency taxation also uses a comparison method to analyze the cryptocurrencies tax regime in Sweden, Portugal and the United States (Andersson,

2022). Further, based on the results of the comparison, steps are formulated to eliminate regulatory shortcomings regarding the application of cryptocurrency taxes.

2.2 What is cryptocurrency mining and what is the difficulty?

Cryptocurrency mining is a process in which computer resources are used to verify and confirm transactions on the cryptocurrency network. It also includes the calculation of complex mathematical problems to create new blocks in the block chain.

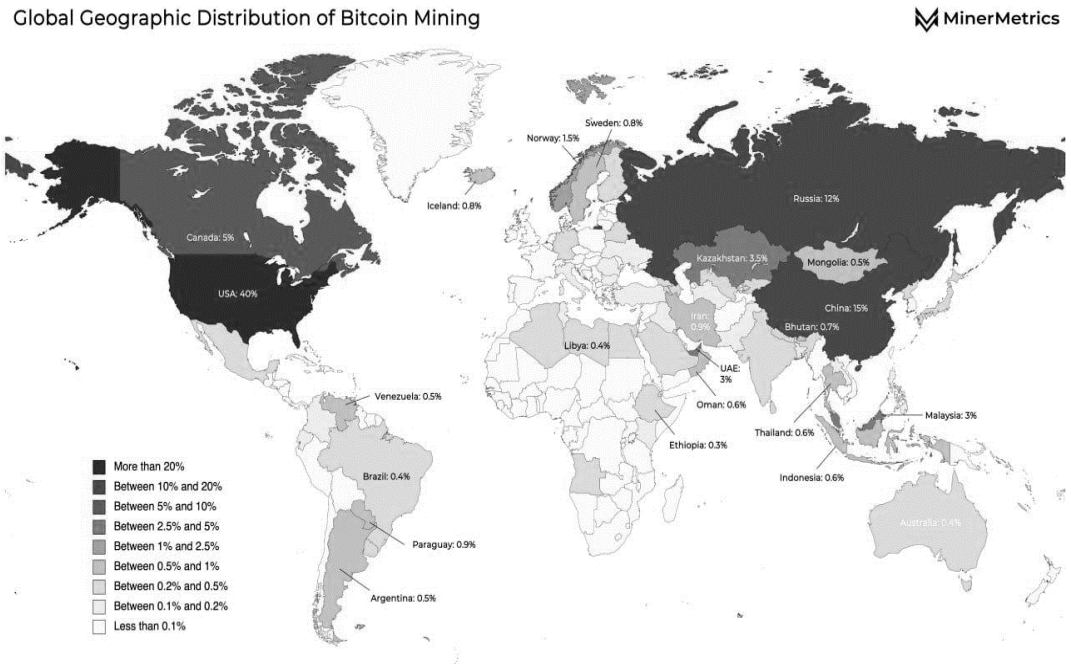
In the case of bitcoin, miners use their computing power to solve complex mathematical algorithms known as "Proof of Work" to confirm transactions and add them to the blockchain. As a reward for their work miners receive a certain number of new bitcoins and commission fees for each successfully added transaction.

At this point in time, the largest amount of computing power in the world is involved in mining crypto currency (Derevtsova et al., 2022). And since the appearance of the first crypto currency, the complexity of mining has increased by more than 1000 times. If earlier it took less than a day to calculate 1 block containing 50 bitcoins on a regular computer, now with huge computing power, the whole world produces about 140–150 bitcoins per day, and every 2 weeks the complexity of mining increases, this is how this system is configured. Now 19.5 million out of 21 possible have been mined, the last bitcoin will be mined not until 2150.

According to the Miner metrics specialists study, bitcoin mining is currently concentrated in three global superpowers: the United States (40 %), China (15 %) and Russia (12 %). Collectively, miners in these three countries generate 67 % of the bitcoin hashrate (Figure 1).

Figure 1

Global geographic distribution of bitcoin mining



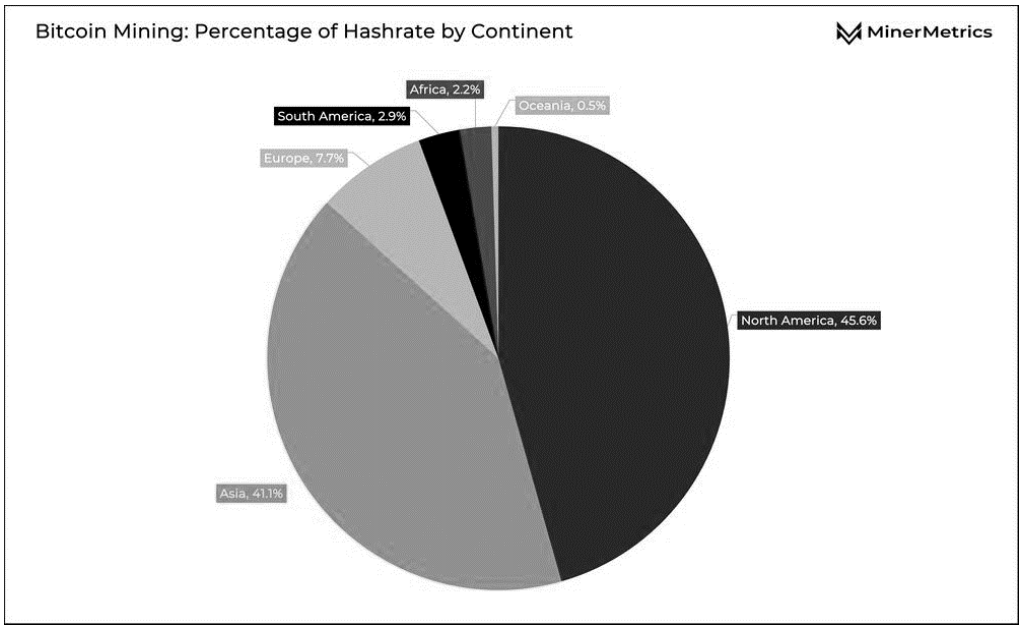
Source: the authors' elaboration.

The map and statistics above differ considerably from the Cambridge data, because firstly, the Cambridge map was created in 2020, and secondly, the specialists of this center used a more accurate and specialized assessment of the mining capacity of the crypto currency.

Which continents are the leaders in hashrate production? The graph below shows that North America produces 45.6 % of the global hashrate, followed by Asia with 41.1 %. Together, these two continents generate 86.7 % of the global hashrate (Mellerud, 2022).

Figure 2

Percentage of bitcoin mining by continent



Source: the authors' elaboration.

Mining also has several problems (Zaghouk et al., 2020), namely: high energy consumption, high heat dissipation (mining farms generate a huge amount of heat during their operation, and require additional cooling), as well as specialized equipment has a limited resource, usually about a year or two (Figure 2).

3 RESULTS

3.1 Legalization of mining in the Russian Federation

The bill "On the legalization of mining in the Russian Federation" was submitted to the State Duma of the Russian Federation on Nov. 17, 2022 (State Duma of the Russian Federation, 2022). According to the bill explanatory note, it is aimed at creating a legal basis for the creation and further use of digital currency (cryptocurrencies). The authors of the bill claim that, due to the lack of legal regulation in the field of mining and turnover of crypto assets, these areas began to develop and operate secretly on the territory of Russia outside the law (Korzhova, 2023).

What is new in this bill and how does it affect the legal regulation of these areas? First, there are official definitions of mining, mining pool and digital currency creation. Based on the bill, "mining is the activity of conducting mathematical calculations using computing devices and software and hardware to make entries into an information system using distributed registry technology, in order to create a digital currency or receive remuneration in digital currency" (State Duma of the Russian Federation, 2022).

A mining pool is a set of capacities of several computing devices belonging to different owners and used for mining, because of which the resulting digital currency is distributed among the owners of these computing devices (Che et al., 2024). The creation of a digital currency in the Russian Federation refers to actions of using the objects of Russian information infrastructure or user equipment located on the territory of the Russian Federation with the aim of issuing digital currency. Secondly, as follows from the explanatory note to the bill, it is aimed at further development of the area: "The adoption of the bill will form law enforcement practice, which, among other things, will contribute to ensuring further comprehensive regulation of issues related to the issuance and circulation of digital currencies". Supervision of the mining sector is entrusted to the Bank of Russia (Mikhailov and Runets, 2023).

Our Government acknowledges mining as a legal activity. Though, according to the Article 8, there are some restrictions concerning its advertising. Besides, the State Duma points out the following aspects:

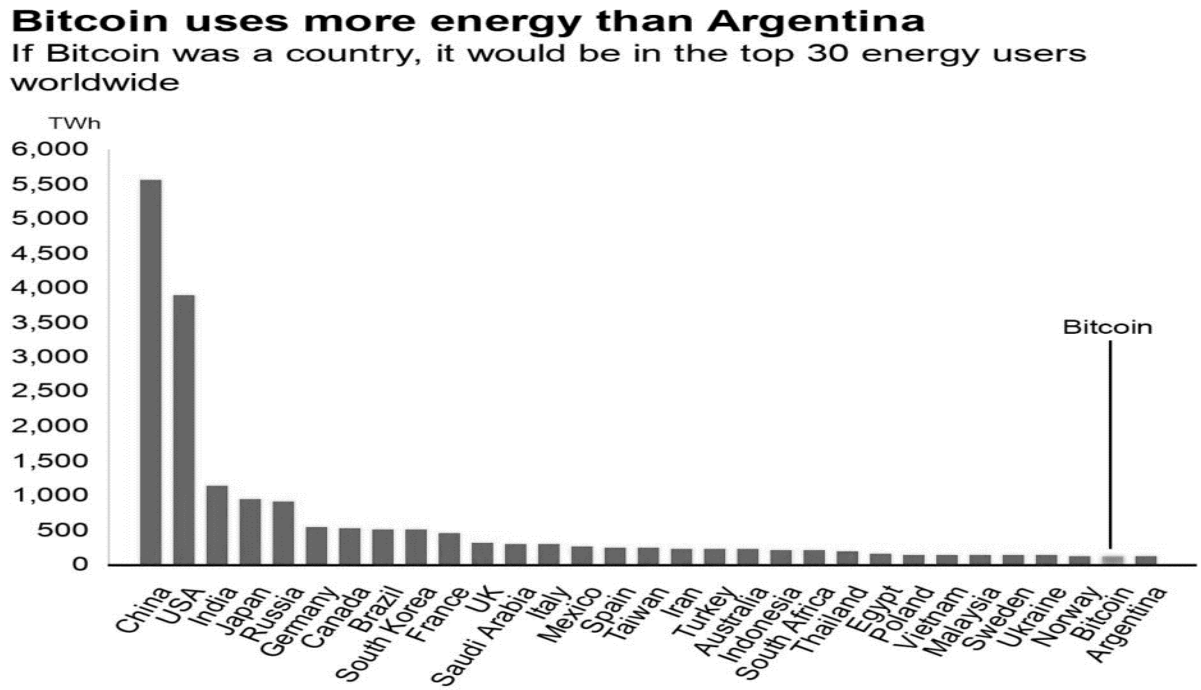
- regulation of digital currency circulation;
- obligation of a person engaged in digital currency to provide all the necessary information;
- to allow mining only in definite territories;
- clarifying the consent of the Bank of Russia concerning mining.

It's quite understandable, because technologies always go ahead of law. More over Sergey Mendeleev, director of the Indefibank blockchain project, says that banning of cryptocurrency advertising violates the rights of those engaged in this field and complicates the foreign investments into this sphere (Kuzmicheva, 2022). our miners may also turn out to be in the shadow economy, or will have to search for other jurisdictions. That's why the Bill should be considered by the business community. For example, Igor Kobzev, leader of the Irkutsk Region, suggests creating separate mining zones in order to

assist the energy system introducing differentiated electricity payment (Kase et al., 2022). Sergey Mendeleev, Executive Director of InDeFi SmartBank (BBC) supports Igor Kobzev. We do believe that cryptocurrency mining should also be observed by the Federal Tax Service (Marthinsen and Gordon, 2022). We may study the Australian experience in this regard. They are searching for friendly cryptocurrency legislation licensing the cryptocurrency circulation and simplifying the taxation. For sure, Australians do not forget that there are a lot of possibilities here for economic crimes and fraud and they are constantly searching for ways to protect the participants of cryptocurrency mining and their investors. It is a well-known fact that mining demands a great amount of electricity. The scientists found out that bitcoin uses more energy than the whole of Argentina (Basel Committee on Banking Supervision, 2022).

Figure 3

Bitcoin as the energy user



Source: the authors' elaboration.

Anyway legislation should be developed taking into consideration environmental, economic and social factors, paying attention to the foreign experience as well (Figure 3).

Nowadays there are several ways for cryptocurrency development, such as introducing the electronic rouble, or following the western pattern with not so numerous restrictions. (Chaniago, 2023).

The location of a data center is crucial for the effectiveness of investments, therefore, a thorough and professional analysis of all the influencing factors is necessary in decision-making, says Timothy Semenov, CEO of Intelion Data Systems (Muradyan and Kyzmin, 2022). He clarified that the most important criteria to consider when choosing a location are the low cost of electricity and the excess of its generating capacity in the region. According to experts, the most popular regions of Russia for hosting mining centers in 2021 were: Moscow, the Moscow Region, Karelia, Buryatia, as well as the Sverdlovsk, Murmansk and Irkutsk regions, the Krasnoyarsk Territory and the Republic of Khakassia. At the same time, electricity consumption in the first four regions exceeded its production volume. In Moscow and the Moscow Region, the difference between electricity production and consumption amounted to 40.735 million kWh.

Experts explained that today, when choosing a place for their activities, many industrial miners focus on the cost of electricity in the region. They rely on the logistical advantages of the federal center, which often leads to the creation of data centers without considering the specifics of the local energy sector (Big Electric Power Industry News, 2022).

According to experts, data centers for industrial mining should be built in regions where the price of electricity is low, but there is also a balance between generation and consumption (Warmke, 2024).

The regions where both parameters are combined today are the Irkutsk, Sverdlovsk and Murmansk regions, the Republic of Khakassia and the Krasnoyarsk Territory. The volume of electricity generation here is sufficient not only to meet the current demand, but also to connect additional consumers without overloading the networks.

Experts believe that the creation and use of specialized data centers can also become a cost-effective and promising solution to the problem of using excess capacity. It can also help to deploy its own IT-infrastructure in Russia, provide additional tax benefits to the regions and create new jobs.

In early July, the analytical resource "Check Index" published a study according to which the cost of the minimum level of mining in Russia in June averaged 80.290 rubles. This is 21 % lower than in February 2022, but only 0.12 % lower than last year.

According to our expert assessment, the total electricity consumption in Russia for mining cryptocurrencies in 2021 amounted to about 20 billion kWh. This allowed energy companies to generate sales from 50 to 75 billion rubles per year. Moreover, additional income is generated by fuel energy enterprises: fuel production, transportation. The share of Russian industrial mining (data center operators) in this volume is about 50–60 %. Next year we expect comparable industry figures for industrial mining.

For example, the Bitriver group of companies paid taxes to budgets of all levels for 2021 totaling over 207 million rubles. The construction of a data center with a capacity of 100 MW creates more than 100 jobs only in the data center in this region and locality, as well as new jobs are created in related construction, utility and household industries (Khavanova, 2023). Of course, for the competent operation of mining data centers, highly qualified personnel are required, who must undergo training before starting work. And that is why it is wrong to talk about the lack of special skills for staff to work in mining data centers (Big Electric Power Industry News, 2022).

Thus, industrial mining makes a positive contribution to the socio-economic development of existing regions.

Industrial mining can serve as a kind of key to solving the problem of "gray" mining, as a source of industry expertise at the intersection of finance, information technology and energy, as well as a positive example of established business practices in the field of energy-intensive computing. Creating separate zones and conditions for cryptocurrency mining is an effective solution and can lead to even greater development of this industry (Savina et al., 2022).

The solution to the problem of gray retail mining lies at the level of systemic regulation of this industry. It is necessary to consolidate the terminological apparatus at the regulatory and legal level, to introduce mining business as a production activity into the National Classification of Economic Activities Types (Trifonova and Sadkov, 2018). To ensure that the cryptocurrency can be sold to the regulatory authorities of the Russian crypto currency purchase and sale platforms. It is also necessary to eliminate the need to register mining equipment using a software and hardware complex, which also provides

tax authorities with access to information about the cryptocurrency mined using this equipment and other data (Rotta and Parana, 2022). Perhaps it makes sense to consider the possibility of creating technoparks with energy infrastructure for retail trade, including in the north of the Irkutsk region, attractive conditions and convenient infrastructure, where gray mining equipment will be relocated to the sites of these technoparks (BUSINESS PROFILE Group, 2023).

4 CONCLUSION

In general, the lack of uniform regulatory standards and the associated uncertainty are among the main obstacles to the widespread adoption of cryptocurrencies. Distributed ledger technology continues to raise a number of questions among regulators and policy makers at the national and international levels. Due to problems with standardization and interoperability, the regulatory status of the cryptocurrency remains uncertain, and this is a major deterrent to growth.

Legalizing mining in Russia will give the country many advantages and opportunities. Legalizing mining in Russia can stimulate the development of the country's technology sector in several ways. Increased demand for high-tech equipment: mining requires specialized equipment such as ASIC miners and graphics processors (GPUs), which can lead to growth in domestic production and import of such equipment. Development of related industries: mining also stimulates the growth of related industries such as power generation, cooling systems, and equipment repair. This can create new jobs and contribute to the development of technology ecosystem as a whole. Emergence of new technology startups: legalizing mining can attract entrepreneurs and investors to create new technology startups specializing in mining, blockchain, and related technologies.

Legalizing mining can improve Russia's image as a country that supports innovation and new technologies. This can attract foreign investment and strengthen international relations in the technology sector. Russia will be able to position itself as a center for mining and blockchain technologies, which will contribute to its reputation as a progressive and technology-friendly country.

Legalizing mining will also help reduce the shadow economy in the following ways. Legalizing mining will give miners the opportunity to engage in mining legally, which will lead to a reduction in illegal mining, which does without paying taxes and can damage the energy system. Legalizing mining will allow the government to collect taxes on miners' income, which will bring additional tax revenue. This can help fund government programs and services. Blockchain technology, which underlies cryptocurrencies, provides transaction transparency. This can make it difficult to use cryptocurrencies for illegal activities such as money laundering and terrorist financing. In addition, legalizing mining can help reduce crimes sponsored by cryptocurrencies, as law enforcement will be able to track, and confiscate cryptocurrencies associated with criminal activity.

Perhaps the main problem that prevents regulators from giving cryptocurrency legal status everywhere remains concerns about security, privacy and control. The fact that crypto-currency transactions and payment data are reflected in the blockchain network not only guarantees the security and reliability of information about these transactions, but also creates risks of hacker attacks and break-ins. Also, a serious problem with the implementation of crypto-currency payments is the issue of confidentiality in a distributed public registry. However, we are confident that the adoption of general rules will make both the use of cryptocurrencies and investments in them much safer. The standards will be especially useful for long-term investments.

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