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Exploration of integration pathways for Web3.0 technology empowering banking scenarios: a dual perspective based on scenario application and regulatory coordination

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Abstract. Commercial banks urgently need to seek breakthroughs in traditional financial scenarios, and Web3.0 technology undoubtedly provides an excellent path to such a breakthrough. However, while restructuring trust and value-transfer mechanisms through blockchain, smart contracts and other technologies, Web3.0 also forms a structural conflict with banks' centralized business model. From the dual perspectives of scenario application and regulatory coordination, this paper analyses the logic of fit between Web3.0 and scenario-based banking finance, the integration pathways and the potential risks. At present, the two are highly consistent in core demands such as trust, efficiency and automation, and the integration pathway manifests itself as the optimization of traditional business scenarios running parallel to the exploration of new ones. Accordingly, the paper proposes a hybrid architecture of "on-chain circulation with off-chain support" and regulatory coordination in which "inclusiveness" and "penetration" run in parallel. Drawing on the locational and industrial advantages of Guangxi, it further proposes practicable integration pathways for scenario-based finance, including RWA tokenization, cross-border settlement and credit tokenization.

Keywords: Web3.0, blockchain, scenario-based finance, regulatory technology, decentralized finance

1. Introduction

In recent years, global financial markets have remained turbulent under the aftermath of the pandemic, and against this background it has become an urgent matter for commercial banks to seek breakthroughs in their development models within traditional business scenarios. Precisely in response to current development needs, a Web3.0 technological transformation, with the core ideas of "decentralization, value co-creation and distribution according to contribution", has been rapidly penetrating and being applied in the banking industry [1]. The underlying operating logic of Web3.0 technology is essentially to gradually weaken and even eliminate the functions of centralized companies, which is in inherent conflict with the centralized operating model followed by banks; for banking businesses that rely on centralized credit, this conflict is particularly acute in the process of applying innovations in many traditional business scenarios. At a time when this new

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technology is being rapidly applied, how commercial banks can use Web3.0 technology to complete the iteration of financial technology and enable traditional businesses to achieve leapfrog development in different scenarios has become a major question that the industry urgently needs to answer.

Historically, during the Web 2.0 period the ownership and control of data were highly concentrated in the hands of a few technology giants, and problems such as privacy leakage, platform monopoly and constrained innovative vitality were relatively prominent. The concept of " Web3.0" proposed in 2014 by Gavin Wood, co-founder of Ethereum, was precisely an attempt to respond to and resolve these structural contradictions [2]. It should be particularly noted that Web3.0 does not refer to any single technology; rather, it is a complex ecosystem integrating a number of cutting-edge technologies such as blockchain, Distributed Ledger Technology (DLT) and smart contracts. Its core goal is to reconstruct the underlying architecture of the Internet, returning the ownership and control of data and the right to create value from centralized platforms to every user, and to establish trust, transfer value and incentivize collaboration in a decentralized manner.

Payment and settlement are the cornerstone of the financial system, and also the segment of traditional banking business where efficiency and cost pain points are most concentrated. Research by the Bank for International Settlements (BIS) has already pointed out that Central Bank Digital Currencies (CBDCs) have broad application prospects in fields such as cross-border payments and real-time payments, and a global consensus among central banks on this new direction has gradually taken shape [3]. Judging from the choices currently made by investment banks, JPMorgan, for example, announced in 2025 that it would formally launch to institutional clients the deposit token JPM Coin (code JPMD) on Base, the public blockchain under Coinbase, achieving near-instantaneous settlement 24 hours a day, 7 days a week [4]. The credit of Wall Street investment banks has, for the first time, been combined with the efficiency of public blockchains, and mainstream finance's strategic shift towards digital assets has thus become clear. Decentralized Finance (DeFi) is a field within the Web3.0 ecosystem that is both dynamic and controversial; characterized by disintermediation, high efficiency, transparency and composability, DeFi directly challenges the role of banks as credit and payment intermediaries [5]. In lending, protocols such as Aave and Compound allow users to over-collateralize their crypto assets to borrow stablecoins or other tokens (the limits vary with the risk level of the asset), while pricing rates are automatically adjusted by algorithms according to market supply and demand, and the entire loan process can be automated; by contrast, traditional bank loan approval appears cumbersome and lagging [6]. The emergence of DeFi has opened up a new field full of opportunities and risks for banks in traditional credit scenarios, but to a certain extent it has also brought to the fore the question of whether centralized institutions are able to master decentralized protocols.

Judging from past commercial practice, the relationship between Web3.0 technology and banking business scenarios is not a simple integration; the two are more likely to move towards a complex and dynamic hybrid application pathway. Yet the realization of this prospect is by no means smooth at present. First, from the perspective of the application environment, the vague regulatory standards for this technology, its technical complexity, obstacles to cross-chain operations and the lag in market education are all unavoidable obstacles at present. Banking business scenarios must embrace innovation while holding to the bottom line of compliance, and must also work together with regulators to build a solid yet flexible legal and regulatory framework, which is extremely difficult at present; this is precisely the issue that this paper mainly explores. Centring on this issue, the paper approaches it from the two perspectives of scenario application and regulatory coordination, analysing the logic of fit between Web3.0 and scenario-based banking finance, sorting out its integration pathways in scenarios such as confirmations, letters of credit, cross-border settlement and supply chain finance, identifying the compound risks accompanying such integration, and discussing a targeted

regulatory coordination framework, in the hope of proposing business-scenario solutions that local banks can implement.

2. Analysis of the degree of fit in Web3.0-empowered integration of banking scenarios

2.1. Core technologies of Web3.0 and the essence of financial services

As a next-generation Internet ecosystem, Web3.0 seeks to build an Internet jointly owned by users and builders, thereby resolving the separation of data ownership. Its underlying driving force is blockchain, a comprehensive technology integrating distributed ledgers, consensus algorithms, cryptography and smart contracts. In contrast, the core of banking services lies in credit: traditional scenarios rely on banks or other financial institutions as credit intermediaries to conduct business, whereas blockchain maintains credit through an openly accessible decentralized ledger without third-party guarantees, and the chained structure based on hash algorithms guarantees at the underlying level that data are difficult to tamper with, which is consistent with the essential demand of financial services for security, trustworthiness and tamper resistance [7]. Smart contracts, with blockchain as their core technology, transform traditional contracts into automatically executable digital contracts, providing a new transaction method for businesses such as bank confirmations to break through the limitations of traditional operating models. It can thus be seen that both the underlying logic of Web3.0 and the operating mode of the technologies under it have points of convergence with banks' business scenarios.

2.2. Integration logic between Web3.0 technology and scenario-based banking finance

As stated above, the reason why Web3.0 technology and scenario-based banking finance can be integrated lies fundamentally in the high degree of fit between the underlying technical characteristics of the former and the core demands of the latter. What scenario-based finance needs to accomplish is nothing more than embedding financial activities into specific scenarios so that financial services become more efficient and safer; the points of fit between the two mainly lie in four dimensions: trust, efficiency and cost, contract automation, and model innovation.

At the level of trust, traditional scenario-based finance relies on banks as the centre to endorse credit, whereas blockchain uses an open, decentralized ledger, that is, it maintains credit without an explicit third-party guarantee. This accords with banks' needs in scenarios such as credit management and credit information sharing, and technically alleviates risks such as attacks on central nodes and the easy tampering of account data. Efficiency and cost are another point of fit. Financial services in traditional scenarios require rapid response, yet outdated infrastructure and complex process links have always been the main shackles restricting business development; by comparison, blockchain can dispense with some intermediate links and save the associated costs. Judging from existing progress, Web3.0 technology has already been well verified in the bank confirmation scenario: distributed bookkeeping has replaced mailing and manual confirmation processing, efficiency and experience have improved relative to traditional business flows, and the time required for document circulation and verification has been greatly shortened.

Traditional banking business is built on complex contracts; the various contracts and business-related documents are complicated, and execution involves offline communication and implementation among banks, enterprises and other parties, so efficiency is not ideal. Smart contracts, however, turn contractual rules into automatically executed code. Taking industrial chain finance as an example, smart contracts can automatically

complete financing, disbursement and repayment on the basis of key information such as logistics and warehousing data, and the level of automation in supply chain finance has improved fairly markedly compared with the past. Finally, the fit at the level of model innovation is manifested more as a kind of reference, because the direction of DeFi is not consistent with the centralized logic of banks; Compound's decentralized lending can still offer inspiration to banks today. Banks can draw on the logic of such protocols to explore possibilities for embedding them in scenarios such as traditional lending and new retail, and thereby launch products with more controllable risk and higher efficiency.

3. Application and integration pathways of Web3.0 technology in specific banking scenarios

3.1. Optimized integration of traditional financial scenarios

Web3.0 empowering traditional banking scenarios first targets the optimization of traditional business flows. By virtue of its distributed ledger, data security and smart contracts, blockchain has already shown fairly significant improvement effects in applications such as confirmations, letters of credit and clearing.

Bank confirmation and Letter of Credit (L/C) business are unavoidable types of business in banks' trade finance operations. Traditional confirmations rely heavily on the circulation, mailing and manual verification of paper documents, which easily create difficulties in advancing business in both time and space, and are also highly prone to problems concerning the authenticity of the trade background, typically represented by information tampering [8]. The integration pathway for blockchain is to build an on-chain platform featuring "multi-party participation, joint maintenance, and security and trustworthiness", and bring it into real confirmation scenarios; at present many domestic and foreign commercial banks have already incorporated blockchain technology into confirmation business in a relatively mature way. For example, banks, accounting firms and audited enterprises jointly act as nodes and are simultaneously connected to a blockchain confirmation platform; confirmation requests issued by audit institutions are circulated through the blockchain, and the digitally signed confirmation replies of banks are recorded on-chain throughout the process. Judging from existing practice, a number of large domestic commercial banks (Industrial and Commercial Bank of China, Agricultural Bank of China, Bank of China, China Construction Bank and others) as well as joint-stock banks have already launched or connected to blockchain-based bank confirmation platforms, a typical achievement being the "Bank Confirmation Blockchain Service Platform" led by the China Banking Association, whose practice has become relatively mature. Compared with past offline reply processes that often took weeks, when accounting firms initiate digital confirmation requests through the platform, which are encrypted by the blockchain and then circulated to banks, banks need only complete authorization verification, data checking, digital replies and electronic signatures on-chain, with the whole process recorded on a distributed ledger, so that process timeliness is greatly improved.

Compared with domestic applications in the field of confirmations, overseas banks' approaches to scenario applications in international letters of credit are more flexible and their system architectures are more mature. Take the Contour network as an example: relying on Corda technology, the platform was jointly initiated by a number of top international banks including HSBC, ING, BNP Paribas and Standard Chartered, bringing all participants into a shareable real-time distributed ledger; exporters submit business documents on the on-chain platform, the smart contract system automatically checks whether the documents comply with the terms of the letter of credit, and banks complete processes such as documentary review on the on-chain platform. The system effectively cut document processing time to within hours, noticeably reduced the probability of

documentary discrepancies, and significantly improved the settlement efficiency of international trade. Although the Contour platform later ceased operations, its "consortium blockchain plus smart contracts" solution provides a detailed reference for subsequent practice in confirmation business scenarios.

3.2. Exploratory integration of new financial scenarios

Beyond the empowerment of traditional scenario-based finance mentioned above, new business scenarios and increasingly well-developed regulation are also constantly urging banks to explore entirely new technology integration pathways and application scenarios. This requires commercial banks to consider how to find, in new technologies such as DeFi, points of fit between technology and scenario application, so as to provide integration pathways for scenario-based finance.

In current credit scenario business, commercial banks still rely on their own centralized credit assessment pathways, paying constant attention to borrowers' qualifications, collateral and use of funds from pre-loan to post-loan in order to complete a credit business. However, the credit granting process based on DeFi technology follows another line of thinking: lending protocols represented by Compound and MakerDAO drive credit granting through decentralized over-collateralization and algorithm-driven mechanisms. They allow users to deposit crypto assets (such as ETH) into smart contracts and borrow another asset (such as the DAI stablecoin) against them, with the execution interest rate determined by algorithms according to current market supply and demand, and with in-loan and post-loan management conducted entirely online. In current practice, traditional commercial banks cannot fully copy the credit process based on DeFi technology, but its underlying operating logic still offers some reference for today's credit scenarios; the principles followed by DeFi are essentially connected in logic with the automated risk control, cost reduction and efficiency improvement pursued by banks.

In terms of practicality, the most practicable approach at present is to tokenize physical assets (such as real estate, bonds and accounts receivable). Once physical assets can achieve trusted on-chain circulation, commercial banks can draw on Compound's operating logic and allow customers to use "tokenized physical assets" as collateral for borrowing, with the entire process completed online by smart contracts. SG-Forge, the digital asset unit of Société Générale, relying on MakerDAO as its technical framework, pledged tokenized bonds worth EUR 40 million on the Ethereum public chain and successfully obtained a DAI loan facility of USD 30 million; this was the first attempt by a large traditional bank to revitalize asset liquidity by embedding DeFi protocols. Another practicable pathway is to move offline business scenarios onto metaverse platforms. JPMorgan, for instance, was the first to open an "Onyx Lounge" in the metaverse platform Decentraland; in this platform, Ethereum, land and virtual goods are all confirmed on-chain in the form of Non-Fungible tokens (NFTs). JPMorgan has stated that the metaverse, as "an emerging economy yet to be developed", contains countless financial demands: for example, can enterprises that open virtual stores in Decentraland obtain working capital loans on the strength of fully transparent and verifiable on-chain transaction records? How can the payment gateway between the virtual and real worlds be connected, and will it become a new opportunity for the payment and settlement system? The Onyx Lounge is precisely an outpost for observing these questions, as JPMorgan is building a bridge between the virtual and real worlds and exploring development pathways for new scenarios.

3.3. Feasible technology integration pathways

Constrained by problems such as "data privacy leakage", the "cross-chain island effect" and "insufficient underlying performance", the practice of Web3.0-related technologies in commercial banking business has always progressed only to a limited extent. Today the industry has long recognized that the radical approach of

directly applying the underlying architecture of public chains is unfeasible; greater emphasis is now placed on drawing on the latest cryptographic achievements and on the implementability of commercial scenarios, supporting a pragmatic route of deep scenario integration.

Traditional financial scenarios place great emphasis on the confidentiality of customer materials and information, which is inherently in conflict with the underlying logic of blockchain's "network-wide public broadcasting and bookkeeping". The solution currently offered by the industry is to rely on Zero-Knowledge Proofs (ZKPs) and their derivative technologies (such as zk-EVM). Banks can prove to the whole network the legitimacy of a transaction and the fulfilment of smart contract trigger conditions without exposing any transaction information online (including transfer amounts and the true identities of both parties). At present, the Onyx platform under JPMorgan has already deeply integrated ZKPs to provide institutional clients with functions such as private settlement; when clients trade with tokenized assets, network nodes only verify the transaction itself and do not expose specific commercial secrets. Domestically, domestic open-source consortium blockchains based on underlying architectures such as FISCO BCOS apply "privacy computing plus ZKP" to syndicated loans; when several banks jointly issue supply chain syndicated loans, ZKPs enable a compliant check of enterprises' multiple-borrowing risk on a "usable but invisible" basis. Banks need not exchange core information and can confirm through on-chain zero-knowledge proofs whether an enterprise meets credit qualifications, so that the contradiction between privacy protection and data sharing achieves a symbiotic balance in the business flow.

Cross-chain interoperability protocols and decentralized oracle networks have now become the standard infrastructure for connecting "information islands". Large banks such as Citi and ANZ, using existing SWIFT instructions, enable the tokenized Real-World Assets (RWA) they issue to circulate across different institutions' private chains and public chains such as Ethereum. In this way, the information island problem brought about by Web3.0 scenarios is alleviated, and traditional banks can connect to the multi-chain ecosystem more safely and at lower cost without overturning their underlying core systems. The "institution-level dedicated application chain (AppChain/Subnet)", which evolved from Layer 2 scaling solutions, is another pathway that balances performance and regulation: banks can build a dedicated subnet with independent computing power and custom rules on the Web3.0 mainnet. "Project Guardian", led by the Monetary Authority of Singapore (MAS), is now operating on a fairly mature basis, with many large commercial banks widely adopting institution-level dedicated subnets; under the MAS regulatory framework, banks can conduct tokenized issuance and trading pilots for assets such as foreign exchange, bonds, funds and deposits. In the first pilot, DBS Bank and JPMorgan completed cross-border transactions on a public chain using tokenized Singapore government bonds and Japanese yen. These application chains couple KYC/AML compliance logic at the network validation layer: any transaction to be conducted on-chain must first pass identity authentication by trusted entities such as banks and obtain a "whitelist credential (SBT/DID)" before business can proceed, which ensures a certain level of transaction security at the underlying level.

In general, the Web3.0 technology pathways that can currently help banking scenarios achieve iterative development and move towards maturity share certain underlying logics. Mature solutions no longer insist on replacing traditional financial networks with purely public chains; instead, they seek to couple with banks' existing core systems (such as SWIFT and traditional clearing networks) and achieve a smooth transition through a hybrid architecture of "on-chain circulation with off-chain support". At the same time, whether it is AppChains presetting KYC access whitelists at the consensus layer or using ZKPs to verify the legitimacy of funds on-chain, these solutions write compliance requirements such as Anti-Money Laundering (AML), privacy protection and penetrating regulation directly into the protocol layer, ensuring the compliance and security of on-chain transactions.

4. Risks in Web3.0 scenario-based finance and regulatory coordination

4.1. Risk identification in integrated applications

While reconstructing traditional banking business scenarios, Web3.0's characteristics such as decentralization and autonomy also bring new risks, such as technical risks arising from the inherent defects of smart contracts. Based on the self-executing logic of "code is law", vulnerabilities in contract design create potential loss risks for on-chain assets. Coupled with the irreversibility of blockchain transactions, the reversible remedies familiar to banks become ineffective, and technical risks often solidify directly into irreversible rigid losses. Meanwhile, the pseudo-anonymity of accounts brings numerous risks concerning Anti-Money Laundering (AML) and compliance review (KYC). For example, the proliferation of Decentralized Exchanges (DEXs) and coin-mixing protocols provides space for illegal funds to hide, banks' traditional AML review capabilities are substantially weakened, and their risk control systems are greatly affected.

At the dimension of law and cross-regional law enforcement, because Web3.0 has distributed characteristics, it brings enormous difficulties to the legal jurisdiction and collaborative governance of cross-border trade. At present, banks' supervision of the authenticity of the trade background behind business mainly depends on the judicial jurisdiction in which the institution is located. Scenario-based finance based on Web3.0 technology operates through globally dispersed validation nodes and autonomous protocols, and funds are not limited by traditional geographical boundaries. Once asset default or a black swan event occurs during the execution of smart contracts and gives rise to cross-border financial disputes, regulatory authorities of sovereign states generally face institutional gaps and conflicts of rules in areas such as confirmation of territorial jurisdiction, cross-border extraction and mutual recognition of on-chain electronic evidence, and cross-jurisdictional law enforcement assistance. This lack of governance rules and their disconnect from technological reality will, to a certain extent, raise the legal compliance costs of technology-enabled cross-border trade application scenarios, and technical failures may also spread rapidly across multi-node networks and evolve into cross-regional systemic risks.

4.2. Building a new regulatory coordination framework

The borderless nature of Web3.0 is forcing banks' regulatory thinking to iterate rapidly towards a new regulatory framework in which government leadership, industry self-discipline and banks' internal risk control are deeply linked, and "inclusiveness" and "penetration" run in parallel. The key to breaking the deadlock lies in comprehensively upgrading Regulatory Technology (RegTech) so that risk control reaches directly into the on-chain data layer. Regulators and commercial banks can jointly develop monitoring engines based on artificial intelligence and underlying blockchain data to track the real flow of funds. Once the system captures abnormal high-frequency transactions or high-risk smart contract interactions, it automatically triggers on-chain real-time circuit breakers. In this way, penetrating regulation can be moved forward, shifting from passive after-the-fact tracking and disposal to ex-ante early warning and in-process intervention.

In light of the characteristics of Web3.0, financial regulators can specifically expand the "regulatory sandbox", carving out a safe and controllable space for commercial banks; within a stable environment with limited business scale, specific customer groups and a defined testing period, commercial banks are encouraged to test frontier scenarios such as Real-World Asset (RWA) tokenization and cross-border digital stablecoin settlement. As for eliminating systemic risks, the foundation still lies in the unification of underlying rules. Given the diversity of current Web3.0 technology routes and the fragmentation of interfaces, the central bank and national financial regulatory authorities need to take the lead, joining hands with large commercial banks and leading technology enterprises to reach consensus on consortium blockchain

underlying technical standards, smart contract security audit specifications and cross-chain mutual recognition protocols for digital assets, so as to eliminate the regulatory blind spots caused by "technology islands" at the institutional and regulatory levels and provide compliance safeguards for the deep integration of scenario-based finance.

5. Strategic breakthroughs and countermeasure recommendations for commercial banks

For regional commercial banks to break through in scenario-based finance in the Web3.0 era, rather than chasing concepts such as the "metaverse" and public chains pursued by top international investment banks, it is better to return to the origin of serving the real economy. Applied to Guangxi, the key for banks to break the deadlock is to deeply integrate Web3.0 technologies (smart contracts, RWA tokenization and others) with Guangxi's locational advantages, major projects and distinctive industries, and to explore a verifiable, implementable and secure application model for scenario-based finance.

5.1. The trade-transport finance scenario of "logistics credential RWA tokenization"

The Pinglu Canal in Guangxi officially entered the stage of trial navigation in September 2026; its construction and navigation will greatly reshape the logistics network of southwest China and generate massive demand for trade-transport financing. Traditional port and shipping logistics finance has long been constrained by credit pain points such as the authenticity of trade documents and the valuation of collateral. Local banks in Guangxi can join hands with local port groups, customs and other institutions to build a consortium blockchain-based collaborative platform for trade-transport finance, introducing Internet of Things (IoT) and oracle technologies at logistics hubs along the canal. When bulk cargo is warehoused or loaded, the system automatically links physical data and records them on-chain, confirming them as tamper-proof digital credentials of "Real-World Assets (RWA)". Bank smart contracts read the status of on-chain electronic bills of lading and warehouse receipts directly, and once the title to goods is clear, the credit process can be triggered automatically. This model not only clearly examines the authenticity risk of underlying assets, but also, through the on-chain splitting and circulation of RWA credentials, revitalizes the idle physical assets of logistics enterprises and small and medium-sized trading companies along the canal, thereby broadening supply chain finance scenarios.

5.2. mBridge for cross-border settlement of agricultural products

As China's financial opening gateway towards ASEAN, Guangxi, especially in border areas (such as Pingxiang City and Dongxing City), has gathered a large number of import and export enterprises dealing in fresh produce and agricultural products from Southeast Asia. First, agricultural trade places extremely high demands on the efficiency of capital turnover; the traditional SWIFT system requires 3 to 5 days for clearing, and the high fees are a cost that cannot be ignored in agricultural trade [9]. Local banks should actively connect to the multi-CBDC Bridge (mBridge) and deeply embed it in the cross-border supply chain of agricultural products. In practice, banks can embed smart contracts into the procurement process: when data such as origin traceability information of Southeast Asian fruit, border customs declarations and inspection and quarantine information are synchronized to multi-party shared blockchain nodes, the smart contracts automatically trigger the mBridge network and complete "payment-versus-payment" settlement using digital renminbi or bilateral local currencies. This model can substantially improve the effectiveness of cross-border

settlement and payment, and greatly reduce local importers' exchange rate exposure and pressure to advance funds.

5.3. Reshaping the supply chain through "core enterprise credit tokenization"

Guangxi has hundreds-of-billions-scale distinctive local industries such as sugar, forestry and non-ferrous metals, but in traditional supply chain finance scenarios, bank credit funds are usually concentrated on core enterprises and first-tier core suppliers, with limited low-cost financing access for individuals at the end of the industrial chain (such as sugarcane farmers and forest farmers) and for micro and small enterprises. Local banks can take the lead in building a "Guangxi distinctive industry consortium chain" and encourage local large state-owned enterprises and core leading enterprises to join the chain, converting core enterprises' accounts payable into "digital credit credentials" that can be circulated, split and protected against tampering on-chain. After a core leading enterprise issues credentials to first-tier suppliers, the credentials can, together with the real trade contracts, be split and circulated level by level downstream to second- and third-tier micro and small enterprises and even farmers. With the fragments of digital credentials they receive, farmers or micro and small enterprises at the bottom can directly apply to banks for loans with greater effectiveness and cost advantages. This model can effectively prevent funds from idling in the system and ensure that loan funds flow precisely to every entity of Guangxi's local real economy.

5.4. Promoting a multi-node mutual trust mechanism among "customs, trade and banks"

Local banks can join hands with Guangxi Customs, the foreign exchange administration and local tax authorities to jointly build a "cross-border trade compliance chain". On the scenario application side, banks use smart contracts to automatically cross-check and approve foreign trade enterprises' customs declarations, logistics GPS trajectories and capital flows; only when the business logic of the "four flows in one" is self-consistent will the smart contracts permit disbursement or cross-border remittance, thereby blocking, at the technical root, the financing risks arising from a false trade background. On the regulatory coordination side, regulators, as regulatory nodes on the chain, obtain on-chain trade data in real time and carry out compliance monitoring such as on-chain penetrating Anti-Money Laundering (AML). This model takes into account both banks' business risk control systems and the state's compliance supervision network, and can substantially reduce the compliance costs of local banks' foreign-related business.

5.5. Monitoring network for pledged movable property

In the process of promoting the digital credentialization (RWA) of physical assets such as bulk commodities, banks must connect the underlying risk control logic with macroprudential regulation. On the scenario application side, through Internet of Things (IoT) devices and Zero-Knowledge Proofs (ZKPs), banks can monitor in real time the physical status and changes of ownership of collateral without disclosing enterprises' commercial secrets; once an anomaly occurs, smart contracts automatically freeze credit lines or trigger early warnings. On the regulatory coordination side, local financial regulators can access the network through open, standardized data interfaces and monitor, on a global basis, the total credit exposure of all commercial banks in the province to specific bulk commodities. When credit to a certain industry becomes excessively concentrated or prices fluctuate sharply, regulators can promptly issue regional risk warning letters to lending banks, thereby safeguarding the bottom line of regional systemic financial risk on the basis of micro-level scenario risk control.

6. Conclusion

Centring on Web3.0 technology empowering banking scenarios, this paper, from the dual perspectives of "scenario application" and "regulatory coordination", discusses in detail issues such as the logic of fit and the integration pathways between the two. Combining Guangxi's local locational and industrial conditions, it explores feasible solutions and application scenarios for technology implementation, and accordingly puts forward a series of recommendations.

The research has produced three main findings. First, Web3.0 technology and banking business scenarios are compatible in terms of internal mechanisms: the tamper-proof trust mechanism of blockchain, the automatic execution capability of smart contracts and the characteristics of decentralized protocols have points of fit with banks in terms of trust, efficiency, automation and model innovation. Second, the current integration pathways between technology and business scenarios present a situation in which existing solutions are continuously and deeply optimized while new technologies and scenarios are integrated iteratively; in traditional businesses such as confirmations and letters of credit, the essence of development lies in process optimization and efficiency improvement, whereas the application of new technologies such as tokenization and the metaverse in scenarios has advanced more boldly, including the use of DeFi protocols and cross-chain interoperability to overcome obstacles to technology implementation. Finally, because the adoption of new technologies brings compliance, cross-border governance and other risks, regulatory coordination in which "inclusiveness and penetration" run in parallel is needed to drive scenario innovation.

At the implementation level, taking local banks in Guangxi empowering regional development as an example, this paper sorts out five recommendations for Web3.0 technology empowering scenario-based finance: (1) Relying on local logistics advantages such as the Pinglu Canal, tokenize elements such as credentials along the logistics chain to broaden supply chain finance scenarios. (2) Conduct cross-border settlement of agricultural products with ASEAN through mBridge and integrate smart contracts into it. (3) Local banks may attempt to build a "Guangxi distinctive industry consortium chain" and convert core enterprises' accounts payable into "digital credit credentials", thereby broadening inclusive finance scenarios. (4) Promote a multi-node mutual trust mechanism among "customs, trade and banks" to strengthen cross-border trade background review and business supervision. (5) Promote the building of a monitoring network for pledged movable property to monitor total credit exposure on a global basis and ensure that credit business based on the digital credentialization of physical assets such as bulk commodities is safe and controllable.

In general, Web3.0 empowering financial scenarios will continue to develop along the hybrid architecture of "on-chain circulation with off-chain support"; zero-knowledge proofs, cross-chain interoperability and institution-level application chains will be integrated with business scenarios ever more seamlessly, and privacy protection and penetrating regulation will be unified. At the same time, with the application of newer Web3.0 technologies, the boundaries of various financial scenarios will be further blurred, while technology empowerment in individual scenarios such as payment and settlement, supply chain finance, digital assets and inclusive finance will become bolder and more proactive. For commercial banks and local banks, whether they can translate technological capability into scenario solutions suited to local industries remains the key to determining whether they can seize the business initiative in the Web3.0 era.

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