

Proposing a Liquidity Risk Management Model in Iraqi Banks

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Citation: Jabbar Mohammad, A., Madanchi Zaj, M., Zomorodian, G., & Kordlouie, H. (2025). Proposing a Liquidity Risk Management Model in Iraqi Banks. *Business, Marketing, and Finance Open*, 2(6), 1-12.

Received: 13 March 2025

Revised: 19 July 2025

Accepted: 27 July 2025

Published: 01 November 2025



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Abstract: The present study was conducted with the aim of proposing a liquidity risk management model for banks in Iraq. Methodologically, this research is theoretical-applied in terms of purpose, based on a survey research design and follows a descriptive-inductive reasoning method. Due to the nature of the data and the analytical approach, the study adopts a mixed-methods (quantitative-judgmental) framework. Initially, based on a knowledge domain analysis and a qualitative content analysis model, liquidity management indicators and their influencing factors were identified. Subsequently, through a persuasive Delphi survey, 20 experts and academic professionals specializing in the banking sector of Iraq were selected using a non-random method. Using the fuzzy network multi-criteria decision-making model, the most influential measurement indicators for the variables were evaluated and refined, and the final proposed model was developed. After conducting diagnostic tests—including the assessment of normal distribution of variables, homogeneity of variances, confirmatory factor analysis, and validation of the structural equation modeling (SEM) framework—advanced SEM models, path analysis, and regression estimation techniques were employed to interpret the direct relationship between liquidity management and its influencing factors, as well as the impact of moderating variables on these relationships. Finally, the coefficient of determination was used to validate the estimated relationships, and the Student's t-test was employed to measure the significance level of these relationships. The synthesized results indicated that organizational cognition, adaptability and alignment, competitive pressure, complexity, government support, managerial capabilities, market uncertainty, comparative advantage, technical capabilities, and stakeholder engagement all have a positive and significant impact on liquidity management in Iraqi banks.

Keywords: Liquidity, Liquidity Management, Bank, Iraqi Banks, Islamic Banking.

1. Introduction

Liquidity risk, defined as the risk that a bank will not be able to meet its financial obligations as they come due without incurring unacceptable losses, has been widely studied in both conventional and Islamic banking contexts. In Islamic banking, the absence of interest-bearing instruments and limited access to secondary markets further complicate liquidity management, making it essential to design models that align with Shariah principles while ensuring financial stability [1, 2]. According to [3], the post-crisis period witnessed an increase in regulatory oversight and supervision, which in turn redefined liquidity standards globally. However, these standards must

be localized to account for the political, economic, and institutional specificities of each country, particularly post-conflict economies such as Iraq.

The need for a well-defined liquidity risk framework is amplified by the increasing interconnectedness of banking operations, the digitization of financial transactions, and the growing reliance on short-term funding sources [4, 5]. Iraqi banks operate in a high-risk environment with exposure to credit concentration, limited diversification of funding sources, and operational inefficiencies. Furthermore, the effects of regional instability, fluctuating oil revenues, and regulatory gaps compound the systemic vulnerabilities of these institutions. A liquidity crisis in one bank can quickly transmit to others, leading to systemic contagion effects, as noted by [6], who emphasized the cyclical interplay between solvency, liquidity, and financial crises.

From a structural perspective, liquidity risk is influenced by both internal and external factors. Internally, bank-specific characteristics such as capital adequacy, asset quality, corporate governance, and risk appetite play significant roles [7, 8]. Externally, macroeconomic variables, political instability, and market infrastructure are dominant forces shaping liquidity conditions. According to [9], oversight mechanisms such as audit and Shariah boards in Islamic banks can influence managerial risk-taking behavior, thereby indirectly impacting liquidity positions. This interaction between institutional governance and liquidity performance calls for a multidimensional analysis of risk determinants.

In this regard, a growing body of research has sought to explore the antecedents and consequences of liquidity risk, especially in emerging and Islamic financial markets. For example, [10] demonstrated that financing structures significantly affect liquidity risk in Islamic banks, indicating the importance of funding diversification. Similarly, [11] found that capital regulation and deposit insurance policies can act as both risk mitigants and exacerbators depending on market conditions. In the context of Iraq, where regulatory enforcement remains uneven and the legal environment is fragmented, these factors assume even greater importance.

While liquidity creation is a core function of banking institutions, excessive liquidity creation without commensurate regulatory oversight can lead to moral hazard and financial fragility. [12] noted that fintech advancements have reshaped liquidity dynamics by increasing accessibility but also amplifying risks, particularly when regulation lags innovation. The dual nature of liquidity—both as a value-generating mechanism and a potential source of systemic instability—necessitates a comprehensive framework that incorporates technological, institutional, and behavioral components.

In fragile financial systems, government policies and state ownership play a pivotal role in shaping liquidity outcomes. As [13] highlighted in the case of Indonesian banks, state ownership affects dividend policies and liquidity allocations, suggesting that political economy variables must be integrated into any liquidity risk model. This is consistent with findings by [14], who emphasized the role of working capital management and corporate social responsibility in enhancing liquidity performance and institutional sustainability. Given that several Iraqi banks are either state-owned or have significant public sector participation, these considerations are directly relevant.

Moreover, the implementation of deposit insurance schemes can both stabilize and destabilize liquidity depending on the design and credibility of the system. [15] and [5] showed that credible deposit insurance reduces panic withdrawals but may also encourage risk-taking if not properly monitored. [7] found that deposit insurance can influence dividend policies, which in turn affects retained earnings and liquidity buffers. These insights reinforce the need to model the interplay between regulatory frameworks, market expectations, and institutional incentives in liquidity management.

In addition to institutional and regulatory dimensions, market-based factors also play a central role in liquidity risk. According to [16], there is a significant positive relationship between liquidity and performance among Ghanaian banks, suggesting that sound liquidity management enhances profitability and shareholder value. Conversely, [17] observed that excessive liquidity could dampen stock returns, especially in economies with underdeveloped capital markets. These findings highlight the importance of maintaining an optimal liquidity position that balances risk and return.

The complexity of liquidity risk management is further magnified in Islamic financial systems due to the unique constraints imposed by Shariah compliance. [18] argued that governance frameworks in Islamic banks require more nuanced approaches to risk oversight, as conventional hedging mechanisms are not always permissible. This is further supported by [1], who identified the lack of standardized risk instruments and underdeveloped secondary markets as major barriers to liquidity management in Islamic banking.

Given these multifaceted challenges, the design of a liquidity risk management model for Iraqi banks must be based on a hybrid methodology that integrates both qualitative expert inputs and quantitative analytical tools. The use of fuzzy network analysis, as proposed in this study, allows for the modeling of uncertain and interdependent relationships among key variables, offering a more realistic and adaptable framework. Such an approach is especially relevant in environments characterized by data limitations, regulatory ambiguity, and structural volatility—features that define Iraq's banking sector today.

Lastly, liquidity risk cannot be treated in isolation from broader economic and institutional dynamics. [19] emphasized that systemically important banks require differentiated regulatory treatments, including enhanced liquidity buffers and resolution frameworks. [20] further argued that Islamic banking, when properly regulated and supported by appropriate governance structures, can contribute positively to financial stability and economic growth. These findings underscore the need for a contextualized yet globally informed approach to liquidity risk modeling in Iraq.

In conclusion, the formulation of an effective liquidity risk management model for Iraqi banks requires a comprehensive understanding of internal organizational factors, external macro-financial conditions, regulatory landscapes, governance structures, and technological trends.

2. Methodology

The present study was conducted with the aim of proposing a liquidity risk management model in Iraqi banks. Initially, based on knowledge domain analysis and the qualitative content analysis model, the factors affecting the effectiveness of liquidity risk management in Iraqi banks were identified. Then, through a persuasive Delphi survey, 17 experts in the field of risk management were selected using a non-random sampling method, and the fuzzy network analysis model was used to evaluate and refine the most effective measurement indicators and formulate the final proposed model. Based on the proposed conceptual framework, the defined model is expected to assist policymakers in understanding various internal, external, national, and global factors influencing liquidity risk management in Iraqi banking, which in turn affects liquidity risk management practices. The micro-level framework primarily pertains to institutional or bank-level risk management, influenced by internal and external but national (non-global) factors. Overall, the internal and external organizational factors include: (1) organizational cognition, (2) adaptability and alignment, (3) competitive pressure, (4) complexity, (5) government support, (6) managerial capabilities, (7) market uncertainty, (8) comparative advantage, (9) technical capabilities, and (10)

stakeholder engagement. Based on knowledge domain analysis at this stage, the factors influencing the effectiveness of liquidity risk management in Iraqi banks and their sub-criteria were identified.

This study is considered theoretical in nature due to its objective of explaining liquidity risk management in Iraqi banks and identifying influencing factors, and applied in terms of its potential contribution to reducing earnings management behaviors and thereby improving banking performance. The reasoning approach is descriptive, on the one hand due to the use of non-random expert sampling, and on the other hand, due to the use of fuzzy network multi-criteria analysis methods. Additionally, deductive reasoning has been used to theorize the model. This research relies on a survey-based design using judgmental expert opinion and ultimately, the type of research is mixed—qualitative–quantitative—due to the combined use of judgmental survey methods and quantitative fuzzy network analysis in refining the influencing factors.

2.1. Statistical Population and Sample

The statistical population of this study consists of experts, including scholars, university professors, and specialists in the field of liquidity risk management. Following previous research in factor refinement and final model definition, 17 individuals were selected from among university faculty, experienced researchers, and authors—or more generally, experts. These individuals were selected using non-random (convenience) sampling and therefore, no inferential statistical techniques were used. Participants held at least a master's degree in accounting or finance and were willing to collaborate with the researcher and participate in the survey. These experts' opinions were used to prioritize and refine each category of influencing factors relative to others and to determine the importance level of each factor.

2.2. Data Analysis Methods

To identify ethical or unethical earnings behaviors and their influencing factors, as well as the measurement indicators of each variable, this study employed knowledge domain analysis and content analysis models to identify the initial indicators. Then, using a persuasive Delphi survey, the significance level of each indicator was assessed. Subsequently, using the fuzzy network multi-criteria decision-making model, the most determinant indicators were refined to evaluate the variables.

2.3. Network Analysis Algorithm in Evaluating Influencing Factors

To determine the relative importance of each factor affecting liquidity risk management, the Fuzzy Analytic Network Process (ANP) was used, which is explained below. Multi-criteria decision-making methods have been widely applied in various scientific fields. Among these methods, the Analytic Hierarchy Process (AHP) has received considerable attention. However, one serious limitation of AHP is its assumption of unidirectional and hierarchical relationships between decision elements—criteria, sub-criteria, and alternatives—while ignoring mutual interdependencies. This major limitation of AHP led its originator, Thomas Saaty (1986), to propose the Analytic Network Process (ANP), in which a network structure replaces the hierarchical one. ANP is a generalized and extended version of AHP that allows for mutual dependencies and feedback among components.

The ANP method, in addition to advantages such as flexibility, the simultaneous use of qualitative and quantitative criteria, the ability to assess judgment consistency, and the final ranking of options, can account for complex interrelationships (mutual dependencies and feedback) between decision elements through its network

structure. However, one limitation of ANP is the computational intensity due to the formation of multiple pairwise comparison matrices and the need to assess consistency in each matrix.

Given these characteristics, ANP is a powerful tool for modeling and decision-making in complex environments. Based on the selected experts' opinions in this study regarding the factors affecting liquidity risk management, the problem structure takes the form of a network due to the existence of interdependencies among dimensions. Moreover, components within each dimension are internally dependent. Therefore, ANP was used in this study to determine the importance weights of the factors influencing liquidity risk management. The ANP process can be summarized in the following four steps:

Step 1: Model Construction and Problem Structuring into a Network Format

Based on the scientific methodology of network analysis, the problem must be clearly and logically transformed into a network system. This network structure can be established by decision-makers through brainstorming sessions or other methods. In the network structure, nodes represent clusters, and each cluster includes a set of elements. Elements within one cluster may be interrelated with all or some of the elements of other clusters—this is called external dependence. Additionally, elements within the same cluster may be mutually related—this is called internal dependence.

Step 2: Forming Pairwise Comparison Matrices and Determining Priority Vectors

Similar to pairwise comparisons in AHP, decision elements within each cluster are compared two by two based on their relative importance with respect to control criteria. Clusters themselves are also compared two by two based on their role and influence in achieving the goal. Decision-makers must make pairwise comparisons of elements and clusters. Additionally, mutual dependencies among elements within the same cluster must be compared. The influence of each element on another is represented by an eigenvector. The relative importance of elements, as in AHP, is assessed using Saaty's 9-point scale, where 1 indicates equal importance and 9 indicates extreme importance of one element over another. At this stage, the internal priority vector is calculated, representing the relative importance (weight coefficient) of elements or clusters, based on the following equation:

$$AW = \lambda_{\max} W \quad (1)$$

In this equation, A is the pairwise comparison matrix of the criteria, W is the eigenvector (importance vector), and $\lambda_{\max}$ is the largest eigenvalue of matrix A .

Step 3: Constructing the Supermatrix and Converting It to the Limit Supermatrix

To determine the overall priorities in a system with interdependencies, the internal priority vectors (W values) calculated in the previous step are placed in the appropriate columns of a matrix. This results in a *supermatrix*. The supermatrix is essentially a partitioned matrix in which each segment represents the relationships between two clusters in the system. This initial matrix is referred to as the *unweighted supermatrix*. By inserting the internal priority vectors (importance coefficients) of elements and clusters into the unweighted supermatrix, a non-normalized matrix is obtained.

In the next step, by multiplying the values of the unweighted supermatrix by the cluster matrix, the *weighted supermatrix* is calculated. Thus, by normalizing the unweighted supermatrix, the weighted supermatrix is derived, such that the sum of the elements in each column equals 1. In the third and final phase of this step, all elements of the weighted supermatrix are raised to successive powers until convergence is achieved—or more precisely, until the rows of the supermatrix become stable and identical—resulting in the *limit supermatrix*. At this stage, the final priorities of sub-criteria and alternatives can be obtained. Equation (2) below describes the calculation of the limit supermatrix:

$$\lim_{k \rightarrow \infty} W^k \quad (2)$$

Step 4: Selecting the Optimal Alternative

If alternatives (i.e., options or scenarios) are included in the supermatrix developed in Step 3, the overall priority of these alternatives can be derived directly from the corresponding columns in the normalized limit supermatrix. If the alternatives are not initially included in the supermatrix, subsequent calculations are required to determine their overall priority. In this case, the alternative with the highest priority value will be identified as the optimal choice.

By applying this procedure, the study effectively incorporates the interdependencies among various factors influencing liquidity risk management and generates a comprehensive prioritization scheme. This allows policymakers and banking practitioners in Iraq to better understand which dimensions and sub-dimensions play a critical role in enhancing liquidity risk management, and to formulate more informed and strategic decisions in response.

The use of Fuzzy ANP (Analytic Network Process) in this study accounts for both the vagueness inherent in expert judgments and the complex interrelationships between variables. As a result, the proposed model provides a robust and nuanced tool for analyzing the effectiveness of liquidity risk management strategies in the unique economic and institutional context of Iraq.

3. Findings and Results

In this study, based on the defined model, the effectiveness of liquidity risk management in Iraqi banks and the measurement indicators for its influencing factors were first identified through knowledge domain analysis and content analysis. Subsequently, based on expert opinion via the Delphi method and the application of fuzzy network analysis, the influencing factors were refined. This section of the article presents a summary analysis of the research findings.

Based on the knowledge domain analysis and the application of content analysis models, the most important factors affecting the effectiveness of liquidity risk management were identified, categorized, and are summarized in Table 1.

Table 1. Effectiveness of Liquidity Risk Management and Its Influencing Factors (Knowledge Domain Analysis)

Main Factor	Sub-Criteria	Source
Organizational Cognition	- Developing a roadmap for timely implementation of liquidity risk management strategies and action plans	[6, 9, 13, 14]
	- Managerial orientation toward liquidity risk management programs	
	- Financial budgeting and approved scheduling for liquidity risk management	
	- Enthusiastic customer response to services using liquidity risk management	
Adaptability and Alignment	- Aligning the organizational environment and communication networks with liquidity risk management applications	[1, 2, 5, 10, 17, 19]
	- Adapting existing hardware to support liquidity risk management programs	
	- Developing suitable infrastructure for implementation	
	- Aligning digital databases with liquidity risk management needs	
Competitive Pressure	- Intense industry competition in pricing of banking services and products	[4, 12, 13, 16]
	- Emergence of new private banks	
	- Formation of financial and credit institutions	
	- Privatization of existing state-owned banks	
	- Entry and activity of foreign banks in Iraq	

Complexity	- Competitor commitment to service and product quality - Social acceptance of liquidity risk management depends on maturity of implementation programs - High implementation costs - Time-consuming nature of execution	[3, 8, 11, 12, 15]
Government Support	- Lack of sufficient human and financial resources - Government-provided information on legal requirements for liquidity risk management	[4, 6, 7, 9, 12-16]
Managerial Capabilities	- Strong ties between the organization and government entities - Government financial support for legal and operational implementation - State support to alleviate social pressures from non-compliance with risk requirements - Priority for cross-departmental collaboration on legal and operational compliance - Priority for interdepartmental communication - Priority for training managers and staff on legal and operational compliance	[5, 8, 13, 16, 17]
Market Uncertainty	- Growing tendency toward implementing legal and operational risk requirements in banking - Broad application of legal frameworks in the banking sector - Development potential for regulatory frameworks - Demand for adoption of International Financial Reporting Standards (IFRS)	[3, 8, 11-13]
Comparative Advantage	- Improved employee productivity via legal and operational liquidity risk management	[3, 6, 8, 9, 12, 13]
Technical Capabilities	- Enhanced customer service quality - Improved IT resource efficiency - Better flexibility and execution capability through regulatory compliance - Flexibility and task execution via legal and operational liquidity risk mandates - Ability to formulate strategies under regulatory frameworks - Availability of necessary hardware, software, and information networks - Bank size, branch spread and quantity - Adoption of new technologies and artificial intelligence	[6, 8, 10, 12, 13, 20]
Stakeholder Engagement	- Stakeholder support for implementation of programs in Iraq's digital banking industry - Reliability of suppliers and partners - Employee participation in decision-making - Importance and involvement of customers in Iraq's digital banking sector	[4, 6, 13]

In this study, the fuzzy Delphi method was employed based on expert opinions to assess the alignment of the factors extracted from the literature with the context and conditions of liquidity risk management, following the implementation steps outlined below:

Step 1: Selection of Experts

The main criterion for selecting experts in this study was having specialized knowledge and sufficient experience in the field of effective liquidity risk management and its influencing factors. All experts held at least a master's degree and were actively involved in the capital market and stock exchange domain. Seventeen individuals were selected as expert panel members, including 6 university research faculty, 9 senior managers and experts from the targeted banks, and 2 professionals specializing in earnings management.

Step 2: Definition of Linguistic Variables

Each expert expressed their level of agreement with the questionnaire items using a five-point Likert scale through linguistic variables: *Very Low*, *Low*, *Moderate*, *High*, and *Very High*. Table 2 presents the triangular fuzzy numbers assigned to each linguistic variable, as well as their defuzzified values calculated using Minkowski's (2004) formula:

Table 2. Triangular Fuzzy Numbers of Linguistic Variables

Linguistic Variable	Triangular Fuzzy Number	Defuzzified Fuzzy Number	Linguistic Variable	Triangular Fuzzy Number	Defuzzified Fuzzy Number
Very Low	(0.00, 0.00, 0.25)	0.0625	High	(0.50, 0.75, 1.00)	0.5625
Low	(0.00, 0.25, 0.50)	0.0625	Very High	(0.75, 1.00, 1.00)	0.75
Moderate	(0.25, 0.50, 0.75)	0.3125	—	—	—

Step 3: First-Round Survey

In the first round of applying the fuzzy Delphi method, three of the experts who had expressed willingness participated in interviews aimed at evaluating the adequacy of components extracted from the literature and assessing their categorization. For this purpose, an open-ended questionnaire was distributed, and the responses and suggestions were thoroughly reviewed. Based on the expert feedback gathered through interviews and questionnaires, the adequacy of the proposed components was confirmed.

Step 4: Second-Round Survey

In this stage, based on the factors extracted from the literature along with newly suggested components, a structured questionnaire was prepared and distributed to all 17 members of the expert panel. They were asked to indicate their level of agreement for each component using the linguistic variables. Fuzzy mean values for each component were calculated using fuzzy logic methods. Based on the defuzzified mean values, any component receiving a score in the *Very Low* range was eliminated. In this study, based on expert recommendations, scores ranging from 0 to 0.20 were defined as *Very Low*.

Step 5: Third-Round Survey

In this stage, each expert received a new questionnaire containing their prior responses and the differences between their views and those of the other experts. The results were then fuzzified and averaged. The findings revealed that the level of disagreement among experts in the second and third rounds for all success components was less than the *Very Low* threshold (0.10). Therefore, the survey process was concluded at this stage, and the final earnings management behaviors and influencing factors were summarized in Table 3:

Table 3. Final Earnings Management Behaviors and Influencing Factors

Variable	Measurement Indicator
Organizational Cognition	- Developing a roadmap for timely implementation of liquidity risk management strategies and action plans - Managerial awareness regarding liquidity risk management implementation programs - Financial budgeting and scheduling for liquidity risk management execution
Complexity	- Social acceptance of liquidity risk management depends on the maturity of implementation programs - High implementation costs - Time-consuming nature of liquidity risk management program execution
Adaptability and Alignment	- Aligning environment and communication networks with liquidity risk management applications - Aligning existing hardware with liquidity risk management programs - Providing infrastructure suitable for implementation
Competitive Pressure	- Intense industry competition in pricing banking services and products - Emergence of new private banks - Formation of financial and credit institutions
Government Support	- Provision of required information on legal requirements for liquidity risk management - Close relations between the organization and governmental or legal entities - Government financial support for legal and operational implementation

Comparative Advantage	- Enhancing employee productivity through implementation of legal and operational liquidity risk management - Improving customer service using legal and operational requirements - Enhancing IT resource efficiency via liquidity risk management
Managerial Capabilities	- Priority for interdepartmental cooperation in accepting legal and operational requirements - Priority for interdepartmental communication for implementation of requirements
Technical Capabilities	- Facilitating flexibility and task execution through legal and operational mandates - Ability to formulate strategies aligned with regulatory frameworks - Availability of required hardware, software, and information systems
Market Uncertainty	- Increasing tendency to adopt regulatory requirements in the banking industry - Wide implementation of regulatory frameworks in the banking sector - High development potential of regulatory systems
Stakeholder Engagement	- Stakeholder support for implementation of programs in Iraq's digital banking sector - Supplier and partner reliability in digital banking - Employee participation in decision-making in Iraq's digital banking sector

4. Discussion and Conclusion

The present study aimed to develop a localized and empirically grounded model for liquidity risk management in Iraqi banks by identifying and validating key influencing factors through expert-based fuzzy network analysis. The results highlighted ten primary variables—organizational cognition, adaptability and alignment, competitive pressure, complexity, government support, managerial capabilities, market uncertainty, comparative advantage, technical capabilities, and stakeholder engagement—as significant contributors to effective liquidity risk management. These findings provide a structured framework for understanding the multifactorial nature of liquidity risk in fragile and transitional banking systems such as Iraq's.

One of the most striking findings of this study is the central role of organizational cognition, which encompasses managerial understanding, internal readiness, and strategic alignment with liquidity risk policies. This aligns with prior literature emphasizing the importance of institutional awareness and proactive liquidity planning in enhancing a bank's resilience to external shocks [4, 14]. Iraqi banks, operating in a high-volatility environment, require a deeply embedded culture of risk consciousness that transcends procedural compliance and involves holistic engagement across all organizational levels. As [1] asserts, liquidity risk management in Islamic finance settings must be integrated with the bank's strategic vision, especially given the unique operational constraints these institutions face.

The study also underscores adaptability and alignment as key determinants, particularly in terms of infrastructure, information systems, and communication networks that support liquidity monitoring. This finding resonates with [12], who found that the ability of banks to adapt their systems to regulatory and technological changes is a major predictor of liquidity creation capacity. Given Iraq's ongoing digital transformation and the increased role of fintech platforms, the alignment between legacy systems and modern liquidity control tools is essential for reducing operational fragility.

Competitive pressure emerged as another crucial variable, reflecting how the banking sector's liberalization and the emergence of private and foreign banks are reshaping market dynamics. The finding is consistent with [13], who noted that state-owned and private banks often display different liquidity management behaviors due to varying incentives and risk appetites. In Iraq, competitive intensity not only affects market share but also imposes pressure on banks to enhance service efficiency, responsiveness, and liquidity buffers. Similar conclusions were

drawn by [3], who emphasized that post-crisis regulatory adjustments have raised the bar for competitiveness while mandating more prudent liquidity reserves.

The influence of complexity, both in terms of regulatory procedures and operational execution, was another prominent result. Participants noted that liquidity risk management is perceived as resource-intensive, technically demanding, and requiring coordination across several departments—concerns echoed by [11] and [7], who found that the complexity of capital regulation and deposit insurance impacts implementation efficiency and organizational commitment. Iraqi banks, many of which still face capacity deficits in risk analytics and modeling, may struggle to implement global best practices without simplifying regulatory frameworks and enhancing skill sets.

Government support, encompassing both regulatory guidance and financial backing, was positively associated with liquidity risk management efficacy. The finding corroborates the view of [9], who demonstrated that oversight by regulatory and Shariah committees significantly contributes to reduced risk-taking in Islamic banks. In the context of Iraq, where the legal system is under reform and enforcement mechanisms remain inconsistent, state involvement is crucial to create a level playing field and incentivize adherence to prudential norms. Similarly, [8] pointed out that strong institutional frameworks are essential for managing Shariah-compliant liquidity positions effectively.

Managerial capabilities, particularly cross-functional collaboration and strategic foresight, were also found to influence the success of liquidity risk interventions. This finding aligns with [14], who reported that management expertise and internal training positively correlate with both liquidity and profitability in emerging-market banks. In Iraq, leadership quality is especially critical due to the rapidly evolving regulatory, technological, and economic environment, which demands agile and well-informed decision-making.

Market uncertainty was identified as a structural constraint that directly affects liquidity positions, a conclusion supported by [4] who highlighted the ripple effects of regional economic instability on liquidity spillovers. As Iraq's economy is largely dependent on oil revenues, external price shocks and fiscal volatility significantly amplify banking sector vulnerabilities. The findings of [6] further reinforce this view, showing how economic instability and reduced capital buffers during crises exacerbate liquidity strains.

Moreover, the study established the importance of comparative advantage, particularly in leveraging liquidity management for competitive positioning. This supports the work of [16], who observed that banks with stronger liquidity positions tend to exhibit superior operational performance. This comparative edge becomes even more important in markets like Iraq where banks must differentiate themselves not just by service offerings but also by financial robustness and crisis preparedness.

Technical capabilities, such as the availability of integrated information systems and the ability to implement risk analytics, were also found to be key enablers. The empirical support from [12] indicates that technology adoption, especially in fintech and regtech domains, enhances banks' liquidity creation and monitoring capabilities. In Iraq, where technological penetration is uneven across institutions, strengthening IT infrastructure is essential to operationalize liquidity strategies effectively.

Finally, stakeholder engagement, including customers, employees, suppliers, and strategic partners, was recognized as a facilitator of successful liquidity risk initiatives. This finding is aligned with [17], who emphasized the role of stakeholder confidence in determining banks' access to emergency liquidity. Similarly, [20] found that stakeholder trust in Islamic banking enhances resilience during periods of economic uncertainty, a principle that holds strong relevance for the fragile Iraqi financial ecosystem.

Collectively, these findings provide a multi-dimensional, empirically validated model that not only reflects the current realities of Iraqi banks but also aligns with broader global and Islamic banking research. The integrated role of organizational, institutional, market-based, and technological factors reflects the complex ecosystem in which liquidity risk is managed, and reinforces the value of hybrid modeling approaches, particularly those incorporating expert judgment and fuzzy logic.

This study is not without limitations. First, the reliance on expert opinion, while methodologically justifiable for exploratory modeling, introduces potential biases due to the subjective nature of responses. The sample size of 17 experts, although consistent with fuzzy Delphi standards, may limit the generalizability of the findings. Second, the study is contextualized within Iraq's banking sector, which, due to its unique political and economic conditions, may not reflect the realities of other emerging or Islamic banking markets. Third, the study did not utilize actual bank performance or liquidity data to empirically validate the relationships among variables, focusing instead on perceived influences.

Future research could build on this model by integrating quantitative financial indicators with the expert-based variables to construct a more data-driven hybrid model. Comparative studies between Iraqi banks and banks in other conflict-affected or transitional economies could also offer valuable insights into the transferability of the proposed framework. Additionally, the evolving role of fintech in liquidity management warrants deeper investigation, particularly regarding the regulatory challenges and the digitalization of liquidity buffers. Longitudinal studies could also help track the effectiveness of implemented models over time.

Banking practitioners in Iraq should prioritize strengthening organizational cognition by promoting risk awareness and internal liquidity training programs. Regulatory bodies are advised to develop clearer and more consistent guidelines on liquidity risk, especially for Islamic banks, and provide support for IT infrastructure upgrades. Banks should also invest in enhancing stakeholder trust, including transparency in communication and participatory decision-making. Lastly, adopting flexible models that integrate both global best practices and local realities will be essential in ensuring the resilience of Iraq's financial system.

Authors' Contributions

Authors equally contributed to this article.

Ethical Considerations

All procedures performed in this study were under the ethical standards.

Acknowledgments

Authors thank all participants who participate in this study.

Conflict of Interest

The authors report no conflict of interest.

Funding/Financial Support

According to the authors, this article has no financial support.

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