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ROLE OF LIQUIDITY POOL IN STABILIZING VALUE OF TOKEN

Ruchi Gupta[1], Mandeep Gupta[2], Deepanshu Gupta[3]
Email Id/Orcid ID: [1] 9.ruchig@gmail.com / https://orcid.org/0009-0002-0626-7614
[2] 9.mandeep@gmail.com / https://orcid.org/0009-0005-3542-1408
[3] 9.deepanshugupta@gmail.com / https://orcid.org/0009-0006-6750-8433

Abstract: Liquidity pools play a crucial role in stabilizing the value of tokens, especially within the context of decentralized finance (DeFi) ecosystems. One of the primary mechanisms through which liquidity pools contribute to stability is by facilitating an arbitrage mechanism. Buying is made when token is undervalued. On other hand selling is made when it's overvalued. This arbitrage activity is made possible by the existence of liquidity pools, where traders can execute these transactions directly on decentralized exchanges. The constant pressure from arbitrageurs helps to bring the token's value back to its target peg, fostering stability. Furthermore, liquidity pools respond dynamically to changes in supply and demand for the token. As demand for the stablecoin increases, users swap other assets for it, leading to a rise in its price. Conversely, when demand decreases, users swap the stablecoin for other assets, causing its price to decrease. Liquidity pools adjust to these changing dynamics by automatically rebalancing the composition of assets in the pool, aligning with market conditions. This responsive behavior contributes to the stable value of the token, as the liquidity pool adapts to fluctuations in demand and supply. This research has discussed liquidity pool creation process of Two NFT tokens (METANFT, 9NFTMANIA) in world famous decentralized exchanges such as Pancake swap and Icecream swap.
Keyword: Crypto token, Liquidity Pool, Decentralized finance, Decentralized Exchange

[1] Introduction

A liquidity pool is a foundational element in the decentralized finance (DeFi) landscape, playing a pivotal role in stabilizing the value of tokens within a decentralized ecosystem. At its core, a liquidity pool is a smart contract that pools together a reserve of tokens, allowing users to trade or swap one token for another with minimal slippage. This mechanism contributes to price stability by ensuring a constant and accessible source of liquidity for traders. As users engage in trades against the liquidity pool, its algorithm adjusts token prices based on the proportional share of each token in the pool, effectively minimizing abrupt price fluctuations. Furthermore, liquidity pools incentivize users to contribute their tokens by offering liquidity provider (LP) tokens and a share of trading fees as rewards. This financial incentive not only attracts liquidity providers but also fosters continuous liquidity, enhances market depth, and mitigates the risk of price manipulation. In essence, liquidity pools create a dynamic and resilient environment that bolsters the stability of a token's value, laying the groundwork for efficient and secure decentralized trading. Here's how liquidity pools contribute to stabilizing the value of tokens:

1. **Arbitrage Mechanism:** Liquidity pools enable an arbitrage mechanism that helps to keep the token's value close to its peg. If the price of a token deviates from its target value, arbitrageurs can exploit the price difference by buying the token if it's below the peg. Selling is made when it's above. This trading activity helps to bring the token's value back to its intended peg.
2. **Supply and Demand Dynamics:** Liquidity pools respond to changes in supply and demand for the token. When demand increases, users swap other assets for the stablecoin, leading to an increase in its price. Conversely, when demand decreases, users swap the stablecoin for other

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assets, causing its price to decrease. The liquidity pool adjusts to these changes by dynamically changing the ratio of assets in the pool.

3. **Incentivizing Liquidity Providers:** Liquidity providers play a crucial role in stabilizing the token value. They contribute assets to the liquidity pool and, in return, receive LP tokens representing their share of the pool. When the token's value deviates from its peg, liquidity providers are incentivized to rebalance the pool by swapping assets and earning transaction fees. This activity helps in stabilizing the token's value.
4. **Algorithmic Adjustments:** In some stablecoin systems, especially those using algorithmic mechanisms, liquidity pools are connected to algorithms that adjust the token's supply based on market conditions. This can involve changing the interest rates, issuing or burning tokens, and altering the pool's composition to counteract price deviations from the peg.
5. **Responsive Market Dynamics:** Liquidity pools create a responsive market environment where the token's value can quickly adjust to changes in market conditions. This responsiveness is essential for maintaining stability, as it ensures that the token's value aligns closely with its intended peg in a decentralized and automated manner.
6. **Dynamic Asset Balancing:** Liquidity pools automatically adjust the ratio of assets in the pool based on market demand. When users trade, they impact the pool's composition, and the protocol rebalances the assets to maintain stability. This dynamic balancing helps prevent large price fluctuations.
7. **Governance and Community Involvement:** Some stablecoin systems involve community governance where token holders can vote on proposals to adjust parameters, such as collateral types, stability fees, or algorithmic parameters. The involvement of the community in decision-making can contribute to the stability and resilience of the token.

Liquidity pools act as the foundational mechanism for stabilizing the value of tokens, particularly in the context of stablecoins. Their dynamic nature, responsive market dynamics, and incentivization of liquidity providers contribute to maintaining the stability of the token's value close to its peg. The interplay between arbitrage, supply and demand, and algorithmic adjustments creates a robust mechanism for stabilizing token values within decentralized financial ecosystems.

[2] Literature review

There have been several research related to blockchain, liquid pool and NFT projects token in existence. Following table is showing existing research with author, title methodology and limitations.

Table 1. Literature Survey

Citation	Author	Year	Title	Methodology	Limitation
[1]	Amihud, Y.	2002	Illiquidity and stock returns: Cross-section and time-series effects	Liquidity and stock market	Limited scope
[2]	Urquhart, A.	2016	The inefficiency of Bitcoin. Economics Letters	Blockchain, Bitcoin	Work is limited to Bitcoin
[3]	Platanakis, E., et al.	2018	Optimal vs naïve diversification in cryptocurrencies	Blockchain, Cryptocurrency,	Lack of technical work
[4]	Dyhrberg, A.	2018	How investible is bitcoin?	Liquidity,	Only Bitcoin has

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	H., et al.		Analyzing the liquidity and transaction costs of bitcoin markets	Bitcoin, Blockchain	been discussed
[5]	Wei, W. C.	2018	Liquidity and market efficiency in crypto currencies	Liquidity, Cryptocurrency	NFT and technical work ignored.
[6]	Makarov, I. and Schoar, A.	2020	Trading and arbitrage in cryptocurrency markets	Cryptocurrency, Blockchain	Concept of Distributed exchange and Liquidity not discussed.
[7]	Aoyagi, J.	2020	Liquidity provision by Automated Market Makers	Liquidity, Blockchain	Need to do technical work regarding liquidity
[8]	Zaremba, A., et al.	2021	Up or down? Short-term reversal, momentum, and liquidity effects in cryptocurrency markets	Cryptocurrency, Liquidity	Ignored efficient blockchains
[9]	Heimbach, L., et al.	2021	Behavior of liquidity providers in decentralized exchanges	Blockchain, Liquidity	Limited work with lack of vision
[10]	Aspris, A.,	2021	Decentralized exchanges: The “wild west” of cryptocurrency trading	Cryptocurrency, Blockchain	Work focused on trading instead of liquidity pooling.
[11]	Brauneis, A.,	2021	How to measure the liquidity of cryptocurrency markets?	Cryptocurrency	Process of granting liquidity on Distributed exchange is missing.
[12]	GUPTA, M., & Gupta, D.	2023	Investigating Role of Blockchain in Making your Greetings Valuable	Blockchain, NFT	This is just review
[13]	Gupta, M.	2023	Reviewing the Relationship Between Blockchain and NFT With World Famous NFT Market Places	Blockchain, NFT	Work has only reviewed blockchain and NFT

[3] Significance of Liquidity pool in blockchain

Liquidity pools play a crucial role in decentralized finance (DeFi) on the blockchain. A liquidity pool is a smart contract that contains funds used to facilitate trading in decentralized exchanges (DEXs). The significance of liquidity pools lies in their ability to provide liquidity for various tokens, enabling users to trade assets without relying on traditional order books and centralized intermediaries. Here are key aspects of the significance of liquidity pools in blockchain:

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1. **Decentralized Exchange Functionality:** Liquidity pools are integral to the operation of decentralized exchanges. Instead of relying on order books, DEXs use liquidity pools to match buyers with sellers, allowing users to trade directly from their wallets without the need for intermediaries.
2. **Facilitating Automated Market Making (AMM):** Liquidity pools operate based on the Automated Market Making (AMM) model. In AMM, the price of an asset is determined by a mathematical formula rather than traditional bid-ask dynamics. This allows for continuous liquidity and eliminates the need for a centralized authority to maintain order books.
3. **Incentivizing Liquidity Providers:** Users can become liquidity providers by depositing tokens into a liquidity pool. In return, they receive liquidity provider (LP) tokens, representing their share of the pool. Liquidity providers are incentivized through transaction fees paid by traders, and they earn a portion of these fees proportional to their share in the pool.
4. **Price Stability and Slippage Mitigation:** Liquidity pools contribute to price stability by providing a pool of assets for traders. However, when a large trade is executed, it can impact the pool's composition, leading to slippage. Slippage refers to the difference between the expected price of a trade and the actual executed price. Well-capitalized liquidity pools help mitigate slippage by providing ample liquidity.
5. **Token Swaps and Decentralized Finance (DeFi) Applications:** Liquidity pools are fundamental to decentralized finance applications, including decentralized lending and borrowing protocols, decentralized stablecoins, and various other DeFi platforms. Users can swap tokens, provide collateral, and access financial services using liquidity pools.
6. **Collateral for Loans:** Liquidity pools can serve as collateral for decentralized lending platforms. Users can lock their assets in a liquidity pool and receive a corresponding amount of a stablecoin, which can then be used for various purposes such as trading, earning interest, or providing additional liquidity.
7. **Permissionless Access:** Liquidity pools operate in a permissionless manner, allowing anyone to contribute assets and participate in decentralized trading. This inclusivity fosters a more open and accessible financial ecosystem.
8. **Innovation and Experimentation:** Liquidity pools have become a focal point for innovation in the DeFi space. New models, strategies, and governance mechanisms are constantly being experimented with and implemented within liquidity pool ecosystems.

Liquidity pools are a foundational component of decentralized finance on the blockchain, providing liquidity, facilitating trading, and enabling various financial services in a decentralized and permissionless manner. Their significance lies in their ability to create efficient and decentralized markets that empower users to participate in the new era of blockchain-based finance.

[4] Process of Liquidity pool creation

This section is focused on creation of liquidity pool at Pancake swap and Icecream Swap. Pancake swap considers BNB smart chain where as Icecream swap considers Satoshi core chain.

4.1 Liquidity pool creation in Pancake Swap

Creating a liquidity pool in PancakeSwap involves providing liquidity to a pair of tokens on the PancakeSwap decentralized exchange (DEX). Liquidity pools enable users to trade tokens on the platform, and liquidity providers earn fees in return. Below is a step-by-step guide on how to create a liquidity pool on PancakeSwap:

Scientific Journal of Metaverse and Blockchain Technologies
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1. Wallet:

- Make sure you have a wallet that is compatible with the Binance Smart Chain (BSC), such as MetaMask or Trust Wallet.
- Ensure that your wallet is connected to the Binance Smart Chain network.

2. Tokens: You need to have an equal value of two different tokens that you want to add to the liquidity pool. For example, if you want to create a liquidity pool for BNB/USDT, you need an equal value of BNB and USDT.

Steps:

1. **Visit PancakeSwap:** Go to the PancakeSwap website: [https://pancakeswap.finance/] (https://pancakeswap.finance/).
2. **Connect Wallet:** Click on "Connect" in the top-right corner and connect your wallet.

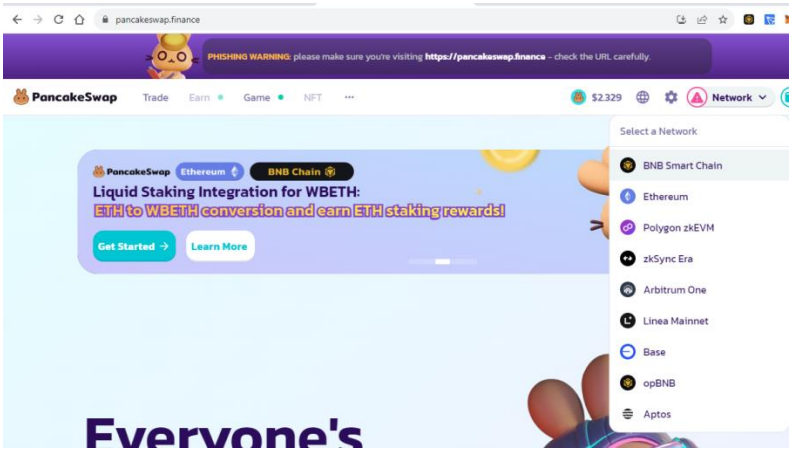

Fig. 1. Connecting Pancake to BNB smart chain

3. **Navigate to "Trade" -> "Liquidity":** Click on "Trade" in the top menu and then select "Liquidity."

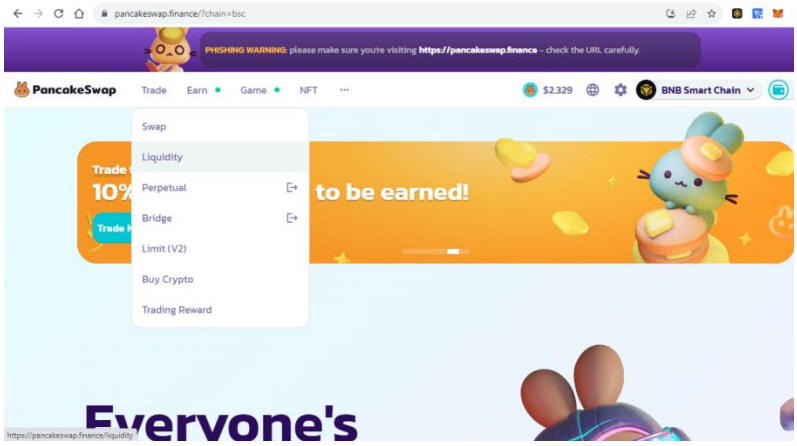

Fig. 2. Switching to Liquidity pool option in Pancake swap

Scientific Journal of Metaverse and Blockchain Technologies
Volume 1 | Issue 1 | Jul - Dec 2023
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4. **Add Liquidity:** Click on the "Add Liquidity" tab.

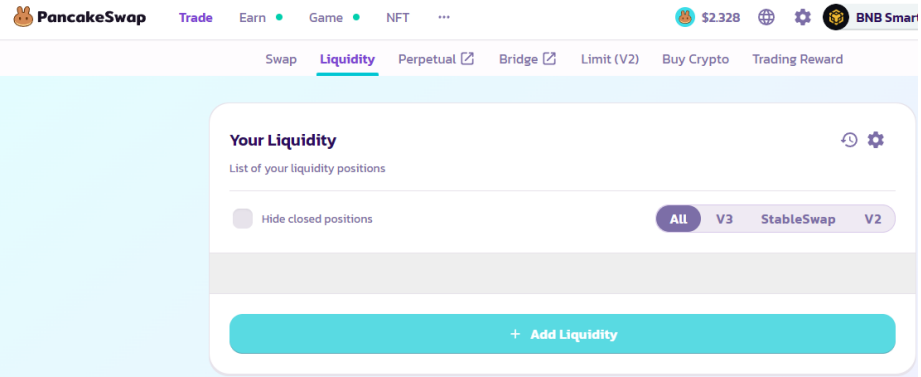

Fig. 3. Liquidity Pool option in Pancake

5. **Token Selection:** In this research MDOGE token has been taken in consideration for liquidity pooling. This token is MDOGE with supply of 10,000. MetaNFT the world famous NFT brand is the issuer of this token.

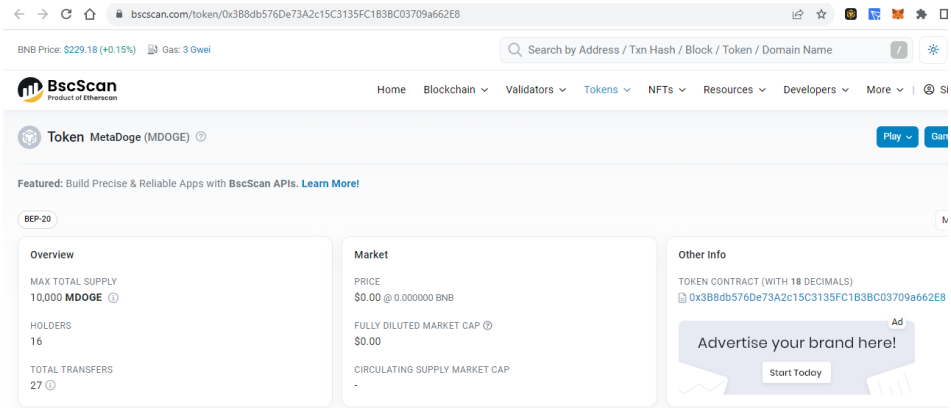

Fig. 4. MDOGE token at BscScan

Copy the token contract from Bsc scan and paste in select a token option to import contract.

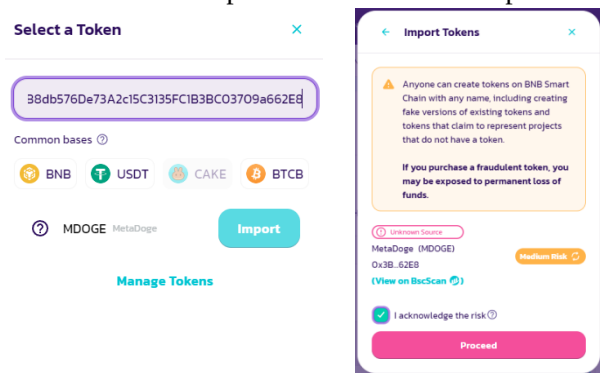

Fig. 5. Token selection and importing by adding contract address

6. **Approve Tokens:** If this is first time adding liquidity for a particular token, you may need to approve PancakeSwap to spend your tokens. Click the "Approve" button and confirm the transaction.

Volume 1 | Issue 1 | Jul - Dec 2023
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7. **Add Liquidity:** Once tokens are approved, enter the amount of liquidity you want to provide for each token. The website will automatically calculate the equivalent value in the other token.

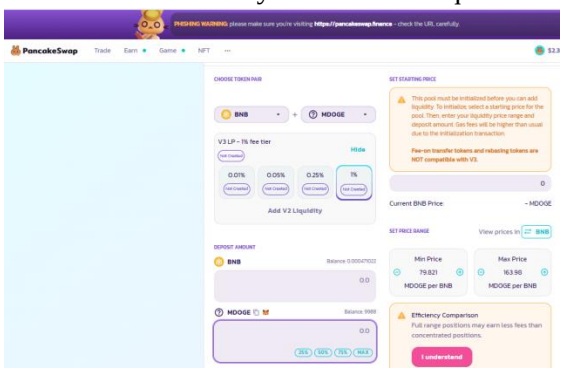

Fig. 6. Liquidity pool creation for BNB-MDOGE

8. **Confirm:** Click on "Supply" and confirm the transaction in your wallet. There will be a gas fee associated with this transaction.
9. **Transaction Confirmation:** Wait for the transaction to be confirmed on the Binance Smart Chain.
10. **Liquidity Pool Created:** After the transaction is successful, you have now added liquidity to the selected token pair, and you will receive liquidity provider (LP) tokens representing your share in the pool.

Now, you're a liquidity provider on PancakeSwap, and you will earn a portion of the trading fees for the token pair you provided liquidity for. Keep in mind that impermanent loss is a risk associated with liquidity provision, so make sure you understand the risks involved.

4.2 Liquidity pool creation in Icecream Swap

The process of liquidity pool creation in Icecream Swap is almost same as Pancake swap. Here in this section liquidity pool creation for 9NFTMANIA token 9NM has been elaborated.

Step 1: Open icecreamswap.com

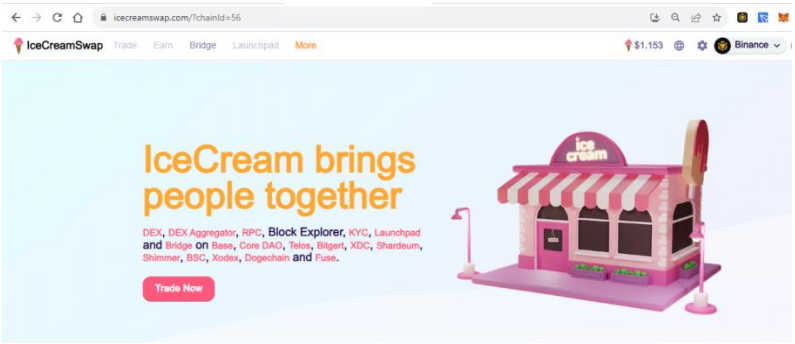

Fig. 7. Icecreamswap.com

Scientific Journal of Metaverse and Blockchain Technologies
Volume 1 | Issue 1 | Jul - Dec 2023
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Step 2: Select the liquidity option in trade

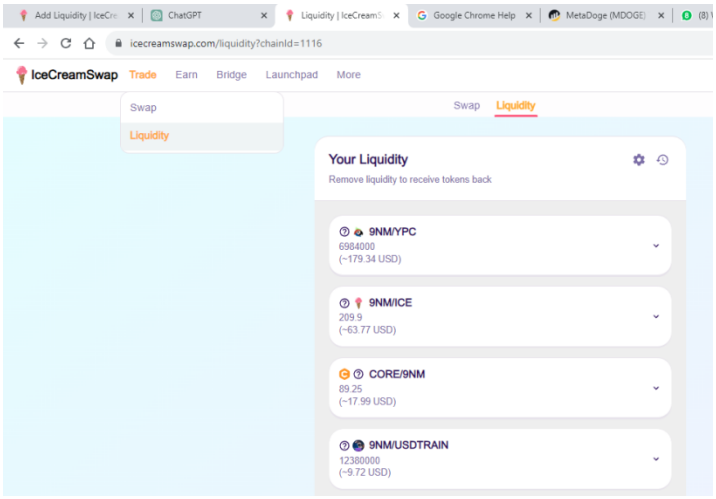
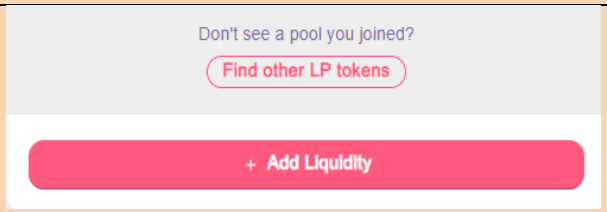
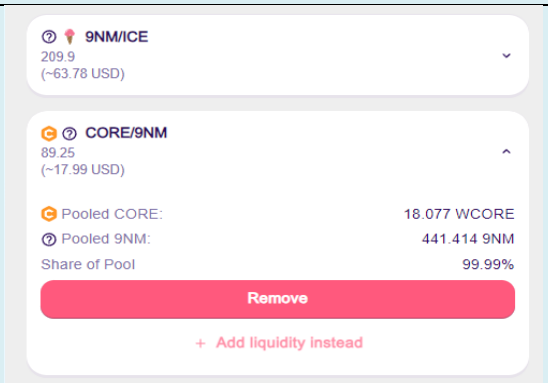
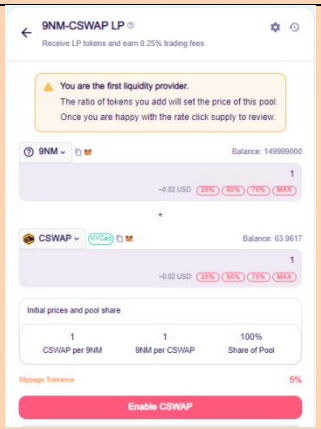
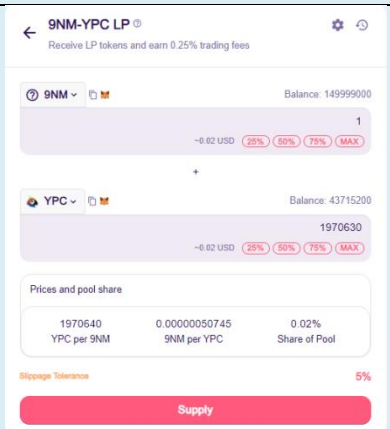


Fig. 8. Liquidity option in icecreamswap

Step 3: Add Liquidity

If Liquidity is not already added then click on Add liquidity button otherwise select existing liquidity and click on Add liquidity instead.

Table 2. Add Liquidity in Fresh Liquidity Pool and Existing Liquidity Pool

Adding New Liquidity to Fresh Liquidity Pool	Adding Liquidity to Existing Liquidity Pool
	
There is need to set quantity manually for both scripts	After setting value of one another is automatically updated according to previously given value
	
After enabling script supply is made	Supply is made

Volume 1 | Issue 1 | Jul - Dec 2023
DOI: https://doi.org/10.36676/sjmbt.v1i1.02

[5] Need of research

Incentivizing liquidity providers is another critical aspect of stabilizing token value. Users who contribute assets to liquidity pools receive LP tokens, representing their share of the pool. These liquidity providers are motivated by the opportunity to earn transaction fees and additional incentives. When the token's value deviates from its peg, liquidity providers are incentivized to rebalance the pool by swapping assets. This active participation helps to counteract price deviations and contributes to the stability of the token. Moreover, some stablecoin systems employ algorithmic adjustments linked to liquidity pools. These algorithms can dynamically alter parameters such as interest rates, issue or burn tokens, and adjust the pool's composition based on market conditions. The integration of algorithms with liquidity pools enhances the system's ability to autonomously maintain stability, making real-time adjustments to counteract price fluctuations.

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