soken

# SMART CONTRACT SECURITY AUDIT

Koji

July, 2021

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# Disclaimer

This is a comprehensive report based on our automated and manual examination of cybersecurity vulnerabilities and framework flaws. We took into consideration smart contract based algorithms, as well. Reading the full analysis report is essential to build your understanding of project's security level. It is crucial to take note, though we have done our best to perform this analysis and report, that you should not rely on the our research and cannot claim what it states or how we created it. Before making any judgments, you have to conduct your own independent research. We will discuss this in more depth in the following disclaimer - please read it fully.

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Security analysis is based only on the smart contracts. No applications or operations were reviewed for security. No product code has been reviewed.

# Procedure

## Our analysis contains following steps:

1. Project Analysis;

2. Manual analysis of smart contracts:
- Deploying smart contracts on any of the network(Ropsten/Rinkeby) using Remix IDE
- Hashes of all transaction will be recorded
- Behaviour of functions and gas consumption is noted, as well.

3. Unit Testing:
- Smart contract functions will be unit tested on multiple parameters and under multiple conditions to ensure that all paths of functions are functioning as intended.
- In this phase intended behaviour of smart contract is verified.
- In this phase, we would also ensure that smart contract functions are not consuming unnecessary gas.
- Gas limits of functions will be verified in this stage.

4. Automated Testing:
- Mythril
- Oyente
- Manticore
- Solgraph

# Terminology

**We categorize the finding into 4 categories based on their vulnerability:**

- Low-severity issue — less important, must be analyzed
- Medium-severity issue — important, needs to be analyzed and fixed
- High-severity issue —important, might cause vulnerabilities, must be analyzed and fixed
- Critical-severity issue —serious bug causes, must be analyzed and fixed.

# Limitations

The security audit of Smart Contract cannot cover all vulnerabilities. Even if no vulnerabilities are detected in the audit, there is no guarantee that future smart contracts are safe. Smart contracts are in most cases safeguarded against specific sorts of attacks. In order to find as many flaws as possible, we carried out a comprehensive smart contract audit. Audit is a document that is not legally binding and guarantees nothing.

# Token Contract Details for 21.06.2021

Contract Name: **Koji**

Deployer address: **0x1c8266a4369af6d80df2659ba47b3c98f35cb8be**

Total Supply: **1,000,000,000,000**

Token Tracker: **KOJ**

Decimals: **18**

Token holders: **3981**

Transactions count: **13,378**

Top 100 holders dominance: **78.96%**

Contract deployer address:
**0x1c8266a4369af6d80df2659ba47b3c98f35cb8be**

# Audit Details

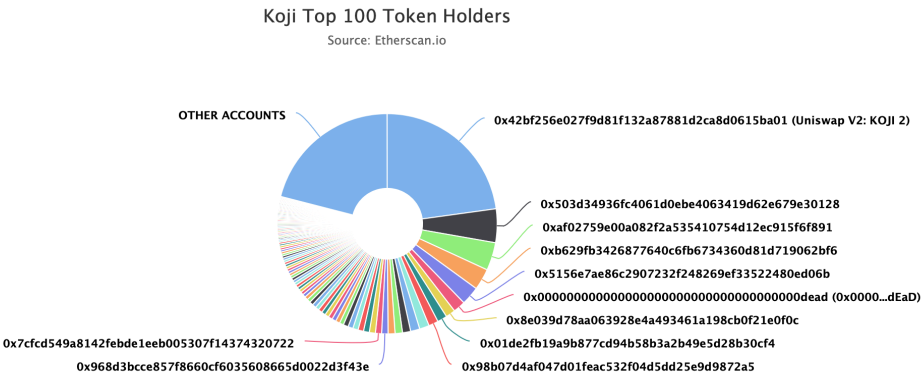
Project Name: **Koji**

Language: **Solidity**

Blockchain: **Ethereum**

Project Website: **koji.earth**

# Koji Token Distribution




# Koji Top 10 Holders

| Rank | Address | Quantity (Token) | Percentage |
|---|---|---|---|
| 1 | Uniswap V2: KOJI 2 | 229,787,274,673.51573949498094589 | 22.9787% |
| 2 | 0x503d34936fc4061d0ebe4063419d62e679e30128 | 49,431,872,427.983539094650205762 | 4.9432% |
| 3 | 0xaf02759e00a082f2a535410754d12ec915f6f891 | 41,170,998,298.421583063037457918 | 4.1171% |
| 4 | 0xb629fb3426877640c6fb6734360d81d719062bf6 | 31,357,143,345.303493687536689624 | 3.1357% |
| 5 | 0x5156e7ae86c2907232f248269ef33522480ed06b | 27,217,862,572.016460905349794238 | 2.7218% |
| 6 | 0x0000...dEaD | 17,910,079,815.582900845054700116 | 1.7910% |
| 7 | 0x8e039d78aa063928e4a493461a198cb0f21e0f0c | 14,247,430,085.442946925013569336 | 1.4247% |
| 8 | 0x01de2fb19a9b877cd94b58b3a2b49e5d28b30cf4 | 14,242,709,351.493900379904083337 | 1.4243% |
| 9 | 0x98b07d4af047d01feac532f04d5dd25e9d9872a5 | 14,241,380,400.093279532713370562 | 1.4241% |
| 10 | 0x520aa93968396fc22de3f49038c1e9f6b4a026e0 | 14,235,518,885.397538931935646045 | 1.4236% |

# Contract Function Details

+ Context.sol
- [Int] _msgSender
- [Int] _msgData

+ IERC20.sol
- [Ext] transfer #
- [Ext] allowance #
- [Ext] approve
- [Ext] transferFrom #
- [Ext] totalSupply
- [Ext] balanceOf

+ [Lib] SafeMath
- [Int] add
- [Int] sub
- [Int] sub
- [Int] mul
- [Int] div
- [Int] div
- [Int] mod
- [Int] mod

+ [Lib] Address.sol
- [Int] isContract
- [Int] sendValue #
- [Int] functionCall #
- [Int] functionCall #
- [Int] functionCallWithValue #
- [Int] functionCallWithValue #
- [Int] functionStaticCall #
- [Int] functionStaticCall #
- [Int] _verifyCallResult #

+ Ownable.sol (Context)
- [Pub] <Constructor> #
- [Pub] owner
- [Pub] onlyOwner
- [Pub] renounceOwnership #
    - modifiers: onlyOwner
- [Pub] transferOwnership #
    - modifiers: onlyOwner

+ Kojitoken.sol

- [Ext] name
- [Ext] symbol
- [Ext] decimals
- [Ext] totalSupply
- [Pub] balanceOf
- [Pub] allowance
- [Pub] approve #
- [Pub] transfer #
- [Pub] transferFrom #
- [Pub] increaseAllowance
- [Pub] decreaseAllowance
- [Pub] isExcludedFromRewards
- [Pub] isExcludedFromFees
- [Pub] totalFees
- [Pub] totalHolderFees
- [Pub] totalCharityFees
- [Pub] totalBurnFees
- [Pub] totalAdminFees
- [Pub] distribute
- [Pub] excludeFromFees
- [Pub] includeInFees
- [Pub] excludeFromRewards
- [Pub] includeInRewards
- [Pub] rewardsFromToken
- [Pub] tokenWithRewards

- [Prv] _approve
- [Prv] _transfer
- [Prv] _transferWithRewards
- [Prv] _transferWithRecipientRewards
- [Prv] _transferWithoutSenderRewards
- [Prv] _transferWithoutRewards
- [Prv] _updateHolderFee
- [Prv] _updateCharityFee
- [Prv] _updateBurnFee
- [Prv] _updateAdminFee
- [Prv] _getValues
- [Prv] _getActualValues
- [Prv] _getRewardValues
- [Prv] _getRewardsRate
- [Prv] _getCurrentSupply
- [Prv] _getFee
- [Prv] _getHolderFee

- [Prv] _getCharityFee
- [Prv] _getBurnFee
- [Prv] _getAdminFee

- [Ext] setTaxPercentage
- [Ext] setTaxAllocations
- [Ext] setCharityAddress
- [Ext] setBurnAddress
- [Ext] setAdminAddress

($) = payable function
# = non-constant function

# Vulnerabilities checking

| Issue Description | Checking Status |
|---|---|
| Compiler Errors | Completed |
| Delays in Data Delivery | Completed |
| Re-entrancy | Completed |
| Transaction-Ordering Dependence | Completed |
| Timestamp Dependence | Completed |
| Shadowing State Variables | Completed |
| DoS with Failed Call | Completed |
| DoS with Block Gas Limit | Low-issues |
| Outdated Complier Version | Completed |
| Assert Violation | Completed |
| Use of Deprecated Solidity Functions | Completed |
| Integer Overflow and Underflow | Completed |
| Function Default Visibility | Completed |
| Malicious Event Log | Completed |
| Math Accuracy | Completed |
| Design Logic | Completed |
| Fallback Function Security | Completed |
| Cross-function Race Conditions | Completed |
| Safe Zeppelin Module | Completed |

# Security Issues

## 1) Owner Privileges over tax allocations:

Owner can change tax allocations using the function setTaxAllocations.

```
function setTaxAllocations(
    uint256 _holderTaxAlloc,
    uint256 _charityTaxAlloc,
    uint256 _burnTaxAlloc,
    uint256 _adminTaxAlloc
) external onlyOwner {
    totalTaxAlloc = _holderTaxAlloc.add(_charityTaxAlloc).add(_burnTaxAlloc).add(_adminTaxAlloc);
```

## 2) Out of Gas issue:

```
function includeInRewards(address _account) public onlyOwner() {
    require(excludedFromRewards[_account], "Account is already included in rewards");

    for (uint256 i = 0; i < rewardExcluded.length; i++) {
        if (rewardExcluded[i] == _account) {
            rewardExcluded[i] = rewardExcluded[rewardExcluded.length - 1];
            actual[_account] = 0;
            excludedFromRewards[_account] = false;
            rewardExcluded.pop();
            break;
        }
    }
}
```

The function includeInRewards() uses the loop to find and remove addresses from the _excluded list. Function will be aborted with OUT_OF_GAS exception if there will be a long excluded addresses list.

## 3) Out of Gas issue:

```
function _getCurrentSupply() private view returns (uint256, uint256) {
    uint256 rewardsSupply = rewardsTotal;
    uint256 actualSupply = ACTUAL_TOTAL;

    for (uint256 i = 0; i < rewardExcluded.length; i++) {
        if (rewards[rewardExcluded[i]] > rewardsSupply || actual[rewardExcluded[i]] > actualSupply) {
            return (rewardsTotal, ACTUAL_TOTAL);
        }

        rewardsSupply = rewardsSupply.sub(rewards[rewardExcluded[i]]);
        actualSupply = actualSupply.sub(actual[rewardExcluded[i]]);
    }

    if (rewardsSupply < rewardsTotal.div(ACTUAL_TOTAL)) {
        return (rewardsTotal, ACTUAL_TOTAL);
    }
```

The function _getCurrentSupply also uses the loop for evaluating total supply. It also could be aborted with OUT_OF_GAS exception if there will be a long excluded addresses list.

**Recommendation:**

Use EnumerableSet instead of array or do not use long arrays.

# Conclusion

Low-severity issues exist within smart contracts. Smart contracts are free from any critical or high-severity issues.

NOTE: Please check the disclaimer above and note, that audit makes no statements or warranties on business model, investment attractiveness or code sustainability.