



## Abstract

*This is an attempt to provide a proof-of-concept for a platform built on the blockchain that allows better incentives alignment and food distribution to those in need for Hong Kong.*

*The philosophy is to provide a simple-to-use and non-abusable way for all parties to be incentivised to interact with each other, with the goal of reducing food waste.*

*It is our hope that such a platform can remove the overhead of intermediaries and provide a new and efficient ecosystem in tackling social issues.*

## Food Takers

### Step 1

Food takers may comprise of communities who are currently taking some form of welfare pension from the local government (e.g. poverty-stricken elderly's and children). Registering requires providing only their HKID's first 7 numeric digits and secret 4-digit PIN.

### How this works:

The registering of food takers can be auto-populated (i.e. mapping of current welfare pension participants HKID) during initiation of the smart contract. This, however, requires the government to generate and send out the secret PINs in a centralized manner and hence may not be the optimal solution. The better option may be for communities to simply visit their local government branches and register in person.

### Step 3

Food takers receive food tokens regularly from the local government, which should be in proportion to their current welfare pensions.

### How this works:

The food tokens balances should be readily-available for public viewing by the individual food takers via inputting their HKID and secret PIN onto the frontend UI of the DApp. A HKID and secret PIN check would be carried out from the smart contract to ensure balances' access are given only to the persons who have the correct PIN and HKID mapping. Finally, a simple public website or desktop setup at a local government branch should suffice to carry out these actions.

### Step 4

Food takers may physically visit their food vendor of choice, and simply present their HKID, together with their secret PIN for redemption of food items. The used food token would then be deducted from the food taker's balance on the blockchain.

### How this works:

The government may issue guidance on the exchange rates of food items against the food token unit (e.g. 1 unit can redeem a HK\$20 - HK\$25 food item). We, however, believe that the value of exchange should best be left with the collective decisions of food takers and vendors (i.e. free market). This is the optimal way as the intrinsic value may be different for each taker (e.g. a hungry child may prefer redeeming a lesser-cost item such as "a bunch of bananas" vs. a higher-cost item "a cup of fine coffee"). A cooldown period of 12 hours with a capped usage of 1 food token unit are also implemented in the smart contract to prevent abuse of a single redemption with a very large number of food tokens.

### Footnote:

Step 0, 2, and 5 are irrelevant and omitted for this party.

## Government

### Step 0

The government would initialise and serve as the owner for the smart contract onto the blockchain.

### How this works:

A certain amount of ETH (i.e. the ether currency is used for withdrawal) can be deposited into the smart contract address during initialisation phase. The owner may also choose to invoke the deposit() function later on to top-up more ETH.

### Step 1

Please see Food Takers - Step 1.

### How this works:

The only requirement is for the government to provide access to the frontend UI of the DApp, and inputting the food taker's HKID numeric digits and secret PIN (inputted by the food taker). The secret PIN is then encrypted via a Keccak256 hash, and finally invoking the registerFoodTaker() function to store the food taker's ID and hashed PIN onto the blockchain. A duplicate HKID check would also be carried out from the smart contract to prevent abuse of registering multiple times with the same HKID.

### Step 3

Food takers receive food tokens regularly from the local government, which should be in proportion with their current-receiving welfare pensions.

### How this works:

Scaling issues may occur for distributing tokens for a large community. This is currently solved via an automated topping of food tokens for all registered takers on a monthly basis, of which an additional function setTopupFreqAndUnit() can be invoked only by the smart contract owner, i.e. government, for altering the frequency and food token units to top-up.

### Footnote:

Step 2, 4, and 5 are irrelevant and omitted for this party.

## Food Vendors

### Step 2

Food vendors may comprise of any parties that can supply any form of foods with a valid Business Registration License (BR).

### How this works:

The registering of food vendors can be auto-populated (i.e. mapping of whitelisted and participating vendors) during initiation of the smart contract. This, however, in our opinion, is an inferior way in getting mass participation from vendors as this involves a centralised entity for maintaining and operating with the whitelist. We think that a public permissionless registration process (i.e. vendors directly can register onto the blockchain via their BR numbers) would be more efficient and expose a much wider choice of food items for food takers. Since the government does not directly issue any forms of payments or ETH to the vendors, the financial incentives to cheat using a fake BR or poor-quality food items would ultimately be determined by the free market forces between the takers and vendors.

### Step 4

Food vendors who have successfully provided the food item, and with the consent of the food taker, would then be able to receive the used food token and see the addition on the blockchain for their food vendor's balance.

### How this works:

The only requirement is for the food vendor to provide access to the frontend UI of the DApp, and allow inputting of the food taker HKID's numeric digits and secret PIN. The secret PIN is then encrypted via a Keccak256 hash in the frontend (to prevent leaking via broadcasting to the blockchain network), and finally invoking the useFoodToken() function to prove that the food token has been used with that vendor, as well as preventing abuse from vendors in charging food takers' tokens without their consent.

### Step 5

Food vendors may at any time withdraw ETH to their vendor-binded wallet address, which serves as the financial incentives in rewarding vendors with tokens that can be HODL or exchanged back to fiat (i.e. HKD) vs. the operation costs of throwing edible food away.

### How this works:

ETH withdrawals are only allowed for food vendors. The ETH withdrawal amounts come directly from the injected ETH funds that is binded with the smart contract (i.e. the government has a fiduciary duty to regularly monitor and inject funds into the smart contract in order to keep the platform and ecosystem running). Also, the amount of ETH to payout is determined by a specific exchange rate within the smart contract (e.g. 1 food token = 0.01 ETH). Ultimately, the free market forces should be able to proxy the right amount of food items redeemable by tokens, and thus determine the optimal outcome between the food takers and food vendors.

### Footnote:

Step 0, 1 and 3 are irrelevant and omitted for this party.