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Application of blockchain-based traceability platform for cold chain food

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Foreword

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This document was prepared by Technical Committee ISO/TC 154—“Processes, data elements and documents in commerce, industry and administration”, WG7 “Digital business”.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

With the ~~outbreak of the~~ epidemic ~~outbreak~~ since 2019, the ~~safety of~~ cold chain food ~~safety~~ is drawing more and more attention. Due to that fact that the coronavirus (COVID-19) is cold-resistant, ~~it has there~~ ~~are~~ high risks that the cold chain food ~~is be~~ infected or contaminated by the coronavirus during the circulation of the cold chain link, which ~~may can~~ further exacerbate people's panic. Therefore, how to guarantee the ~~cold chain food~~ safety ~~of cold chain food~~ is a primary ~~and urgent~~ issue expected to be resolved ~~urgently~~.

~~The Traceability in the~~ cold chain ~~for~~ food ~~traceability~~ is ~~an effective way to ensure~~ ~~essential in ensuring~~ food safety, ~~—, through~~ which ~~realizes~~ continuous tracking of the whole lifecycle ~~is realized~~, including cold chain food production, storage, purchase, sales, and transportation, etc. In this ~~technical report~~ ~~document~~, a blockchain-based traceability platform is proposed, which links the required data series throughout the circulation of the cold chain food. By applying such ~~a~~ platform, ~~the~~ following benefits are expected:

~~Anti— anti~~-counterfeiting: on this platform, each batch/lot of cold chain food is identified by a unique code, which can enable identification of each distinct batch of cold chain food.;

~~Trusted— trusted~~ lifecycle tracking: the information throughout the circulation of the cold chain food is written into the blockchain, which is tamper-~~resistant~~.; and identity cannot be denied.;

~~Supply— supply~~ chain collaboration: the traceability data are shared among the supply chain by leveraging distribution databases/records/ledgers to achieve unified credentials and reduce logistics costs.;

~~Effective— effective~~ regulation: the platform provides credentials for regulatory agencies, and the most important information about cold chain food safety for consumers.)

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Application of blockchain-based traceability platform for cold chain food

1 Scope

This ~~technical report (TR) document~~ addresses a blockchain-based ~~cold chain food~~ traceability platform ~~for cold chain food~~ which realizes continuous and effective tracking of the cold chain food. ~~Following The following~~ aspects are included:

~~It— it~~ explores issues and considerations for cold chain food traceability, especially ~~underduring the~~ epidemic outbreak~~;~~

~~It— it~~ describes scenarios and stakeholders for effective tracking of the cold chain food using the platform~~;~~

~~It— it~~ describes data elements and processes for the platform~~;~~

~~It— it~~ presents the platform capabilities such as data tamper resistance, sustainability~~, etc.;~~

~~It— it~~ gives relevant use cases based on the platform.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

~~For the purposes of this document, the following terms and definitions apply.~~

~~ISO and IEC maintain terminology databases for use in standardization at the following addresses:~~

~~— ISO Online browsing platform: available at <https://www.iso.org/obp>~~

~~— IEC Electropedia: available at <https://www.electropedia.org/>~~

3.1

~~Cold~~ cold chain

temperature-controlled supply chain.

Note 1 to entry: An uninterrupted series of storage and distribution activities which maintain a given temperature range. It is used to help extend and ensure the shelf life of products such as fresh agricultural produce, seafood, frozen food, photographic film, chemicals, and pharmaceutical drugs.

[SOURCE: ISO 26683-3:2019(en), 3.7]

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at

4 — ~~ISO Online browsing platform: available at~~ Overview

~~Cold chain food safety has drawn increasing attention under To ensure the epidemic outbreak. Because the new coronavirus (COVID-19) is cold-resistant, it has high risks that the fresh food is being contaminated by COVID-19 in the cold chain link, which will further exacerbate people's panic.~~

~~Cold chain food traceability is an effective way to ensure food safety, which realizes continuous tracking of the whole lifecycle including production, storage, purchase, sales and transportation, etc. However cold train for food, stakeholders encounter many problems in the current processes, including but not limited to: the following.~~

— ~~Data integrity cannot be guaranteed for traceability of cold chain food among a large number of parties on the supply chain, such as massive number of document flow, inefficient manual verification, etc.~~

— ~~Enterprises are concerned about the risk of core business data leakage when traceability data isare made available.~~

— ~~There is a lack of long-term food safety regulatory mechanisms.~~

To solve these problems, a blockchain-based traceability platform is proposed for cold chain food in this document, which aims to link all trusted data series of food, people, places during the whole lifecycle of cold chain food circulation and uses international standardized data elements and/or processes for their traceability. ~~In this proposed platform, following functions can be achieved:~~

— ~~Anti-counterfeiting: each batch/lot of cold chain food is identified by a unique code, which can enable identification of each distinct batch of cold chain food.~~

— ~~Trusted lifecycle tracking: the information throughout the circulation of cold chain food is written into the blockchain, which is tamper resistant, and identity cannot be denied.~~

— ~~Supply chain collaboration: the traceability data is shared among supply chain by leveraging distribution databases/records/ledgers to achieve unified credentials and reduce logistics costs.~~

— ~~Effective regulation: the platform provides credentials for regulatory agencies, and the most important information about cold chain food safety for consumers.~~

This ~~TRdocument~~ assumes that the traceability platform uses a consortium blockchain. Clause 5 describes the traceability process and gives the minimum required data elements for data sharing and data transfer. Clause 6 gives the whole platform architecture of blockchain systems which are provided by stakeholders. At last, Clause 7 summarizes the benefits by utilizing such a platform.

5 Traceability process and data elements for cold chain system

5.1 Stakeholders

The main stakeholders involved in the traceability process of the cold chain system include:

- a) traceability platform providers;
- b) source warehouses/suppliers;
- c) subordinate warehouses;
- d) logistics providers;
- e) retailers & distributors;
- f) catering enterprises;
- g) government regulators;
- h) inspectors;
- i) consumers.

5.2 Traceability process at key links

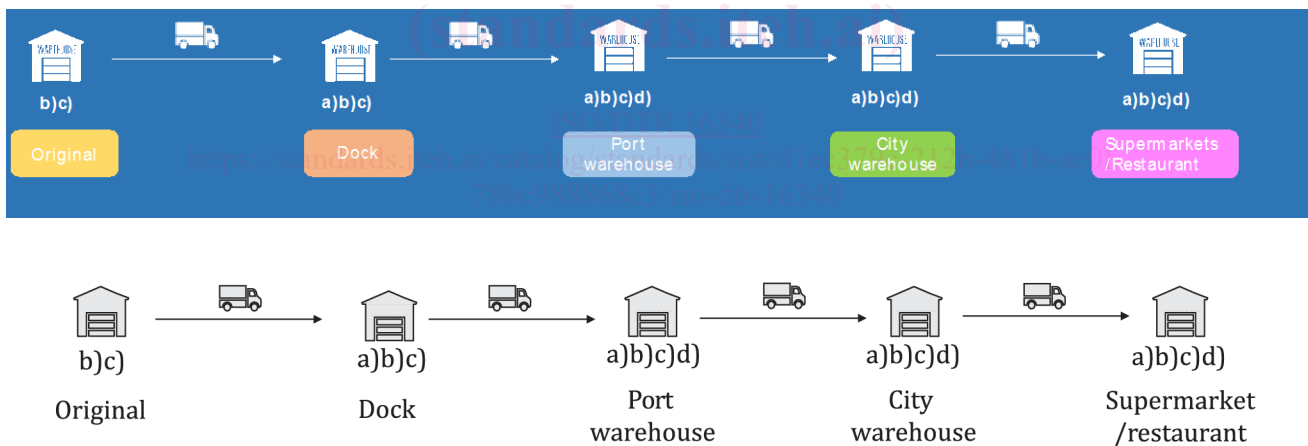


Figure 1 — The key links for cold chain system

The data generated at the key links throughout cold chain food circulation, e.g., for example, original manufacturer, dock, port warehouse, city warehouse, supermarkets, until cold chain food arrives at consumers, will beare encrypted and identified via a unique traceability code to form a traceability record/data/block, and will beare stored and connected into a blockchain. At each of the key links, the cold chain food traceability process can be divided into 4 stages: See Figure 1.

a) Cold chain food receipt process

— The logistic provider delivers the customs-related documents, such as customs declaration form, inspection and quarantine certificate, disinfection treatment report, etc., to the documenter.