



The Practical Guide for Time Release Study

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1 Overview

Time Release Study (hereinafter shortened as TRS), is an important trade facilitation means advocated by the World Customs Organization. The Trade Facilitation Agreement of the WTO also explicitly requires that member countries regularly and consistently calculate and publish the average release time of their goods, therefore, many developed countries, and even some developing countries, have initiated relevant research projects.

Measurement of the time required for the release of goods has become a very critical component of trade facilitation-related research, and is of great importance to the improvement of import/export processes and port release efficiency. However, to date, no institution or individual has produced a sufficiently detailed report on specific methods and procedures for these research projects. The *Guide to Measure the Time Required for the Release of Goods* by the World Customs Organization offers framework-based and instructional recommendations. However, research methods vary across countries and no document elaborating on implementation procedures has been produced yet.

This Guide intends to offer practical and broadly applicable guidance on the TRS procedures and specific measurement methods, and lay the groundwork for the vertical (time axis) and horizontal (geographical axis) comparisons of TRS.

Generally speaking, a complete TRS needs to perform the following procedures:



Figure 1.1 TRS Flow Chart

(* refers to procedures and operations that take place when a sample survey is conducted)

A TRS does not have to go through all the aforementioned procedures, and what procedures need to be completed is dependent upon the current status and consolidation of a country's customs, inspection and quarantine information systems. If an advanced single window exists, similar to Korea's UNIPASS, where a relevant time nodes can be directly retrieved, then no sample survey is necessary.

2 Determination of the Scope of Goods

The first step of a TRS is to determine the scope of goods under study, because there are substantial differences in release procedures for different goods. The scope of goods determines the transportation method, loading type, and applicable trade policies, which dictate the appropriate release procedures.

In the majority of countries, the completion of a whole sample analysis is often hindered by technological limitations or historical reasons. Therefore, a sample survey may be the primary choice of measurement. However, effective sampling is conducted on a random basis, hence the need to define the scope of goods under study in order to exclude less relevant research targets and utilize limited resources to focus the research on the most common types of goods.

2.1 Goods to be Excluded

The first step of defining the scope of goods is to exclude some import/export goods, which may involve some special scenarios. Despite making up a small amount of total trade, such goods have a pronounced impact on the time required for release. Given that countries vary in their approaches to managing goods declaration and release, the following instructions are for the exclusion of export/import goods under common conditions:

① Import/export goods being investigated for smuggling

Once a consignment of goods enters smuggling investigation procedures, even if it is eventually released, the entire release process will consume a considerably long period of time. If the sample size is not large enough, the final statistical results are bound to be affected.

② Disaster-relief goods

Considering that disaster-relief goods are given priority for release, the entire release process will be significantly shorter than that in an otherwise regular scenario.

③ Trans-customs goods

When import/export customs transit goods are transported from the point of entry to the place of designation (or, alternatively, from the place of departure to the point of exit), time is inevitably consumed. Even if customs declaration and transit procedures conducted in advance may avert excessive time consumption, the transportation time still affects the sequence of post-entry (or pre-exit) operations.

④ Trans-boundary, transferring goods or through cargo

Generally speaking, the ship manifests used for the declaration procedures of these three types of goods should be submitted to customs, and after such goods enter the border, they may be loaded to a different means of transport, transported within the border, or processed through other operations, but eventually, they will be transported out of the border. TRS does not take such goods into account.

2.2 Goods to be Studied Separately

Apart from the goods mentioned in 2.1 that need to be excluded, separate studies may need to be conducted in case of either of the following two scenarios:

① Import/export goods with some special declaration procedures

Express-delivery goods, pipeline-transported goods, goods with centralized declaration, etc. involve special declaration procedures that require more time for release, and generally should thus be excluded from the sample. That is not to say it is meaningless to evaluate the release time of such goods, but that the scope of import/export goods in question in this paper ought to have the most common and relatively consistent declaration procedures. Therefore, the import/export goods that involve special declaration procedures may be studied separately.

② Bonded goods

Bonded goods, due to the temporary exemption of taxation, tend to go through simplified declaration procedures, and their customs clearance and release procedures consume less time compared to those of general export/import goods. Therefore, this paper recommends that separate research be conducted on bonded goods to evaluate the relevant ports.

2.3 Different Means of Transport and Loading

Types of transport mainly include maritime, air, truck, and railway transport. Generally speaking, TRS should incorporate all these transport types, however it is important to note that marked differences do exist in the declaration procedures for the import/export goods under each type of transport. If evaluation is to be completed with limited time and resources, trying to account for all types of transportation will lead to significant difficulties. In that case, research should be focused on goods transported by maritime routes or by what are determined to be the two most important types of transport for study.

Regarding forms of loading, particularly forms of loading when the goods are transported by sea, containers and bulk goods may consume vastly different amounts of time for specific procedures despite generally having consistency of overall declaration procedures. For instance, for commodities imported via maritime transport,

the entire process from the arrival of the cargo vessel at the port to the completion of unloading may be extremely time-consuming; in some cases, the unloading of an entire cargo vessel takes up to one or even two weeks. Similar to dealing with different types of transport, the best-case scenario would be to comprehensively study all forms of loading, but a tradeoff exists between comprehensiveness of the study and the efficient use of time and resources. From a global trade perspective, containerized goods are undoubtedly the most common, therefore, this paper recommends choosing containerized goods as a main target of study when conditions are limited.

3 Defining the Time Points during Release

Defining the time points during release of import/export goods is of particular importance, as the measurement of release time is not a simple task, and instead, it requires comparisons of release durations for different time periods and across countries. Only through such vertical and horizontal comparisons can the relevance of this study be established. Such comparisons require comparing the same process (i.e. release of goods) through time periods and across geographical regions. For instance, if the starting point in one statistical analysis is when the vessel reaches the port, whereas another statistical analysis selects the completion of the vessel's unloading as the starting point, then a lack of comparability occurs between these two analyses.

3.1 Time Points during Release of Import Goods

3.1.1 Determination of Starting Point

Depending on specific circumstances, time points can be determined as follows (in the general sequence of occurrence):

- ① Arrival of the vessel at the anchorage (maritime transport)
- ② Arrival of the vessel at the berth (maritime transport)/the plane at the airport (air transport)/the vehicle at the station (land transport)
- ③ Completion of cargo unloading and tallying

For the starting point of the port's release time of imported goods, this paper recommends selecting the time of arrival of the vessel at the berth (maritime transport)/the plane at the airport (air transport)/the vehicle at the station (land transport).

Granted, if the operational capacity of the port needs to be taken into account, then the time when the vessel reaches the anchorage may be chosen as the starting point. However, the period between the arrival of the vessel at the anchorage and at the berth is more relevant to the port's level of efficiency of managing vessels. TRS looks more for the efficiency of handling procedures and clearance of goods, whereas a vessel's movement from anchorage to berth involves objective factors like the port's natural environment. Therefore, strictly speaking, it is more reasonable to use the time when the vessel reaches the berth as the starting point.

Regarding how time points are obtained, the time when the freighter arrives at the berth can be accessed via the port's system. Likewise, the time of arrival of other forms of transport can also be obtained via relevant systems.

3.1.2 Determination of Ending Point

The ending point can be selected from following these time points (in the sequence of occurrence under general circumstances):

- ① Customs issues order of release
- ② Customs clearance and inspection or quarantine are all completed at the place of declaration, and permission is given to enterprises to pick up/dispose goods
- ③ Inspection or quarantine is completed at the destination within the border, and permission is given to enterprises to pick up/ dispose goods

In many countries, after a consignment of goods is released by customs, inspection and quarantine authorities have to inspect (or quarantine) the consignment as per their respective inspection and quarantine standards. Only consignments that have been inspected or quarantined and met certain standards (or met certain standards after being treated in a certain manner) may then be picked up and officially enter the border to be used or sold. However, it is not reasonable to use this time point as the ending point of TRS, because inspection or quarantine locations are not always consistent. Some of these goods, after applying for and acquiring an inspection and quarantine permit and being released by customs, go through the inspection or quarantine procedures within the border. However, transport of such goods from the port of entry to the destination within the border takes time, which shall not constitute a part of the release time. Therefore, considering the above and the research experiences from various countries, this paper recommends the time when customs issue the order of release (or other permits) be chosen as the ending point.

3.1.3 Determination of Other Time Points

If different stages of the release process can be sectioned by each time point, an in-depth study on the factors that influence the release time can also follow this segmentation. However, in practice multiple restrictions make it difficult to acquire these time points from authorities, or the acquisition of these times points may require excessively high inputs and costs. Despite this fact, this guide still recommends sectioning the entire process into at least three stages:

- ① Port operation: Arrival of the vessel at the berth – completion of cargo unloading and tallying;
- ② Preparation for declaration: Arrival of the vessel at the berth/completion of cargo unloading and tallying – completion of declaration entries (accepted by customs);
- ③ Customs clearance: Completion of declaration entries – customs release.

It needs to be noted, however, that the last two of the three stages above do not

necessarily occur only after the previous ones are completed. For instance, in many countries, tallying does not have to be completed before the initiation of work that includes declaration entries and other declaration preparations, and such entries may be completed even prior to the arrival of the vessel at the berth.

If the entire process is divided into three sections, then at least two time points have to be obtained:

- a. Completion of cargo tallying (usually the sending time of tallying report);
- b. Completion of declaration entries (usually the time when the enterprise that declares customs completes the declaration entries as per the requirements, and when customs accepts such declaration).

3.2 Time Points during Release of Exported Goods

This paper recommends setting the starting and ending points as such:

- ① Starting point: the arrival of cargo at the designated customs supervision location;
- ② Ending point: customs release.

The export release process may be sectioned in two parts with the completion of declaration entry as the time point: declaration preparation and customs clearance.

4 Determining the Evaluation System and Sub-items

As stated above, different transportation types, loading types, and trade policies may greatly impact the release time, particularly for imported goods, hence the need to carry out separate studies on goods based on varying conditions. Ultimately, the conclusions produced by such studies need to be consolidated using statistical analysis to arrive at a final evaluation of the release time. This requires the establishment of an evaluation system, where sub-items are set based on transport modes, cargo types, trade modes, etc. of the goods in question. If human and financial resources are sufficient, different work groups with respective professional knowledge can be assigned simultaneously to engage with these sub-items, and finally the conclusions are drawn and then categorized for analysis.

Imaging a database record corresponds to a sequence of goods release procedures, then such a record will include multiple fields: import/export, mode of transport, type of cargo, mode of trade, port of entry (or port of exit), type of operator, etc. The establishment of various levels of the evaluation system requires taking into account the extents of impact these factors have on the release process and the release time. Therefore, if the entire evaluation system is divided into four levels, according to the impact extents of factors to the release process, this paper arrives at the following evaluation system:

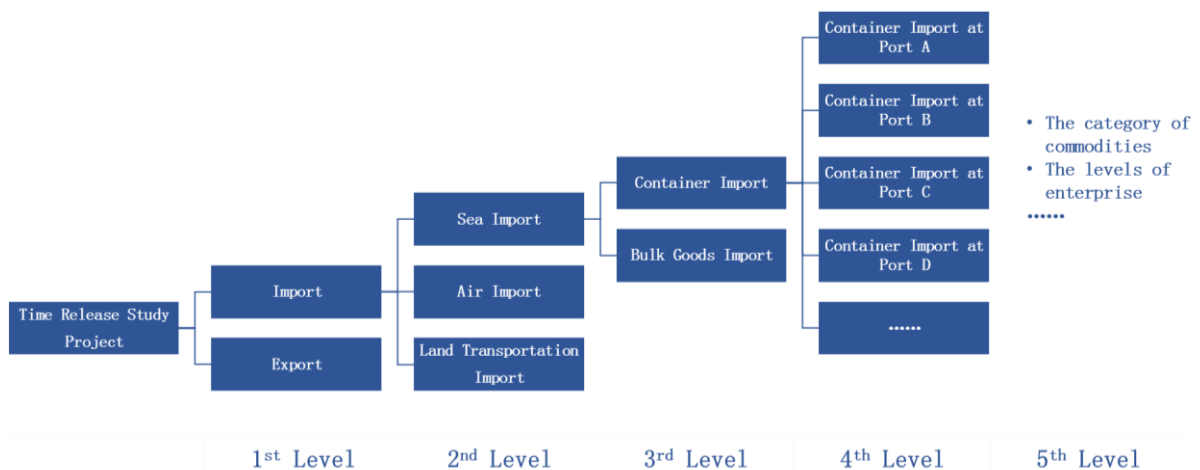


Figure 4.1 Structure of the Evaluation System of a Port's Release Time of Import/Export Goods

Suppose the fourth level of sub-items may be formed via this structure (if the fifth level and above are disregarded), then through backward induction based on a certain method of statistical analysis, the conclusion at the fourth level can lead to that of the third level; repeat this backward induction process, then the final conclusion of the

release time evaluation may be obtained. A few points need to be clarified:

① Selectively giving up certain sub-items is acceptable

As presented previously, with limited time and resources, it is basically infeasible to include all aspects in a TRS. The importance of the study on import evidently outweighs that of the study on export. Import involves more complicated procedures and supervision requirements from Customs and other governmental departments, so there are more room of reduction to the time-consuming of import goods and the study on the release time of import goods is more relevant for the overall improvement of the port's release efficiency. Moreover, not all modes of transport and types of cargo have to be included, and the most common sub-items may be chosen to study and clarified in the final report.

② If a reliable information collection system is not established, a sample survey is necessary for conducting each sub-item to collect enough data of time points.

As of now, the statistical analysis of TRS of most countries is based on sampling, and only a few countries are able to establish independent time points collection systems. Examples include CLIS in Korea, which can roll out real-time and comprehensive statistical collection and analysis on the release time, with a view to evaluating the performance of the port's release process. In addition, given that procedural differences exist among ports, it is important to consider the differences when designing sample survey plans.

5 Defining the Method of Statistical Analysis

Depending on specific circumstances, the following methods of statistical analysis may be chosen:

① Whole sample data analysis

During the process from when a vessel carrying a consignment of goods reaches the anchorage (instead of anchorage, customs supervision location is used in case of export) to when the consignment is eventually released by customs, records will be kept that correspond to the 'time stamps' in the information systems of various authorities and agencies, including the port system, customs system and other competent authorities. Such time records can be exported, or special tools can be developed to capture these time nodes, thereby forming a 'time axis' that encompasses all the steps during the release of goods. The differences between time points can then be analyzed to determine the duration of the corresponding steps, and using these data, further analysis may be conducted. Given that all time points of a consignment of goods can be captured through various systems, a 'time axis' record can be formed for every consignment of goods, and the final database can include all consignments of goods processed over a specific period of time, leading to the 'whole sample' analysis.

② Sample Survey

As the collection of data is restricted by resource, technology and inter-departmental co-ordination, the whole sample analysis is often extremely hard to conduct, so sample survey should be an alternative solution. It collects sample data during several or all stages of the release process indexed by the bill of lading number and the customs declaration number. Next, the data of these samples are recorded and analyzed, thereby arriving at the time used for each stage and the overall time used for the release process at a certain confidence level.

When a sample survey is being conducted, it is usually necessary to locate partners in the business sector, such as customs brokers and freight forwarders, and obtain the records they keep for the time point of each step (e.g. arrival of the vessel at the port, exchange for delivery order, inspection and quarantine declaration entry, customs declaration entry, tax payment, etc.) via a designed recording form during the operation of their routine businesses, so as to form the 'time axis' record for each sample, with which further analysis can be conducted.

③ Combination of whole sample data and sample survey

For research entities, the types of statistical methods that can be used are

restricted by the limited resources they have at their disposal. Given that customs do not have administrative jurisdiction over regulators of other stages of the release process (e.g. inspection and quarantine authorities and port administrators), customs may encounter difficulties when requesting time point data from these authorities other than the customs itself. If customs cannot engage in sufficient co-operation with other authorities, it will be difficult to collect and analyze the whole sample data from all the stages.

In scenarios where the authority that presides over the research has limited power and jurisdiction, the authority may combine a whole sample data analysis with a sample survey. If customs are in charge of TRS, they may use whole sample data in the customs information system for the calculation of time used on customs clearance; whereas for the pre-declaration stage (the period from the vessel reaching the port to the bill of lading being exchanged for the delivery order) and the inspection and quarantine declaration stage, a sample survey may be adopted. The average time used for each stage can then be calculated to determine the final evaluation.

6 Choice of Ports, Determination of Sample Size and Sample Distribution

6.1 Choice of Ports

If a sample survey is used, or sampling is used for specific stages of the release process, then apart from the scope of goods and time nodes under study, there are a few other problems that need to be addressed prior to survey implementation and statistical analysis: how to choose ports for sampling, how to determine the sample size, and how the sample is distributed among the ports, together with consideration of other relevant factors.

It is evidently not a realistic option for countries with a large number of ports to sample all the ports, hence the need to choose the ports to sample by first evaluating the determined scope of goods, type(s) of transport and type(s) of trade:

- ① Ranking ports by their proportion of consignments, choose ports where the sampled good reaches a designated cumulative proportion of declared consignments;
- ② Choose ports where the sampled good reaches a designated cumulative proportion of container quantity/weight/volume of goods;
- ③ Choose ports where the sampled good reaches a designated cumulative proportion of total value of goods.

Taking ① above as an example, suppose the scope of sampled goods has been determined to be containerized imported goods. The ports' proportion and cumulative proportion of consignments thereof in a given year are as follows:

Table 6.1

| Number | Port | Proportion of Consignments % | Cumulative Proportion of Consignments % |
|--------|--------|------------------------------|---|
| 0 | Total | 100.0 | 100.0 |
| 1 | Port A | 29.3 | 29.3 |
| 2 | Port B | 15.6 | 44.8 |
| 3 | Port C | 11.0 | 55.8 |
| 4 | Port D | 6.7 | 62.6 |
| 5 | Port E | 4.7 | 67.3 |
| 6 | Port F | 4.2 | 71.5 |

| | | | |
|----|----------------------|-----|-------|
| 7 | Port G | 4.0 | 75.5 |
| 8 | Port H | 4.0 | 79.5 |
| 9 | Port I | 2.7 | 82.3 |
| 10 | Port J | 2.6 | 84.8 |
| 11 | Port K | 2.1 | 86.9 |
| 12 | Port L | 1.9 | 88.8 |
| 13 | Port M | 1.3 | 90.2 |
| 14 | Port N | 1.2 | 91.4 |
| 15 | Port O | 1.0 | 92.3 |
| 16 | Port P | 0.7 | 93.1 |
| 17 | Port Q | 0.7 | 93.8 |
| 18 | Port R | 0.7 | 94.4 |
| 19 | Port A | 0.7 | 95.1 |
| — | Total of Other Ports | 4.9 | 100.0 |

Ports that have cumulatively reached 80%, for example, may be considered representative. Granted, more criteria may be set for the choice of ports, e.g. the proportion of consignments for a single port shall be no less than 1%, and the cumulative proportion of consignments for such ports shall reach 85%. Guided by these criteria, altogether 11 ports from Port A to K may be chosen.

Moreover, the choice of ports needs to consider an assortment of factors including the timeframe of the research project, resources that can be mobilized, funding support, etc.

6.2 Determining Sample Size

The determination of the sample size is a statistical issue, and the following is an illustration of how it is done:

First set the following:

- 1) N is the size of the population;
- 2) t is a critical value derived according to the prescribed confidence level. Suppose the release time of all goods conforms to normal distribution, then set the confidence level at 95%, and then the critical $t=1.96$;
- 3) σ^2 is the population variance, and unknown;
- 4) Δ is the required error term, which is set at the discretion of the researcher.

Then, as per relevant statistical theories, the sample size is:

$$n = \frac{Nt^2\sigma^2}{N\Delta^2 + t^2\sigma^2} = \frac{1}{\frac{\Delta^2}{t^2\sigma^2} + \frac{1}{N}}$$

Given that the population variance is unknown, there are two methods that can be used:

① Substitute the population variance with the sample variance. However, given that sampling has not yet been conducted, it is necessary to take a certain amount of samples first, so estimate sample variance $\hat{\sigma}^2$ should replace σ^2 . Note that this is a rather complicated process.

② A proportional sampling formula may be considered:

$$n = \frac{Nt^2P(1-P)}{N\Delta^2 + t^2P(1-P)} = \frac{1}{\frac{\Delta^2}{t^2P(1-P)} + \frac{1}{N}}$$

Max sampling size of proportional sampling (P=0.5):

$$n_{pmax} = \frac{1}{\frac{4\Delta^2}{t^2} + \frac{1}{N}}$$

Here the population standard deviation σ has to be no smaller than 0.5, therefore the sample size should be:

$$n = C n_{pmax} = \frac{C}{\frac{4\Delta^2}{t^2} + \frac{1}{N}}$$

Then the minimum sample size should be n_{pmax} .

If the required error is 1%, suppose that: the population conforms to normal distribution, the scale of the economy is relatively large, the number of consignments of import/export goods tends to be extremely large, and the minimum number of consignments for sampling is around 10,000.

6.3 Determining Sample Distribution

Supposing the sample size of all ports has been determined, the next issue is to determine the sample distribution among the selected ports and other segments. The

primary issue that needs to be addressed, of course, is the allocation among ports.

① Distribution as per proportion of consignments

Generally speaking, distribution based on each port's consignments of goods is a common approach. It is an easy method in that it only requires multiplying the total sample size by the proportion of consignments of each port. It is worth noting, however, that the proportion of consignments here refers to the proportion that a port's consignments make up of the total consignments of all the sampled ports, rather than against the total consignments of all ports.

② Distribution as per value of goods

When the value of goods is taken into account, the method of distribution will likely change accordingly. For instance, referring to Table 6.1, goods that are imported via Port A have very short release times on average for each consignment, but the value of the goods in each consignment is relatively low; whereas for goods imported via Port B, the release time for each consignment tends to be longer, but the average value of goods of each consignment is significantly higher than those of Port A. If all these factors are considered for the distribution of the sample size among ports, then alternative methods of distribution are needed, where the proportion of the amount of consignments and the proportion of the value of goods are combined via mathematical formulas, one possible version of which is shown below:

Suppose there are m number of ports, and for Port No. i :

p_i is the proportion of imported consignments of this port against the total number of consignments of m ports (suppose the scope of goods under study has already been defined);

q_i is the total value of imported goods of the port against such ports' total value of imported goods;

If n_t is the total number of sampled consignments of all sampled ports, then the number of sampled consignments for Port No. i is:

$$n_i = n_t \cdot \frac{\sqrt{p_i^2 + q_i^2}}{\sum_{k=1}^m \sqrt{p_k^2 + q_k^2}}$$

Granted, this is but one of multiple different sample size distribution methods, and more rigorous and more statistically valid methods may be adopted according to other statistical theories.

This paper believes that the distribution of sample size among other factors can be implemented depending on the specific conditions of the sampled ports and the research project's objective. However, this paper does not advise over-consideration of the differences among multiple factors, because such over-consideration could decrease the implementation efficiency of the entire project. In most cases, the four-level system as shown in Chapter 4 of this paper is sufficient, because there are generally no marked differences in release procedures and average time for the processing of various goods, unless there are certain special factors and processes that may generate substantial differences in release time for various ports.

6.4 Determining the Sampling Period

Apart from the above-mentioned issues on the choice of sampled ports, determination of sample size and of sample distribution, the determination of the period for sampling is also a relevant issue, in that only when sampling is conducted within the same period for different ports and different years will the conclusions derived from the analysis be comparable in nature. When the sampling period is determined, attention needs to be paid to the following issues:

① Set aside sufficient time for preparation

Sample surveys involve the establishment of a research team, determination of the processes of various ports, the choice of and co-ordination with partners, the design of the recording form, etc. Therefore, sufficient time must be set aside for the above-mentioned tasks before actual sampling can be initiated upon.

② Length of the sampling period

The length of sampling period should be neither too short nor too long. If it is too short, then the sample size is hard to be guaranteed; if it is too long, then the differences in sample periods regarding the data collected by different ports and different partners will be too large. Supposing the sampling period spans from June to August with the data of Port A mainly collected in June and the data of Port B mainly collected in August, the comparability of the two ports will be called into question. If a relatively long period for sampling is required in order to meet a certain sample size, then partners need to properly allocate the sample to different time periods. Even so, this paper recommends that the sampling period is set at approximately one month and not exceed 2 months.

③ Make efforts to avoid irregular fluctuations

The change of trade volume is subject to various factors, and tends to exhibit fluctuations. As long as these fluctuations are within a proper range, then the sample

survey does not necessarily have to avoid them on purpose. But, if certain 'incidental events' lead to irregular fluctuations, then they will have to be excluded from the sample. For instance, the blast that struck Tianjin Port in August 2015 rendered the port unable to maintain routine operations in the months that followed, resulting in sharp declines of cargo turnover. As a result, neighboring ports, including ports of Dalian and Qingdao, witnessed soaring increases of cargo turnover. Therefore, the sample survey should avoid the following September and October, or even a longer period of time in the aftermath of the blast.

7 Establishing the Research Team

7.1 Involvement of Customs and Other Government Authorities

Government authorities involved in the release of goods by import/export ports primarily are the entry/exit inspection and quarantine authorities and customs authorities. However, the procedures that involve customs are the largest in number, including electronic document examination, price review, on-site document reception and examination, customs inspection, final release, etc. These procedures vary depending upon specific conditions of each country.

As the government authority most extensively involved in the entire release process, customs should serve as the core of the TRS team, preside over TRS implementation, and undertake the organization and establishment of the research project team.

During the establishment of the entire team, customs' first and foremost task is to address the issue of internal co-ordination between departments in the customs system. During project implementation, data needs to be provided by the statistics department, tools need to be developed with the involvement of technical departments, processes need to be confirmed by the business department, and concrete operations require the co-operation of customs departments in various localities. Such co-ordination needs to be undertaken by an independent specific department in the customs authority, or might even require a main leader of the customs authority to lead the TRS team.

Many countries require separate inspection and quarantine declarations, which tend to be conducted prior to customs clearance. Moreover, many shipments may only submit customs declarations after acquiring a permit from inspection and quarantine authorities. It is therefore imperative that TRS obtain the co-operation from inspection and quarantine authorities. However, this co-operation can prove difficult to achieve in reality. In the absence of a single window, if the research project needs the data of certain time points from the inspection and quarantine authorities' information system, or needs inspection and quarantine authorities to fill out survey forms, given that customs authorities and inspection and quarantine authorities are of the same administrative level, customs cannot command them hence the considerable difficulty in coordinating the above-mentioned missions. In order to achieve their co-operation, it is imperative that researchers help the inspection and quarantine authorities to appreciate the value of TRS to inspection and quarantine-related work, and the positive role TRS can play in the improvement of inspection and quarantine declaration and implementation processes.

All in all, the implementation of TRS not only calls for inter-government department co-ordination and internal co-ordination within departments, but also requires powerful leading institutions. This paper therefore recommends that the team's leading institution:

- Sit above customs and inspection and quarantine authorities on the administrative hierarchy;
- Consists of members from the customs, inspection and quarantine authorities, and other relevant government departments;
- Be headed by vice premier-level leaders.

The resources of various government departments can only be effectively mobilized to facilitate the entire research project if these requirements are met.

7.2 Involvement of Enterprises and Private Non-Enterprise Organizations

The release of goods involves multiple players in the business sector: dock operators, warehouse operators, shipping companies, shipping agents, import/export enterprises, customs brokers, etc. These players are involved in processes ranging from port operation and preparation of customs declaration, to customs clearance. When the research requires more detailed analysis into each process, it requires the collection of time node information by these enterprises, including the time when the cargo reaches the berth, the time when the cargo unloading and tallying is completed, and the time when the bill of lading is exchanged. In some cases, such information is hardly accessible in the customs system or the single window system.

Among these enterprise players, dock operators and customs brokers (including freight forwarders with customs declaration services) are relatively important. The dock system can provide the time when the vessel reaches the berth and when the cargo is unloaded and warehoused, and the customs brokers are directly and indirectly involved in all procedures of the release process. Therefore, organizing and mobilizing the resources of dock operators and customs brokers are of great importance in detailing and facilitating the research project.

Moreover, with regards to team organization, the previous section proposed putting in place a government authority that outranks customs and other relevant government departments to head the implementation of the entire research project. However, in case of a lack of policy support, government departments may entrust third-party private non-enterprise organizations to complete the project, but such organizations should not share very specific interests with government departments

and enterprise players, and should be competent and professional, have personnel extensively experienced in customs and trade affairs, and be capable of conducting objective investigations and producing reliable conclusions. By this solution, a relatively 'loosely structured' project team can be formed, thereby completing the TRS by engaging government departments and ensuring positive communication and cooperation with enterprises.

8 Determining the Sections of the Release Process and the Differences in Release Processes of Various Ports

Before concrete data collection is conducted, the first thing to do is to determine the release procedures of ports for import/export goods. In countries with a large number of import/export trade ports, release processes of import/export goods may vary significantly across such ports, due to factors including trade policy, geographical location, etc. Therefore, such differences ought to be taken into consideration when the processes of sampled ports are illustrated.

In order to facilitate vertical and horizontal comparisons, regarding the primary objectives of TRS, it is imperative to seek similarities among various processes, and simplify the entire release process into sections. The TRS reports of countries around the world feature release processes that can generally be categorized into three sections: 1) vessel reaches the port (plane arrives at the airport) – goods are warehoused (tallying is completed), 2) goods are warehoused (tallying is completed) – customs declaration, 3) customs declaration – customs release. When the time consumed by each section is calculated, comparisons with previous years' records should be conducted before the research proceeds into section-specific analysis.

Granted, the simplified approach of sectioning does not mean the disregard for differences in terms of the ports' processes in later analysis. Therefore, prior to data collection, we need to confirm the differences between the ports' processes, determine relevant time nodes, and keep records before data collection. Such records will act as a very critical source of data in later analysis.

Processes of various ports can be consolidated and shown in one picture. For example, take containerized imported goods transported via maritime routes in China. After the release processes of various ports are studied, a flow chart such as that in the Appendix Figure 1 may be drawn and the relevant time nodes may be shown as in the Appendix Table 1.

9 Designing Survey Form and Developing Data Recording Tools

Sample survey and data collection require the design of a survey form as per the release process to solicit time node information from the respondents. Also, supporting entering and recording tools should be developed to consolidate the collected data into standard data records that are consistent in format and field.

9.1 Design of Survey Form

Personnel involved in each procedure should fill in the survey form for each time node of operation during the release process. The form ideas are determined by the basic information of the goods and the operation of each procedure. A detailed example of the survey form may be found in Appendix Table 2.

The survey form shall clarify specifications on how it should be filled in: digits of the customs declaration number (e.g. China's customs declaration code), digits of commodity code, time format, etc. Specifying these formats helps avoid data entry errors.

In addition, for the same procedure or operation, specific personnel at each port may have inconsistent 'abbreviations', hence the need to attach notes on abbreviations used, so as to avoid misunderstandings by respondents.

9.2 Development of Data Recording Tool

After being collected via the survey form, time node information needs to be standardized into data records by computer software before analysis can be conducted, thus entailing the development of a data entry tool.

The development process for similar data entry tools is relatively simple and can be built on platforms like Microsoft Access and FoxPro. In cases of long-term data collection, dedicated data collection systems may be developed based on SQL Server, Oracle, etc. This paper recommends that under these circumstances, the project team choose to co-operate with professional software service providers.

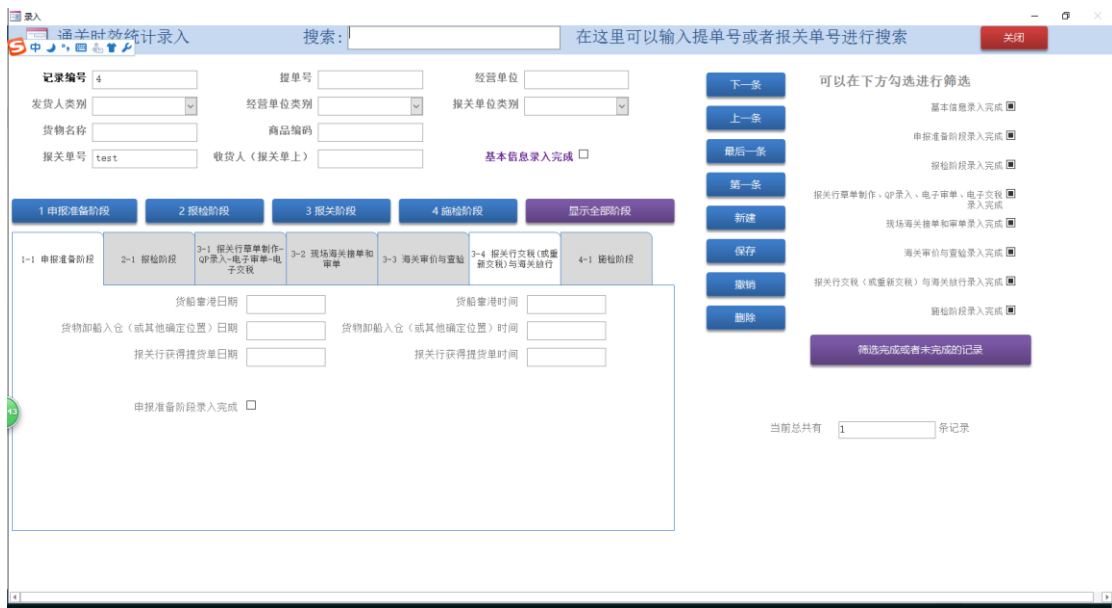


Figure 9.1 A Simple Data-Entering Tool (developed based on Access 2013)

As for co-operation with professional software service providers, the specific personnel in charge of development of the required data entry tools are very critical. Development of such tools not only requires relevant knowledge and experience on customs and trade, but also calls for a certain level of understanding of the development of database software. Only with this combined knowledge can the data-collection systems accurately translate into models that developers can understand, thus facilitating the development of data collection systems that meet such requirements.

Researchers themselves may develop short-term data entry tools after they receive a certain amount of training. Long-term data collection systems, on the other hand, require more professional technical support. The research project's requirements bear upon the choice of tools, and sufficient funding provides fundamental support to the development of data entry and collection tools.

10 Data Collection and Review

If preparatory work have been effectively completed, then with a certain level of funding or administrative support, the survey form can be passed from one procedure to the next, so that the enterprises and government authorities involved in each procedure enters their respective information on the form. In this sense, data collection is not a difficult task.

However, a lack of effective co-operation from enterprises and government departments threatens the integrity, accuracy and timeliness of the sample data. As previously stated, whole sample data analyses also rely on support from the private sector and other government departments. In order to collect high-quality data, communication with companies and other government departments are indeed essential, and it is important for those involved in the data collection process to understand the importance of data accuracy and timeliness. In this sense, support in the form of administrative orders and funding is necessary, because for most of the personnel involved in data recording and entering, such assignments go beyond their routine work and result in extra workload. It is therefore often necessary to reward these personnel with a certain level of compensation.

After data is collected, the reasonableness and accuracy of manually recorded data needs to be checked. This is a difficult task, and the confirmation of the reliability of the data requires checks be done singly. This paper lists the most frequently occurring problems as follows:

① Violation of the order of occurrence

An order of occurrence does apply to certain procedures of the release process. If time node records do not conform to such an order, then the records in question must be inaccurate. The recording personnel should be contacted for checks and revisions.

② 'Yes/No' choice contradicts later time records

For some 'Yes/No' questions, e.g. on submission of paper documents and on customs inspections, some of the 'No' answers stand in conflict with later appearances of time records which should have been left empty due to the previous 'No' answer. This situation is not reasonable, and needs to be checked and revised by the recording personnel.

③ Lack of required time records

Certain required time records are absent, so the recording personnel in question should be contacted to ascertain if he/she missed the entry, if so, the empty record should be filled or the entry should be deleted.

④ Excessively long durations

When calculating the time consumed, if the duration for a certain procedure is excessively long and clearly contradicts reality, the associated time record is very likely problematic.

⑤ Repetitive bill of lading numbers or declaration numbers

When the tool does not set the uniqueness for the records, repetitive bill of lading numbers or repetitive declaration numbers are likely to occur. This situation is attributable to accidental duplication of a certain records by the recording personnel, or to the wrongful recording of bill of lading numbers or declaration numbers by the recording personnel.

⑥ Wrong declaration number and commodity code digits

Digit errors of declaration numbers and commodity codes are highly probable, and such errors will affect the evaluation of the port, the sub-zone of port, and the category of commodity associated with the record.

In general, time records should conform to procedural logic, and in special cases where such logic is violated, the recording personnel should be immediately contacted and the identified problems should be checked and compared with the original manual records. Also, the development of entering and recording tools should incorporate settings as per such procedural logic so as to avoid the problems above, e.g. the final confirmation of electronic declaration during the customs clearance stage has to be happened after the arrival of the vessel to the port.

11 Analysis of Data and Writing of Report

11.1 Process of data analysis

After the standardized data records are obtained, the research team may analyze the data and write the report. The conclusions derived from the data analysis are the basis of writing the report, therefore, using appropriate methods of analysis is critical.

Generally, sample data may be analyzed with Excel, as follows:

① Calculating the time consumed for each stage

Subtract the previous time node by the time node that succeeds it to arrive at the specific duration of the procedure in between, and enter the duration as a field of each record. For instance, in the following table, via subtracting ‘completion date and time of tax payment’ by the preceding ‘date and time of customs issuance of declaration form’, the difference arrived at is the ‘time consumed by the customs broker for tax payment’:

| date of customs issuance of declaration form | time of customs issuance of declaration form | completion date of tax payment | completion time of tax payment | time consumed by customs brokers or importers for tax payment |
|--|--|--------------------------------|--------------------------------|---|
| 2015/11/14 | 10:10 | 2015/11/14 | 10:12 | 0days0hours02mins |
| 2015/12/2 | 9:50 | 2015/12/2 | 10:00 | 0days0hours10mins |
| 2015/12/11 | 15:50 | 2015/12/11 | 16:00 | 0days0hours10mins |
| 2015/11/10 | 10:20 | 2015/11/10 | 10:30 | 0days0hours10mins |
| 2015/11/10 | 10:00 | 2015/11/10 | 10:30 | 0days0hours30mins |
| 2015/11/10 | 10:00 | 2015/11/10 | 10:20 | 0days0hours20mins |
| 2015/11/3 | 16:00 | 2015/11/3 | 16:10 | 0days0hours10mins |
| 2015/12/13 | 15:30 | 2015/12/13 | 15:35 | 0days0hours05mins |
| 2015/11/9 | 10:30 | 2015/11/9 | 10:45 | 0days0hours15mins |
| 2015/11/3 | 16:00 | 2015/11/3 | 16:05 | 0days0hours05mins |
| 2015/11/11 | 10:10 | 2015/11/11 | 10:30 | 0days0hours20mins |
| 2015/11/11 | 16:00 | 2015/11/11 | 16:20 | 0days0hours20mins |
| 2015/12/13 | 15:00 | 2015/12/13 | 15:25 | 0days0hours25mins |

Figure 11.1 Calculation of Time Consumed of Each Procedure

However, it must be noted that the ‘subtracting’ approach is not applicable to all procedures, because in reality, many procedures occur in parallel and that certain goods do not go through certain procedures, therefore, under such circumstances, researchers ought to exercise judgment on how to calculate the time used for each procedure.

② Generation of pivot table

Select all, and use the ‘Pivot Table’ function of Excel, to generate the pivot table and drag the fields to make various calculations. For instance, the following picture shows the average release time of a port under a ‘customs inspection’ scenario and a ‘customs inspection free’ scenario.

| Average Value: Total Time Consumption | |
|---------------------------------------|--------------------------------|
| Whether Customs Inspection Conducted | Time Consumption |
| FALSE | 5 days 12 hours 43 mins |
| TRUE | 6 days 1 hours 11 mins |
| Total | 5 days 14 hours 45 mins |

Figure 11.2 Average Release Time of a Port with and without ‘Customs Inspection’.

③ Contemplating the statistical conclusions to be presented in the report

After the generation of the data pivot table, multiple statistical results may be produced. The research team needs to contemplate which conclusions are needed in the report. Generally speaking, statistical conclusions are presented in a ‘general’ to ‘specific’ manner: presenting the average total time consumed of the sample at the outset, then the average time consumed of each of the three sections. If causes for concern are detected when comparisons are conducted across ports, countries, or even through time, then researchers should conduct an in-depth study of the specific circumstances of a procedure, a port or a time node and make efforts to review the release process and locate the causes of excessively long or short time consumed.

④ Consolidating data conclusions

As previously stated, in cases which involve complicated trade structures, it is imperative that the release process be divided into several sub-items for study, and ultimately the conclusions of each sub-item is consolidated via a backward induction approach, i.e. using the conclusion of one sub-item to arrive at that of the sub-item preceding it, and repeat this process until the ultimate conclusion is reached. The following methods may be employed:

a. Assigning weights per proportion of consignments of goods

As stated in the previous section, following the same approach used to determine sample size distribution at each port, it is feasible to weigh each sub-item by assessing the proportion that each sub-item makes up of the total amount in order to conclude from the impact of each sub-item and produce a weighted-average conclusion. For instance, the total time consumed for the release of sea-transported import goods in the second-level sub-items can be calculated as follows:

Suppose the proportions of consignments of containerized goods and bulk goods imported by sea against the total consignments of goods imported by sea are respectively p_1 and p_2 , and the respective average total amounts of release time arrived at by each of the two sub-items are t_1 and t_2 . The average total release time consumed for goods imported by sea at the second level, backwardly induced from the third-level sub-items (containerized goods and bulk goods transported by sea) is:

$$t_{\text{sea-imp}} = p_1 t_1 + p_2 t_2$$

b. Weight allocation to conclusions considering value of goods

Chapter five of this paper explains the impact of the value of goods on sample size distribution. Likewise, backward induction from sub-items to those preceding them may also incorporate the value of goods-related considerations into weight assignment. Taking the previous example again, where containerized goods and bulk goods imported by sea are used to induce the average total release time consumed for goods imported by sea at the second level:

Number of consignments of the population are respectively: N_1, N_2

Average values of goods of the sampled consignments are respectively: v_1, v_2

Average total amount of time consumed for each consignment of the sample are respectively: t_1, t_2

Then the average total time consumed for the release of goods imported by sea is:

$$t_{\text{sea-imp}} = \frac{N_1 \frac{v_1}{t_1}}{\sum_1^3 N_k \frac{v_k}{t_k}} t_1 + \frac{N_2 \frac{v_2}{t_2}}{\sum_1^3 N_k \frac{v_k}{t_k}} t_2$$

Among the factors in the equation above, $\frac{v_k}{t_k}$ represents the total value of imported goods of each sub-item on an hourly basis (or alternatively, on a minute or a daily basis). This equation has taken into account the time factor during the release of imported goods, and incorporated it into the weight assignment during the induction process.

⑤ Statistical conclusions may be visualized using statistical charts

This paper recommends a tool to draw statistical charts – ‘think-cell’, which can easily use data in the pivot table in the chart that it constructs, as shown below:

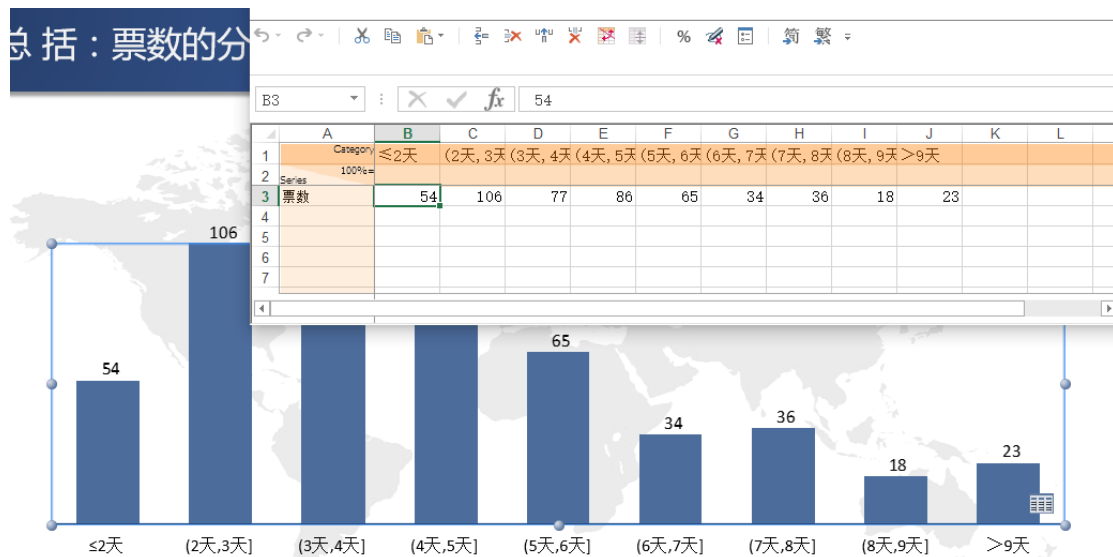


Figure 4.5 Chart Drawing Interface of think-cell

11.2 Issues that Deserve Attention during Writing of Report

Effective sorting and analysis of data and the drawing of charts can lay a solid groundwork for the writing of the report, during which authors should pay attention to the following problems:

- ① Define the scope of goods under study;
- ② Determine explicitly the starting point and ending point of port release;
- ③ Clarify the method of statistical analysis of this study: whole sample data analysis, sample survey, or a combination of the two;
- ④ In case of a sample survey, define the sample size, sampled ports, sample size distribution to ports, etc.;
- ⑤ Analyze the process of each port, and produce a process that is applicable to all sampled ports;
- ⑥ Conduct comparative research: comparisons across various enterprise categories, comparisons between scenarios with and without on-site customs reception of documents, comparisons between scenarios with and without inter-department transfer of electronic declaration data by customs, and comparisons between scenarios with and without customs inspection, etc.

12 Publication of Report, Workshops, and Project Review and Summary

12.1 Report Publication and Workshops

This paper recommends holding a press conference and relevant workshops for the study after it is completed, reviewed and approved by experts. Building on the published report, concerted efforts of customs, other government departments and the enterprise sector should be made to locate problems during the release processes and arrive at the solutions to such problems.

Government attendees to the press conference and workshops should include foreign trade-related government departments apart from Customs. In addition, major leaders from competent government authorities or departments of port cities in which foreign trade is the pillar industry should also attend, so as to gain a better idea of the release process of goods in the city and the impact thereof on the trade competitiveness of the city that they govern.

Businesses that should attend the press conference and workshops include: shipping companies, shipping agents, dock operators, warehouse operators, various terminal operators, freight forwarders, customs brokers, enterprises with foreign trade businesses and other enterprise stakeholders of the release of import/export goods.

Moreover, university faculty members and students in relevant fields should also be on the invitation list.

12.2 Project Review and Summary

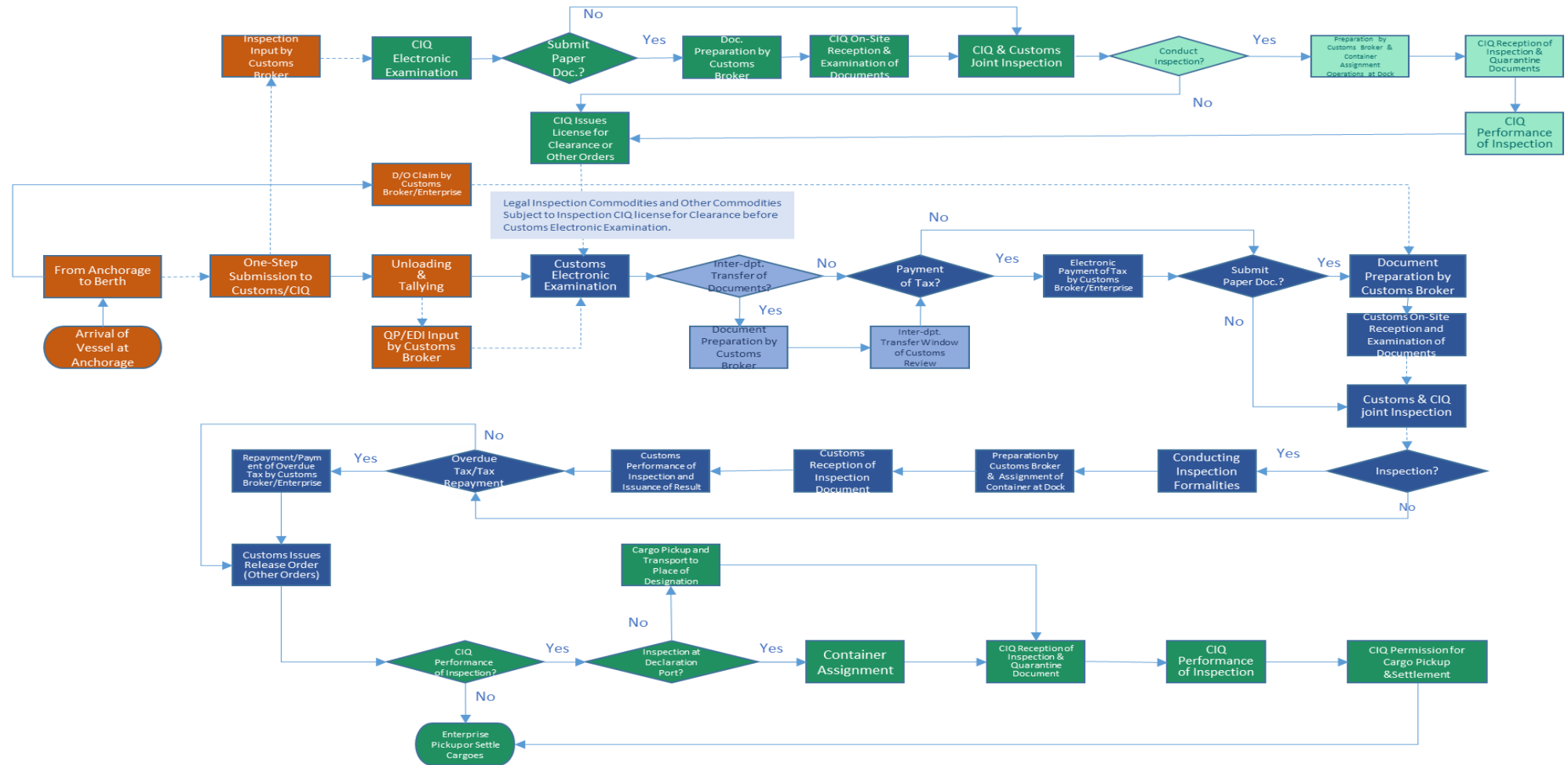
For TRS projects being conducted for the first time, unexpected problems are hardly avoidable during implementation. Therefore, after completion of the project, review and summary of the entire implementation process is required, so that adjustments and improvements can be made for the projects going forward.

Project review and summary should not only cover technical problems, but also possible problems of communication in various parts of the project among those involved, which requires the timely recording of these difficulties and problems during implementation, so that solutions can be found thereof during project review and summary.

After the entire project is completed, the project members can organize one or several work meetings that should be attended by project leaders, as well as planning, process-formulating, technical and surveying personnel. Key partners for certain procedures should also be invited. Communication via such meetings should aim to solve the identified problems, and a memo thereof should be produced to provide

references for the planning and implementation of projects going forward.

Appendix Figure 1: Flow Chart of Release of Containerized Sea-Import Goods in China



[Note]: Orange: Port administration affairs and declaration preparation stage; Green: Inspection and Quarantine clearance stage (light green: procedure unique to Yantian, Shenzhen); Blue: Customs clearance stage (light blue: procedure unique to Yantian, Shenzhen); CIQ: Inspection and Quarantine Authorities of China.