

UNCTAD MONOGRAPHS ON PORT MANAGEMENT

*A series of monographs prepared for UNCTAD in collaboration
with the International Association of Ports and Harbours (IAPH)*

15

Quality management: The Port of Nantes/Saint-Nazaire experience

by

*Frédéric Dupin, Operations Director
Alain Tcheng, Port Commandant
Yannick Guillon, Assistant Chief, Technical Facilities Operation
Nantes/Saint-Nazaire Port Authority
and
Nicolas Terrassier, Director
ISEMAR, Saint-Nazaire*



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NOTE

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INTRODUCTION TO THE SERIES

UNCTAD has been cooperating with the International Association of Ports and Harbours (IAPH) for some years, in fields that include the production, translation and distribution throughout the world of technical studies in the form of monographs. Through these, it helps to develop the management capacity needed for efficient port operation in developing countries.

One important outcome of the ninth United Nations Conference on Trade and Development (UNCTAD IX) was a new work programme for UNCTAD in the transport sector. It is important to stress that the original aim of improving efficiency at ports which spawned the idea of the UNCTAD/IAPH monographs was reaffirmed.

The UNCTAD Division for Services Infrastructure for Development and Trade Efficiency is thus pleased to be able to continue to cooperate with IAPH, presenting the experience of a port or group of professionals for the benefit of the international port community.

This cooperation supplements other research, training and activities at the Division for Services Infrastructure for Development and Trade Efficiency that seek in particular to encourage the development of competitive international maritime transport services, reinforce trade structures and promote international cooperation and exchanges of expertise. We should like to express our thanks to the authors for their contributions towards these monographs, all of which have been produced on a voluntary basis.

Jean Gurunlian
Director
Division for Services Infrastructure
for Development and Trade Efficiency

FOREWORD

When UNCTAD first decided to seek the cooperation of the International Association of Ports and Harbours in producing monographs on port management, the idea was enthusiastically welcomed as a further step forward in the provision of information to management of ports in developing countries. The preparation of monographs through the IAPH Committee on International Port Development has drawn on the resources of IAPH member ports in industrialized countries and on the willingness of ports in developed countries to record for the benefit of others the experience and lessons learnt in reaching current levels of port technology and management. In addition, valuable assistance has been given by senior management in ports of developing countries in assessing the value of the monographs at the drafting stage.

I am confident that the UNCTAD monograph series will be of value to managements of ports in developing countries by providing indicators to be used in decision-making on improvements and technological progress and optimum use of existing resources.

The International Association of Ports and Harbours looks forward to continued cooperation with UNCTAD in the preparation of many more papers in the monograph series and expresses the hope that the series will fill a gap in the information currently available to port managements.

Goon Kok Loon
Chairman
Human Resources Committee
IAPH

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Abbreviations and acronyms

ETA	estimated time of arrival
ETD	estimated time of departure
ISO	International Organization for Standardization
Mt	millions of tonnes
t	tonne(s)
t/h	tonnes per hour
VHF	very high frequency

Introduction

QUALITY - A COMMERCIAL MUST WITH OPERATIONAL BENEFITS

1. High-quality port services have become a commercial must. Competition between ports, nationally and internationally, makes it essential for ports to respond to the demands of clients on the highly competitive transport and logistics markets. The quality of port services is becoming a commercial asset, helping to retain customer loyalty. Carriers, concerned about their cargoes and about satisfying their own customers, are also on the look-out for logistical routes over which the quality of services provided throughout the transport chain is uniform.

2. Besides the commercial advantages, quality management results in operational improvements. It can help to optimize the use made of facilities that are poorly used or under utilized for lack of coordination among the services provided by different entities during port operations. By improving working procedures, it can rationalize and improve practices and apply performance-monitoring procedures and indicators, thus resulting in increased productivity or reduced damage to merchandise.

3. The port of Nantes/St. Nazaire, which handles 26 million tonnes of merchandise and 2,600 vessel calls per year, is France's fourth-busiest port and its busiest on the Atlantic seaboard. The port, however, is not immune from competition. Through action to improve the services it offers to incoming vessels and its cargo-handling and technical facilities, the Port Authority, in association with the port community, is striving to adapt its working practices to an increasingly demanding environment.

4. Nantes/St. Nazaire's experience is based on a targeted, step-by-step approach that takes account of local practice and involves the port community. As such it could easily apply to ports in countries which do not have the means (qualified staff, financial resources or immediate support from the port community) to apply quality measures such as ISO 9000-based certification. In the long term, it may also be possible to progress to certification.

I. THE DEVELOPMENT OF QUALITY SCHEMES

A. Beginnings of the projects

1. The role of the Commerce Commission - Action at the Agri-Food Terminal

5. Efforts to improve quality stemmed from a commercial drive to offer a better service to clients, whether operators (cargo handlers, ships' agents etc.) or carriers (importers). The concentration on quality of service at the Port Authority of Nantes/St. Nazaire began in the port's Commerce Commission. This is a body set up on the initiative of the Harbour Board; it brings together representatives of the port and its clients (ships' agents, commissionaires, cargo handlers and carriers).

6. A sub-committee responsible for bulk solids handling at the specialized Agri-Food Terminal, one of the main activities at Nantes/St. Nazaire, put forward the idea of a "quality charter" for incoming vessels. The Pilots' Committee then set the following objective:

Box one

Extract from the proceedings of the Commerce Commission

"The quality management efforts currently being made are informal;* the Pilots' Committee would like them to become formal so that all concerned, chiefs of cargo handling, dockers (...) and crane operators, can move forward together in the same direction. In conclusion, the Pilots' Committee is politically willing to continue with quality management and consider means of conveying information rapidly to those concerned. Quality management will initially focus on the vessel-handling side."

* A number of steps had already been taken: a representative of the port management was attending transit meetings to centralize the information required for smooth operation; internal meetings were being held with the Harbourmaster's office to establish rules on berthing and vessel behaviour; and the technical facilities services were in constant contact with users.

Following this pilot initiative, other "quality" actions will be undertaken in the technical facilities and cargo handling areas.

2. Action at the oil terminal - the Port Authority

7. Based on the experiment with high-quality services for incoming vessels at the Agri-Food Terminal, a similar but much more formal drive to improve procedures, based on an analysis of industrial hazards, was launched at the oil terminal. Improved port services here take the form of greater safety.

8. One task of a port authority is to coordinate calls in the port. The Port Authority management at Nantes/St. Nazaire thus embarked on a voluntary drive to improve reception procedures for vessels arriving at the oil terminal. This does not absolve others in the chain of port operations of their responsibilities, but does help to reduce risks.

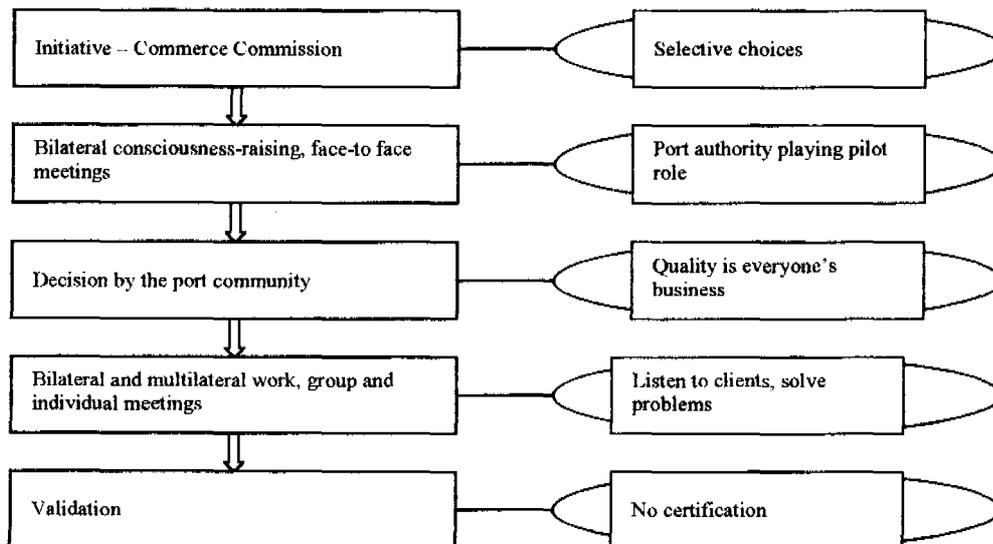
9. The objective here is less to respond to commercial concerns than to avert possible incidents or accidents when oil tankers call, even if the two notions cannot be completely separated.

B. Design of the schemes

10. Quality management is primarily a commercial action, supported by the port community. Listening to clients and the port business association is crucial. The procedure is based on a dual approach, both selective and progressive.

Figure 1

The different stages in the quality management



C. Choice of activities

11. The port of Nantes/St. Nazaire takes a selective, not all-embracing, approach to quality. It does not wish to embark upon an overly ambitious venture with mixed results. It believes that quality is not an urgent concern in every area of port activities. Taking a targeted approach, therefore, it has begun to tackle the issues of highest priority.

12. Quality is, moreover, a recent concern at Nantes/St. Nazaire, and not all the operators and staff concerned are always aware of what is at stake. By taking a progressive approach, the port is seeking to gain their consistent support and cooperation. With a progressive approach, a new "quality culture" can be instilled into the staff of all the partners involved. The aim is to attain specific, realistic objectives by making full use of the resources available. Such caution avoids the risks of discouraging companies and individual players that are essential to high-quality port services.

D. The question of certification

1. The Agri-Food Charter

13. At the Agri-Food Terminal, the port went ahead with the development of a "quality charter" before it embarked on a much more complicated and expensive certification process. There were several reasons for this choice. First, in the light of certification exercises at other ports, the port realized that in several respects it was not ready to launch straight into certification. For example, the port operators had not yet had any opportunity to indicate through other projects whether they were willing to introduce quality management. The idea was a new one. A simple project was needed to develop some momentum behind the notion of quality. More ambitious plans could be

tackled later. Nevertheless, by the time it had finished, the "quality charter" process had become sufficiently rigorous to allow certification to follow if it was felt that that offered tangible advantages.

14. Within the port establishment, quality was a new notion when the scheme was devised. As a result, a pragmatic approach was favoured, setting a specific, reasonable target instead of trying to put grandiose, unworkable plans into effect. The port community did not want to embark on an "intellectual" venture. A scheme of its own devising, based on the development of a charter, was therefore put into effect.

2. The oil terminal

15. The formal nature of the quality process at the oil terminal, based in part on the preparation of a manual of "recommended procedures", raises the possibility of certification - certifying a method of analysing and preventing hazards. Certification would thus be the equivalent of validating a method that could be used to formalize other aspects of port operations, and would accord wider recognition to a method developed by the Port Authority that might possibly find commercial applications.

16. The Port Authority is considering both the costs and the benefits, which are harder to assess, of a certification procedure, in particular the added value it would bring to an already formalized exercise. The merits of certification are particularly questionable since it would apply to special-purpose terminals used by a limited number (two or three) of large industrial clients. The shipowners do not appear to believe there is a need for certification. The legal implications of certification have not yet been evaluated. The Port Authority would like answers to all these questions before embarking on a certification process.

II. QUALITY MANAGEMENT AT THE AGRI-FOOD TERMINAL

A. Treatment of incoming vessels - a quality charter

1. The choice of a charter

17. While quality management was being discussed, it was found that coordinators needed to be appointed for each port terminal. These would serve as the principal contacts for port clients operating at the terminal. On the "one-stop shop" principle, the coordinators would be the "front counters" for client requests. They would then pass on information to other operators and see to it that the requests were followed up and services were provided. They would be nodes for information exchange and the coordination of operations. Efficient circulation of information and coordinated activities are two features of the quality charter drawn up for the Agri-Food Terminal.

18. The choice of a quality charter was made when it was observed that the Agri-Food Terminal, with its modern, efficient facilities, was reaching saturation owing to increased traffic and calls by vessels. The density of activity and the wide variety of traffic handled made organizing calls difficult. Originally designed to support a number of agri-food trade flows, the terminal had come to handle a huge variety of bulk merchandise - so much

so that it had come to be called the "multi-bulk" terminal. Calls by vessels had to be organized more rationally in order to make best use of its high-performance facilities.

Box 2

**The Agri-Food Terminal at the Port Authority of
Nantes/St. Nazaire in a nutshell**

Traffic	2.8 million tonnes, including cattle feed (1.8 Mt), cement (0.3 Mt) and fertilizer (0.7 Mt)
Facilities	4 berths, 820 linear metres, capable of receiving fully-loaded "Panamax" and "Cape Size" vessels 2 fast, continuous unloaders: capacity 1,400 t/h (soya); six 15-tonne lift cranes, capacity 500 t/h, for a total of 14,000 to 18,000 tonnes per day on large vessels 3 distribution towers and 5 weighing hoppers distributing cargo to private warehouses; 3.7 km of high-capacity conveyor belts (1,250 t/h); one loading crane, capacity 700 t/h (wheat)
Warehouses	Cattle feed (240,000 t), grain (47,000 t), minerals and cement (30,000 t), miscellaneous (200,000 t)
Environment	Numerous dust-trapping devices

19. Quality management had a dual aim: (a) to satisfy clients by guaranteeing that vessels can put into port reliably and safely; (b) to optimize sub-saturation-level terminal operation.

2. The scope of the quality charter

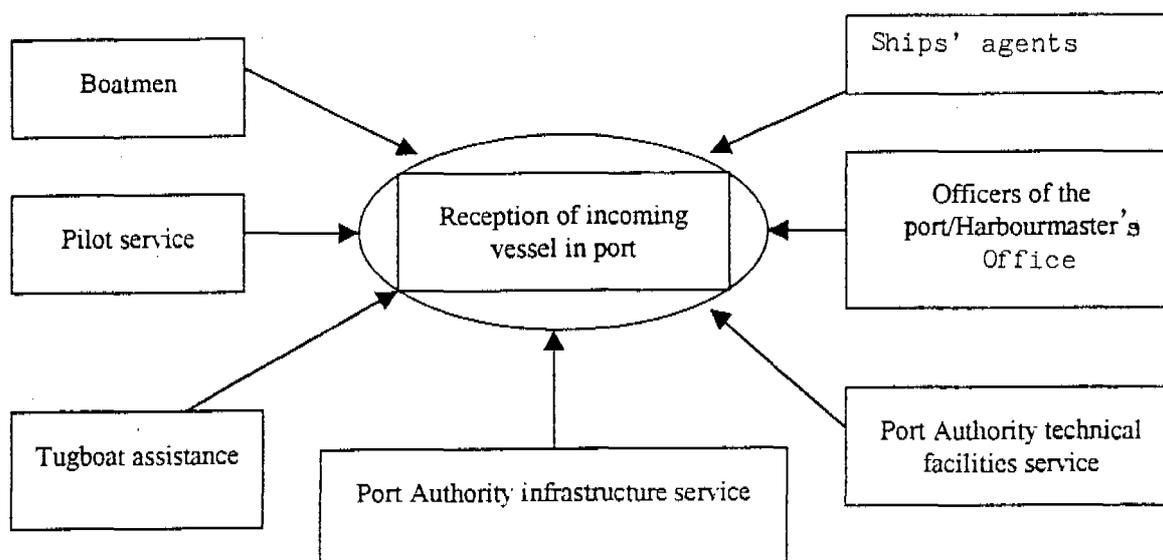
20. The quality charter is concerned with the reception of incoming vessels, which is an essential phase of port operations. This consists of a preparatory phase and an execution phase. When a vessel enters port, several steps occur in succession: embarkation of the pilot, navigation of the channel, berthing, services for the call (means of going ashore, provisioning, telephone hook-ups etc.). Several different entities are involved: the ship agent, the pilot, various Port Authority services - the Harbourmaster's office, the infrastructure and technical facilities operators, tugboat assistance, boatmen - in all, around a dozen players, all of whom will have signed the charter. The objective of the charter is to improve reception procedures for incoming vessels, give the various parties involved responsibility for what they do and coordinate their activities in the chain of operations.

3. Formulation of the charter - participants and stages

21. The Commerce Commission assigned the preparation of the charter to the Port Authority, which designated an official to take charge of the project: the chief of the Methods and Safety Bureau at the Harbourmaster's office. Its central position in the port community enables the Port Authority to put such projects into effect in conjunction with all the users of the port.

Figure 2

Those involved in the reception of an incoming vessel



22. It was decided not to "sample" businesses - i.e. select just some of them to participate in this first quality initiative. The success of the drive depended on mobilizing all involved in the chain of port services. The new working practices had to win acceptance from all concerned, and overall, the players responded favourably.

23. A number of bilateral and multilateral meetings took place over the 10 months it took to formulate the quality charter. That the undertaking was successful was due to constant collaboration.

- In the first phase, bipartite meetings - a total of 11 - with representatives of the businesses involved
- Five plenary drafting meetings of the various parties concerned, attended by the Operations Director of the Port Authority of Nantes/St. Nazaire (roughly one every two months)
- Before the text was finalized, five drafting meetings were held with each of the bodies of workers concerned (pilot services, tugboat assistance, ships' agents etc.), resulting in the immediate incorporation of amendments
- There was a final "signature meeting", to which the press, the port's chief clients and operators, the Port chairman and the chairmen of the commissions were invited.

Minutes of each meeting were prepared and participants were asked for their comments. If none were forthcoming, the minutes were approved. This validation procedure enabled the discussions to make progress.

4. Identifying problems and solutions

24. Initially, the Harbourmaster established individual contact with businesses, asking three questions of the various operators (one on negative aspects of the terminal, one seeking a "positive" response and one open-ended one to encourage reflection):

- What problems do you associate with the Agri-Food Terminal?
- What improvements should be made to correct these defects?
- What do you understand by "quality"?

Common replies received during these interviews served to identify the main shortcomings in the reception of incoming vessels at the terminal. They were used to define a plan behind which all participants in the quality management exercise could unite.

25. Four main problems were then identified:

Access to vessels. Access to vessels is gained via a gangway. Installing access gangways at Nantes/St. Nazaire was the responsibility of the crane operators, who positioned them when cargo handling operations began. If a vessel arrived outside cargo handling hours, no gangway was installed since the crane crew was not on site. Often, though, the ship agent would have liked to take advantage of the time before cargo handling began to prepare for the call with the crew on board and complete a number of prior operations, such as checking the atmosphere in the holds, provisioning, etc. Asking for a crane crew to install a gangway outside cargo handling hours was not possible on organizational and cost grounds. Agents thus had to take risks to get aboard. Sometimes they could not get aboard at all, and that had repercussions on the time when cargo handling could begin. A solution to the gangway problem had to be found. The quality of port services depended on it.

Mooring. There was room for improvement in mooring arrangements. Both the preparations for mooring and the actual operation were sometimes sloppily done, with problems being caused by the tidal movements in the estuary where the port is situated. Vessels would tend to drift away from the quayside, increasing the risks of an accident. The lines might break, for example. It might also become difficult to work aboard the vessel, and that could lead to interruptions in operations. Improving the quality of mooring was a must.

Berthing times. Berthing operations were not consistently coordinated. There were sometimes slippages between scheduled, desired and actual berthing times because of poor communication between the various parties involved in the chain of operations. Cargo handling staff (dockers, crane crews, etc.) might be ready for work when the vessel was not at the quayside. This created organizational problems and led to additional costs. Improving service quality depended on eliminating these problems.

Cleaning the quays. After bulk handling was completed, the quays were dirty and posed a hazard to personnel when the vessel left the quayside. Cleaning the quay shortly before a vessel departed would improve the quality of the service offered.

26. The representatives of the various entities along the chain of operations were asked to consider how to tackle these problems.

Access to vessels. To solve the gangway problem, the Harbourmaster's office acquired some lightweight gangways that could be put in place by just one person, thus doing away with the need for the crane crew. Now when a vessel arrives at the quayside the ship agent and the on-board personnel can set up the gangway by themselves. This simple step resolved a problem that had not been tackled in years. It was quality management that led to the solution.

Mooring. The conditions under which vessels are prepared for mooring and moored were reviewed in a small meeting with the boatmen. Since quality management began, specific mooring instructions have been issued by the port officer, who draws up precise, scale plans. Vessels are required to abide scrupulously by these plans, which specify where they are to tie up in relation to boundary markers and bollards and how the mooring lines and hawsers are to be arranged. The plan - the *minimum mooring requirements* - is sent aboard, to the boatmen and to the pilot, by the port officer. Compliance with this plan is mandatory. The port officer is empowered to require the vessel to change its moorings if he believes the minimum conditions have not been respected. The plan does not exonerate the vessel's captain or the boatmen from making such additional arrangements as they may consider necessary for the ensuing operations, the master remaining responsible for the mooring of his vessel.

Berthing times. A working party was set up to analyse the errors found. Two main points were studied: (a) identifying the demand for berthing times; (b) circulating information and assigning tasks and responsibilities. It transpired that agents often wanted a vessel to be berthed before cargo handling operations began so that they could make appropriate preparations. Thus with cargo handling scheduled to begin at 6 p.m., the agent would request a berthing time of 4 p.m. Before the launch of the quality management, poor communications often meant that the pilot would only pay attention to the time when cargo handling was to start, and as a result the vessel would be being berthed when cargo handling operations were due to begin. The preparations would delay the start of operations, but the dockers and crane operators were already on site and would be paid even if they were standing idle. Clients' wishes were not taken into consideration. The effects of such delays were also not carefully evaluated.

Cleaning the quays. The Port Authority bought some cleaning equipment. Ships' agents were asked to indicate when cargo handling was expected to be finished so that clean-up teams could come and clear the quays during the half-hour before the vessel began preparations for departure.

5. Formalization of procedures - drafting of the quality charter

27. The purpose of the quality charter was to identify, occupation by occupation, what information and operations were necessary and what responsibilities attached to each of the parties in the chain of operations associated with the reception of an incoming vessel.

28. The official responsible for drawing up the charter began with a chronological analysis of operations. He identified the tasks, activities and responsibilities of the various parties concerned at each stage of the berthing procedure. Such a sequential listing could not, however, constitute a charter. Several parties might be involved at any one stage.

29. The sensible thing to do, it was decided, was to reorganize the information gathered according to the broad categories of parties involved: the Harbourmaster's office, pilots, boatmen, ships' agents and so forth. This kind of "didactic" presentation reflected the desire to make the charter an "operational" document.

30. The charter comprises several elements (see Box 3). An introductory section (Preamble) describes the main objectives of the charter and what is needed for it to succeed. Then, in a section entitled "Information required", the charter details the information that needs to be exchanged among the different parties along the chain of operations. A section entitled "Undertakings by the parties" then sets forth the responsibilities of each group and what they have to do when a vessel calls at the port (see Box 4 and annex 1).

6. Evaluation of outcome

31. Evaluating an outcome requires indicators. The problems encountered by incoming vessels are being catalogued. Dissatisfaction rates over the gangway problem have dropped from 100 per cent to 20 per cent. Outstanding problems relate to the positioning of the gangway under particular physical constraints. This question is currently being dealt with.

32. All concerned agree that improvements have been made. It is difficult, however, to quantify this subjective appraisal. As far as quality is concerned, a new mindset has been instilled into personnel and operators. The effect on quality is mentioned every time a problem arises, thus revealing how aware of the question they have become.

33. All involved in the exercise have learnt to understand the problems that others face and where they fit into the transport chain. Everyone's role and responsibilities have been better defined. Responsibility for shortcomings can no longer be shifted elsewhere.

7. Extensions to the quality charter

34. The production of the quality charter was only one stage in the quality-improvement process. Once the charter had been adopted, follow-up meetings were scheduled. The charter also paved the way for future improvements in quality. It stipulates that parties should provide information that is not immediately useful but will be needed to improve procedures in the future.

35. Procedures have been improved further since the charter was adopted. Berthing requests by ships' agents have been formalized. The Harbourmaster's office amended the application form, put it into computer-readable format (diskette) and circulated it to all concerned, who can now work with a standard document giving information appropriate to the preparations for an incoming vessel. The information requested is of three types: (a) mandatory; (b) desirable; and (c) optional.

Box 3

Format of the charter

Preamble Objectives and conditions for successful application

Information required

On arrival

- Particulars of the vessel (name, nationality, length, beam, etc.)
- Type of propulsion and manoeuvring capabilities (number of shafts, type of propeller, etc.)
- Mooring and ship-to-shore communication (number of bollards available fore and aft, winches, etc.)
- Details of the call (ETA, ETD, provenance of vessel, cargo carried, etc.)
- Vessel requirements (fresh water, garbage disposal, telephones, bunkers, etc.)
- Vessel requests and constraints (date and time of berthing, date and time requested for start of cargo handling operations, berth location requested, etc.)

On departure

- Date and time of expected end of cargo handling; whether vessel has the same manoeuvring capabilities as on arrival, etc.

Input procedure

Undertakings by the parties: ships' agents, pilot service, Harbourmaster's office, port services (infrastructure and technical facilities), tugboat assistance, boatage. Each party undertakes to provide information and services of a given quality upon commencement and conclusion of services (example below).

Annex

Internal Port Authority charter for the reception of vessels at the Agri-Food Terminal, defining:

- the obligations of each port service
- the connections between the port services
- the main procedures followed.

Box 4

Example of an undertaking by a party

The ships' agents undertake

Upon arrival

- to provide the particulars needed to prepare for the call;
- to procure the information and forward it as soon as they have it;
- to keep the information up to date;
- to keep the chain of information current.

During the call

- to provide the earliest possible notice of completion of cargo handling and departure of the vessel so that the quay can be cleaned.

Upon departure

- to provide all necessary information in the Exit Declaration;
- to forward that information to the St. Nazaire Harbourmaster (Information and Coordination Centre, thereafter the Harbourmaster's information system).

Followed by the signatures of the ships' agents that are party to the charter.

36. The charter stated that the port would be computerizing procedures. Following its introduction, the port, in conjunction with a sample of ships' agents, amended the background documentation with a view to computerization. The formulation of the charter was a step leading to the computerization of procedures. When a vessel calls at the port, many items of information are repeated. A berthing request concerns every player in the vessel reception chain. The same information is shared among six parties: the pilot, the boatman, the tugboat operators, the port officer, the agent and the harbour service. Information used to be exchanged orally with no indication of the date and time of the exchange, making it impossible to check on its validity.

37. The ship agent who arranges for the call gathers the information, formats it as required and distributes it to all those involved in the reception of incoming vessels - the boatmen, the pilot, the tugboat operator, the Harbourmaster and the harbour service. With computerization, messages are distributed automatically. Everyone is given the same information. The computer issues a receipt. On receiving the information, the various parties add their stamp of approval or, if they have justifiable grounds for declining

to do so, can ask the agent to issue an amendment. The agent will then issue a new, date-stamped document superseding all previous ones. This will then be distributed to all parties. There is no longer any conflicting information.

B. The quality of the Agri-Food Terminal technical facilities

38. The Port's Commerce Commission also launched a quality management exercise aimed at the technical facilities. Bulk cargo handling raises the question of shrinkage. ^{1/} The shrinkage rate at Nantes/St. Nazaire was too high, at between 0.6 per cent and 0.9 per cent, whereas the average commercially tolerated rate ranges between 0.3 per cent and 0.5 per cent. At clients' - chiefly importers' and surveying firms' - request, the Port Authority set about reducing the loss rate. Quality of service required a reduction in the abnormally high shrinkage rate.

39. A number of steps were taken:

(a) The Port Authority set up a task force consisting of a service official and four technicians to make sure the weighing hoppers were completely reliable. Preventive maintenance routines, static and dynamic checks were defined and put into effect. Preventive maintenance and static checks are performed on the hoppers quarterly. Dynamic checks, which consist in measuring the weight on arrival of a 300-tonne sample of merchandise unloaded with the cargo handling and weighing equipment operated under standardized conditions, are performed once every two months. A statutory check is carried out yearly. The quality of the weighing equipment can no longer be the reason for discrepancies in weight. The quality procedures put in place have eliminated doubts as to the reliability of the weighing process.

(b) A quality assurance plan (QAP) for operating personnel was drawn up, defining check-up procedures for the weighing hoppers at the Agri-Food Terminal (see extract, annex IV). The QAP requires a number of steps to be taken. For example, at the end of each cargo handling operation, the general state of the hopper must be checked - the technical components and the cleanliness of the unit. Corrective action can thus be taken before work begins on the next vessel. Thus the quality of the equipment is maintained from one vessel to the next.

(c) At the same time, the Port Authority has striven to improve the overall quality of its technical facilities:

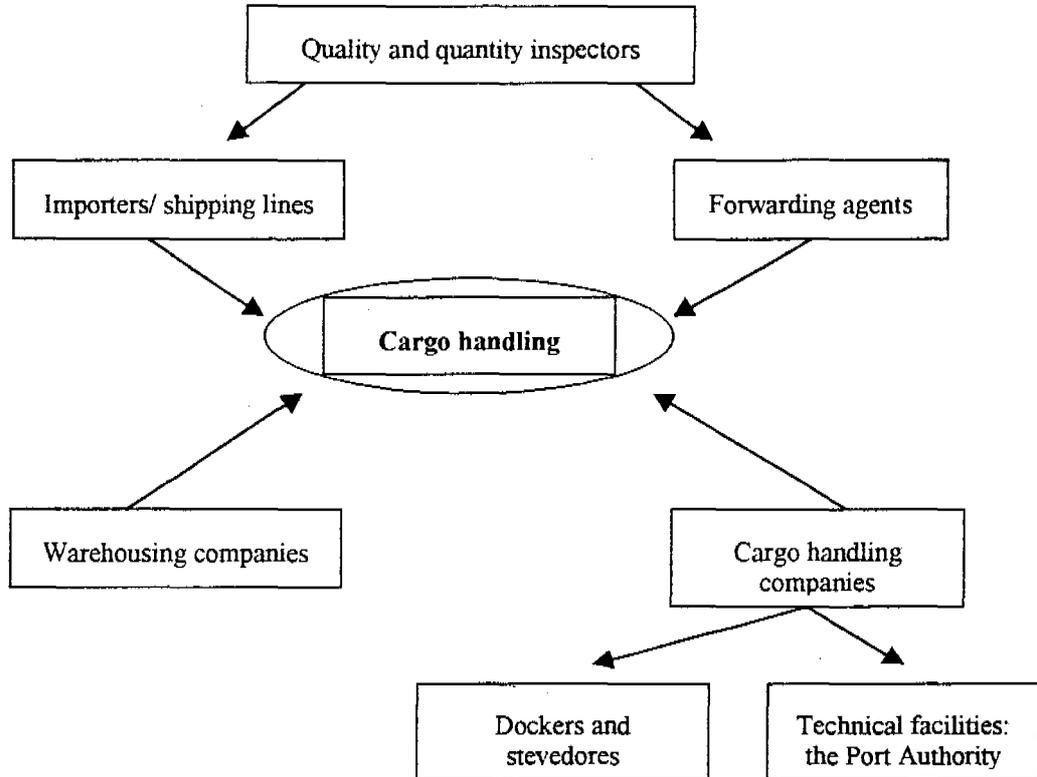
- Alterations have been made to the continuous cargo handling circuits to reduce losses of merchandise, dust emissions and leaks at joints;
- The cargo handling equipment maintenance personnel have been given greater responsibility and urged to monitor the performance of the facilities throughout cargo handling operations, making adjustments as the need arises to reduce losses of merchandise;
- These steps must be viewed in conjunction with the efforts made in cargo handling (see below), the third area in which action has been taken.

C. Cargo handling

40. Cargo handling when a vessel calls at the port is a complex operation involving a number of entities.

Figure 3

Those involved in the organization of cargo handling operations

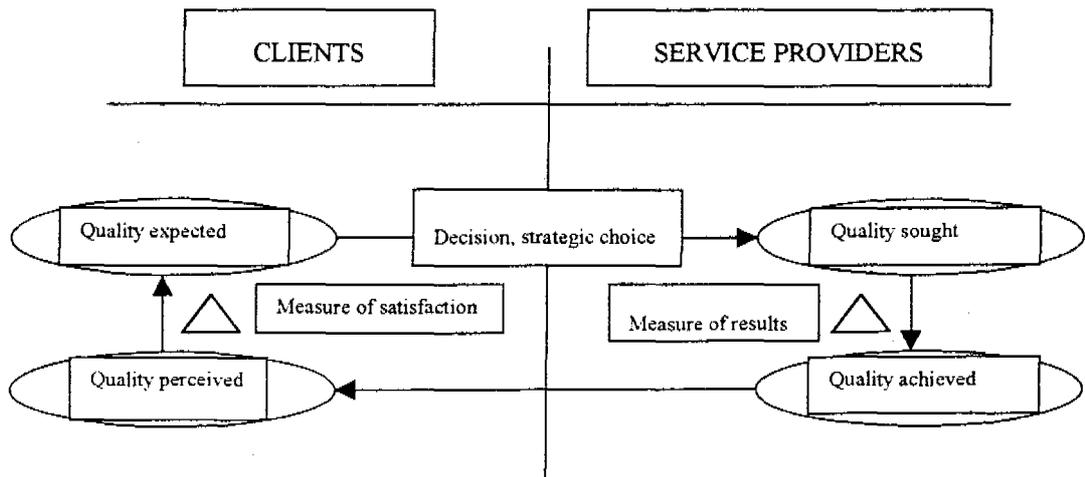


1. Preparations for receiving incoming vessels at the Agri-Food Terminal

41. One way of assessing the quality of a service is to measure the difference between what clients ask for and what services are provided.

Figure 4

The quality loop



42. The Port Authority decided to put its contractual arrangements with its clients on a formal footing. "Contractualizing" has enabled it to measure shortfalls vis-à-vis demand, discover why they occur and improve the service it offers.

43. Two steps were involved:

- Drawing up a contract between the port and the cargo handlers. The Port Authority's Technical Facilities Operation Service has produced a standard form so that cargo handlers can order the facilities they use (items of equipment, warehouses, circuits etc.) at the Agri-Food Terminal (see annex II). On receiving the form, the service indicates that the facilities will be made available or not - if it finds the request inappropriate or the facilities will not be available at the time requested. A binding contract for clearly defined services is then drawn up between the port and the cargo handler. In the event of disagreement over the services rendered (facilities not available, made available late etc.), the contract will be used to assess whether the cargo handler or the port is liable. It can also be used to check whether customer demand has been satisfied and ensure there has been no discrimination. If a client's order cannot be met (even several times), statistics can be used to show that the client concerned has not been discriminated against.
- Arranging preparatory meetings before vessels call. Because many different service providers are involved in any one cargo handling operation, their activities need to be very well coordinated. Preparatory meetings bring together cargo handlers, warehousing ventures, the Port Authority and the local dockers' enterprise. There the service providers establish their objectives for the call. Once again, these are put on a formal footing by being entered on a form (see annex III) that gives the following information: scheduled unloading time, number of crews, daily throughput and equipment start-up time. The scheduled objectives are then compared with the results obtained, and discrepancies measured. The reasons for them are analysed and remedies suggested. After a number of unloading operations, the cargo handlers, port personnel (the facilities service and staff) and dockers meet to discuss the operations carried out and consider what corrections should be made. Meetings of this kind depend on there being complete understanding among the parties involved, which does not develop overnight. Quality management entails a learning process. The virtuous circle of quality takes time to take shape.

2. Training for crane and gantry-crane drivers

44. The Port Authority of Nantes/St. Nazaire has taken a number of steps to improve the quality of its services by putting the working procedures of crane and gantry-crane drivers on a formal footing. Overall service quality largely depends on how well the crane drivers work. As regards shrinkage, for example, it transpired from an analysis of operations that cargo handling conditions were to blame for some of the losses. Improved procedures have

reduced losses. Before removing cargo from the hold, for instance, crane crews must nowadays ensure that the grab (the part of the crane that picks up the merchandise) closes firmly and will not let its contents escape. The grab must then be positioned over the unloading hopper without swinging to either side before it is opened to unload the cargo.

45. Besides the preparations for cargo handling, the quality exercise entails two activities:

- Practical training. A training module has been developed. Training is given to new recruits and less experienced operators. Learning in tandem - i.e. doing the job accompanied by an experienced professional - crane drivers assimilate good working procedures. Training in operating a container crane has on occasion been given in a simulator, to improve working practices;
- Production of a handbook of crane operating instructions. At the same time, instruction handbooks describing in detail, with illustrations, how to manipulate and drive a crane or gantry crane have been produced with the help of a work psychologist. These detail all the procedures a crane driver must follow, from starting up his equipment to shutting it down.

46. These steps have improved the quality of service. In bulk traffic, better crane driving has helped to reduce shrinkage rates. For liner traffic, the length of calls in port has become more predictable. Damage to cargo has diminished. The productivity of the container cranes 2/ has risen to 31 container movements per hour. The productivity of the terminal has increased by 15 per cent.

III. ANOTHER ASPECT OF QUALITY - SAFETY AT THE OIL TERMINAL

A. Use of industrial hazard analysis

47. At the oil terminal, quality is associated with the safety of reception of incoming vessels. Based on the experience gained at the Agri-Food Terminal, and in association with an accident-prevention programme, the Port Authority developed a much more structured tool for improving services together with a series of recommendations to operators on ways of improving safety.

48. The method employed is called "analysis of failure modes, effects and criticality". It is currently used in industry, in the automobile and aeronautics sectors, for example. It is used above all to analyse the risks associated with the use of physical components (a motor, propulsion unit). In adapting it to a maritime operation (the reception of vessels in port), the Port Authority took an original step.

49. The method breaks down the call of a vessel into several functions (sub-operations). For each of these, the question considered was what problems could arise if the functions were badly performed, and what the effects would be.

50. This method of risk analysis is based on a combination of three elements:

- analysis of the effects of an incorrectly performed function;
- analysis of the potential frequency of such a failure;
- analysis of capacity to correct the failure.

Ranked in the form of an index, this combination of elements can be used to derive a **criticality index**.

B. Production of safety recommendations

51. The method was applied to a simple case: a terminal with a single client and a single product (hydrocarbons).

1. The various stages

52. The method used at the Agri-Food Terminal was copied, but given the scope and technical nature of the task, an engineer employed by the Port Authority was specifically assigned to the work.

- Action began with a plenary meeting of the professional port workers involved in the reception of an incoming vessel at the terminal - the various Port Authority services, the client, the pilots, boatmen, agents etc.;
- The engineer held individual meetings with all the port workers involved, to establish what functions were carried out during the operation;
- A working party was set up to analyse these functions.

For example:

Function	Failures identified	Criticality
Maintaining vessel heading	Steering error Machine failure	1. Before the point of no return, minimum 2. After the point of no return, variable

Note: The "point of no return" is the moment during the overall process of navigating the channel and berthing the vessel when a failure becomes hard to cope with because the physical constraints imposed by the channel make it impossible to manoeuvre or use tugboat assistance, etc.

Considerable work has been done. Two hundred and sixty functions have been identified (besides commercial ones), covering the phases of arrival,

berthing, start of cargo handling operations and departure of the vessel. Forty of them have been analysed, e.g. use of the VHF radio, placement of mooring lines.

53. The exercise was given a formal structure with a view to possible certification. Minutes were kept of every meeting. Those attending were identified by name and signed the documents circulated. The comments made by each participant were recorded:

- At the end of the meetings, a consolidated document on the functions identified was issued and a working paper was validated;
- On the basis of the elements discussed, a criticality table was drawn up (see annex V). This lists the effects associated with each function, i.e. the seriousness and potential frequency of failures and the capacity for correcting them.

54. These effects were then ranked by assigning a mark between 1 and 10 to each failure identified, depending on how serious the consequences would be: incurring a financial loss due to delay scored lowest; putting the port and its surroundings in peril was given the highest score. Each incident was given a score.

55. The combination of scores for the seriousness, frequency and difficulty of correcting failures was used to determine the criticality of a function. 3/ A criticality threshold was established. When a function exceeds that threshold, procedures or recommendations are devised to reduce the level of criticality.

56. Evaluations of the probable consequences, frequency and means of rectifying failures contain a large subjective component. In contrast to physical objects such as a motor, evaluations are difficult to subject to real-life tests. The related uncertainty is diminished, however, by taking account of the views of all participants. When their evaluations converge, the various elements used in calculating criticality may be considered to have been properly assessed.

2. Duration and cost of the programme

57. The programme was much more complex. It began in January 1997, and lasted a year. The costs, in time terms, can be broken down as follows:

- Specialist engineer 5 months
- Plenary meetings (number) 6
- Bilateral meetings (number) 50

By way of comparison, the certification phase, if embarked on, would cost the equivalent of 200/250 hours. The bulk of the work has already been done. Certification will validate it.

C. Recommendations for vessels calling at the oil terminal

1. Recommendations

58. The diversity of factors that come into play when a failure occurs, the variety of means of rectifying it and the difficulty of covering all possible cases of failure or combinations of failures associated with the 260 functions identified made it impossible to establish exhaustive procedures. Any such attempt would have ended in confusion, made operators' tasks more burdensome and been disproportionate to the objective sought.

59. It was therefore decided to develop a handbook of guidelines (see annex VI) with the objective not of eliminating failures entirely or ensuring complete infallibility but at least of reducing errors and encouraging operators to apply certain procedures. The handbook puts forward recommendations that all are urged to follow. As at the Agri-Food Terminal, the overall operation of receiving incoming vessels has been "exploded" to allow recommendations to be produced for each of the parties concerned. Tables of recommended tasks have been drawn up to help operators to check that they have followed all the recommendations. The handbook is a working tool for each occupational group to use as it sees fit. It also catalogues the main incidents that are likely to occur (without claiming to be exhaustive) and describes the action needed to remedy them. Every player has a handbook of recommendations relating to his own actions and to what others in the chain of operations do when a vessel calls at the port.

60. The programme is an evolving process. As fresh incidents occur, the experience is used progressively to improve the recommendations, the goal being to reduce risks to near zero.

2. An example: preparations for an incoming vessel

61. As this function was analysed it became apparent that the Port Authority did not have available the information it needed to prepare properly for an incoming vessel. The procedure was thus improved by means of a series of recommendations.

62. When the function was analysed, it transpired that the harbour services did not have the information they needed to moor vessels swiftly and safely.

63. The procedure was therefore modified: two documents are now transmitted, by fax and satellite, to the master of the vessel 48 hours or less before the vessel calls at the port. The first is an entry declaration which the master must return to the port, containing information on the technical characteristics of the vessel when it calls (description of its anchors, winches, braking capacity, manoeuvring equipment available etc.). The second is a mooring plan. The 48-hour time frame gives the master time to think; it is also close enough to the scheduled arrival time to reduce discrepancies between the reply sent to the port and the actual state of the vessel when it arrives.

64. When the Harbourmaster's office receives the documents, the officers there can check that the vessel's characteristics and the proposed mooring plan match. If the vessel is not equipped to comply with the plan, or if the

captain rejects it, another proposal can be sent. By the time this procedure is complete, a definitive minimum mooring plan can be produced with the agreement of both parties, the Harbourmaster's office and the captain of the vessel. The plan is then sent to all involved in the berthing operation: port officers, boatmen, pilots, tug crews and agents.

65. In the first few months, vessel captains provided unsatisfactory answers to the questionnaires. Nearly 80 per cent of the answers given were unrealistic. In the remaining cases, the proposed mooring plans could not be carried out. After six months, however, it was found that 90 per cent of the answers given were serious and thoughtful.

66. The quality management at the oil terminal has enabled procedures to be put on a formal basis, and recommendations to be made on a number of functions crucial to the reception of a vessel in port.

D. Evaluating the benefits

67. The recommendations have had a number of benefits. First, more time has been gained to prepare for unloading operations, which makes for commercial savings for the client. There has also been a benefit in terms of safety: the more swiftly unloading commences, the faster the vessel is lightened, making it less sensitive to currents, which can be powerful in an estuarial port such as Nantes/St. Nazaire.

68. In summary, the benefits evaluated are of three kinds:

- Improved safety for personnel, the port zone and the surrounding area;
- An improvement in commercial terms, since safety attracts custom in the hydrocarbon sector;
- Time gained at the quayside.

69. There are points in common between the experiments at the Agri-Food and oil terminals: in each case there was a targeted, progressive, rigorously conducted programme with heavy involvement of the port community. Producing the quality charter at the Agri-Food Terminal was easy and did not require any additional or private human, financial or technical resources. The results were immediate. Any port could launch such a programme. Quality management at the oil terminal was more complex and required greater technical know-how. This paper presents two different approaches for different kinds of traffic, reflecting the diverse constraints that apply to port operations. In both cases, quality is a must.

Notes

1/ Shrinkage is the difference between the weight of the cargo loaded at departure and the (lower) weight upon arrival. The reduction in weight can be attributed to dust in the case of dry goods and to evaporation in transit in the case of bulk liquids.

2/ Productivity is calculated based on the time between the start-up and shut-down of the crane.

3/ The highest score for criticality was 512. The Port Authority has set a criticality threshold of 60 for each function. When that score is exceeded, action must be taken to reduce the seriousness, the frequency or the costs of rectifying the function under consideration.

Annex I

Extract from the Agri-Food Terminal Quality Charter - the Pilots

The PILOTS undertake:

Upon arrival

- To be capable of receiving information round the clock;
 - To acknowledge receipt of information;
 - To draw the vessel captain's attention to the planned mooring arrangements, secure his confirmation as soon as possible that they are feasible and encourage him to begin making ready;
 - Having set a boarding time, to stick to it;
 - Having established with the tug operators and the planning office (in the light of the information supplied) what is needed, to use it (other things being equal);
 - Having set a time with the tugs, to stick to it;
 - Having set a time, in coordination with the Surveillance and Intervention Unit and the boatmen, for arriving at the berth, to stick to it;
 - Having been told the "ship ready" time and agreed to it, to stick to it;*
- To forward the information to the St. Nazaire Harbourmaster's Office, either via the Co-ordination and Information Centre or, when it has been installed, the information system at the Harbourmaster's Office.

* To meet this quality criterion, a "normal" amount of time is allowed for mooring the vessel which, in the absence of information to the contrary from the ship's agent, is assumed to have the requisite equipment in good condition and a crew of average ability. Ninety minutes are allowed for a Panamax, for example. Cape Size vessels are considered case by case.

Upon departure

- To be punctual for the boarding time set with the Surveillance and Intervention Unit and the boatmen;
- To determine needs with the tug operators and the planning office;
- To use the resources determined at the time set;
- To ascertain the captain's views on the call overall;
- To forward the information to the St. Nazaire Harbourmaster's Office (Co-ordination and Information Centre or Harbourmaster's Office information system).

Annex II

Standard request form for equipment and facilities

Emetteur de ce fax

Destinataire de ce fax



Service Exploitation des Outillages
Bureau Escale Aval
Fax : 02.40.00.45.60

A l'attention de

COMMANDE D'ENGINs et INSTALLATIONS

TERMINAL AGRO-ALIMENTAIRE

NOM DU NAVIRE

MARCHANDISE

JOURNEE DU

	6/14	14/22	22/6	8/16	REPONSES DU PORT	
					OUI	NON
ENGIN →						
CIRCUIT →						
CIRCUIT →						
TOUR →						
MAGASIN →						
ENGIN →						
CIRCUIT →						
CIRCUIT →						
TOUR →						
MAGASIN →						
ENGIN →						
CIRCUIT →						
CIRCUIT →						
TOUR →						
MAGASIN →						

EQUIPEMENT SPECIFIQUE

Observations du Client :

Signature du Client :

Observations du Bureau Escale Aval :

QUALITE DU SERVICE EFFECTUE - TERMINAL AGRO-ALIMENTAIRE

MANUTENTIONNAIRE	<input style="width: 95%;" type="text"/>	NAVIRE	<input style="width: 95%;" type="text"/>			
	PRODUIT <input style="width: 95%;" type="text"/>	ESCALE DU	<input style="width: 95%;" type="text"/>	AU	<input style="width: 95%;" type="text"/>	
INDICATEURS DE QUALITE DE SERVICE	<i>Réunion préparatoire ou commande</i>	<i>Signature du décompte d'heures</i>		<i>Réunion de débriefing</i>		
	<i>Prévu</i>	<i>Réalisé</i>	<i>Ecart</i>	<i>Causes</i>	<i>Préconisations</i>	<i>Améliorations 1-2</i>
TEMPS DE DECHARGEMENT						
NOMBRE D'EQUIPES	TOTAL <input style="width: 40px;" type="text"/> EDC <input style="width: 40px;" type="text"/> dont : GRUES <input style="width: 40px;" type="text"/> P16 <input style="width: 40px;" type="text"/>	TOTAL <input style="width: 40px;" type="text"/> EDC <input style="width: 40px;" type="text"/> dont : GRUES <input style="width: 40px;" type="text"/> P16 <input style="width: 40px;" type="text"/>				
RENDEMENT JOURNALIER						
(en tonnes) TEMPS DE DEMARRAGE DES INSTALLATIONS (en cumulé)						
OBSERVATIONS DIVERSES						

1-Améliorations relevant d'une décision des Cadres Opérationnels.
 2-Améliorations relevant d'une décision des Directions.

Monitoring the quality of cargo handling equipment

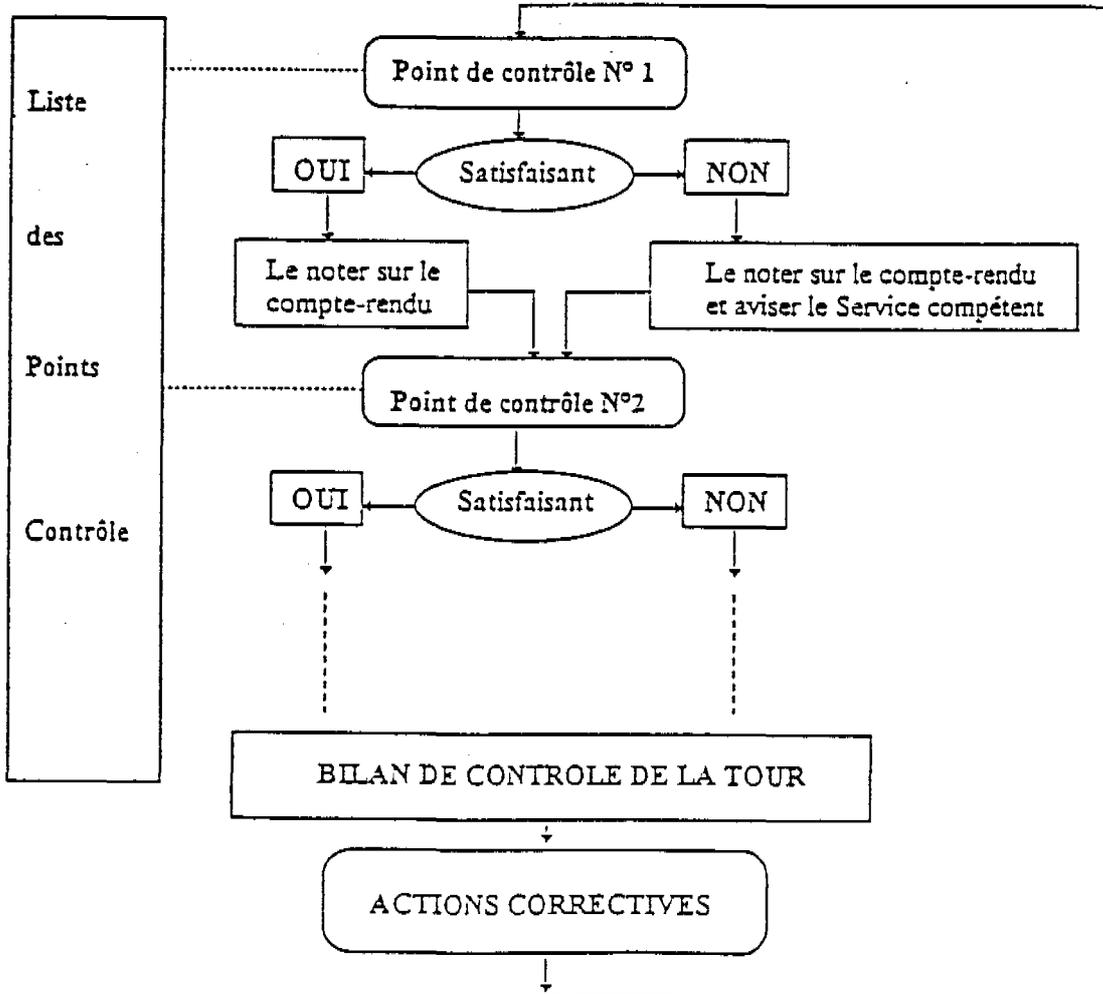
PORT AUTONOME DE NANTES-SAINT-NAZAIRE
PLAN D'ASSURANCE QUALITE

TERMINAL : TAA de MONTOIRE

APPLICATION : Tours de pesage P2, P3, P6

DESIGNATION PROCEDURE : CONTROLE ETAT GENERAL TOUR

LOGIGRAMME



NANTES/ST. NAZAIRE PORT AUTHORITY
QUALITY ASSURANCE PLAN

TERMINAL: MONTOIRE AGRI-FOOD TERMINAL

APPLICATION: Weighing towers P2, P3 and P6

DESIGNATION OF PROCEDURE: GENERAL CHECK ON TOWER CONDITION

PERSON RESPONSIBLE: Officer in charge of operations, Agri-Food Terminal

OBJECTIVE: After every vessel call, to check the general state of the weighing tower used, in particular how clean it is and its physical condition, so that corrective action, if necessary, may be taken before the next time the tower is needed.

PROCEDURE:

Under the Port Authority's Quality Assurance Plan, each weighing tower must be clean and in good working order before cargo handling operations begin on the next vessel needing to use it.

1. General state of each tower: checklist

1.1 After each call by a vessel during which a weighing tower is used, the officer in charge of operations shall designate a professional to check the general state of the tower, following the checklist. The checker shall sign off against each item checked and add any comments necessary. He shall then report to the officer in charge of operations, who will take corrective action as appropriate.

1.2 When corrective action has been taken, the officer in charge of operations shall again designate a professional to re-check the tower, using the same checklist, making sure in particular that the corrective action has been properly carried out. The checker shall add his findings to the checklist and report to the officer in charge of operations.

PORT AUTONOME DE NANTES - SAINT NAZAIRE		
TAA de MONTOIR	Date contrôle :	

CONTROLE ETAT GENERAL TOUR DE PESAGE <u>P.</u>
--

Nom Agent :

Etat des matériels et installations.	Commentaires.
RDC	
Sol et murs propres, secs, bien dégagés	_____
Transporteur vers magasin	_____
Local calculateur pesage / imprimante	_____
Capotages et aspirations	_____
1^{er} ETAGE	
Sol et murs	_____
Navette / Révolver	_____
Trémie vidange propre et vide	_____
2^{ème} ETAGE	
Sol et murs	_____
Trémie peseuse propre et vide	_____
Pesons et guidages	_____
Trappes et portes	_____
Casques de fermeture / Vérins	_____
3^{ème} ETAGE	
Sol et murs	_____
Trémie de réception propre et vide	_____
Trappes et portes	_____
Réseau de dépoussiérage	_____
4^{ème} ETAGE	
Sol et murs	_____
Aspiration et filtres	_____
Décolmatage / vidange fines	_____
Réseau de dépoussiérage	_____
Tête de transporteur de quai	_____
Boite 2 directions propre et vide	_____
Gaine by-pass propre et vide	_____
Conclusions :	

Annex V

Specimen analysis of a function - Failure, effects and criticality

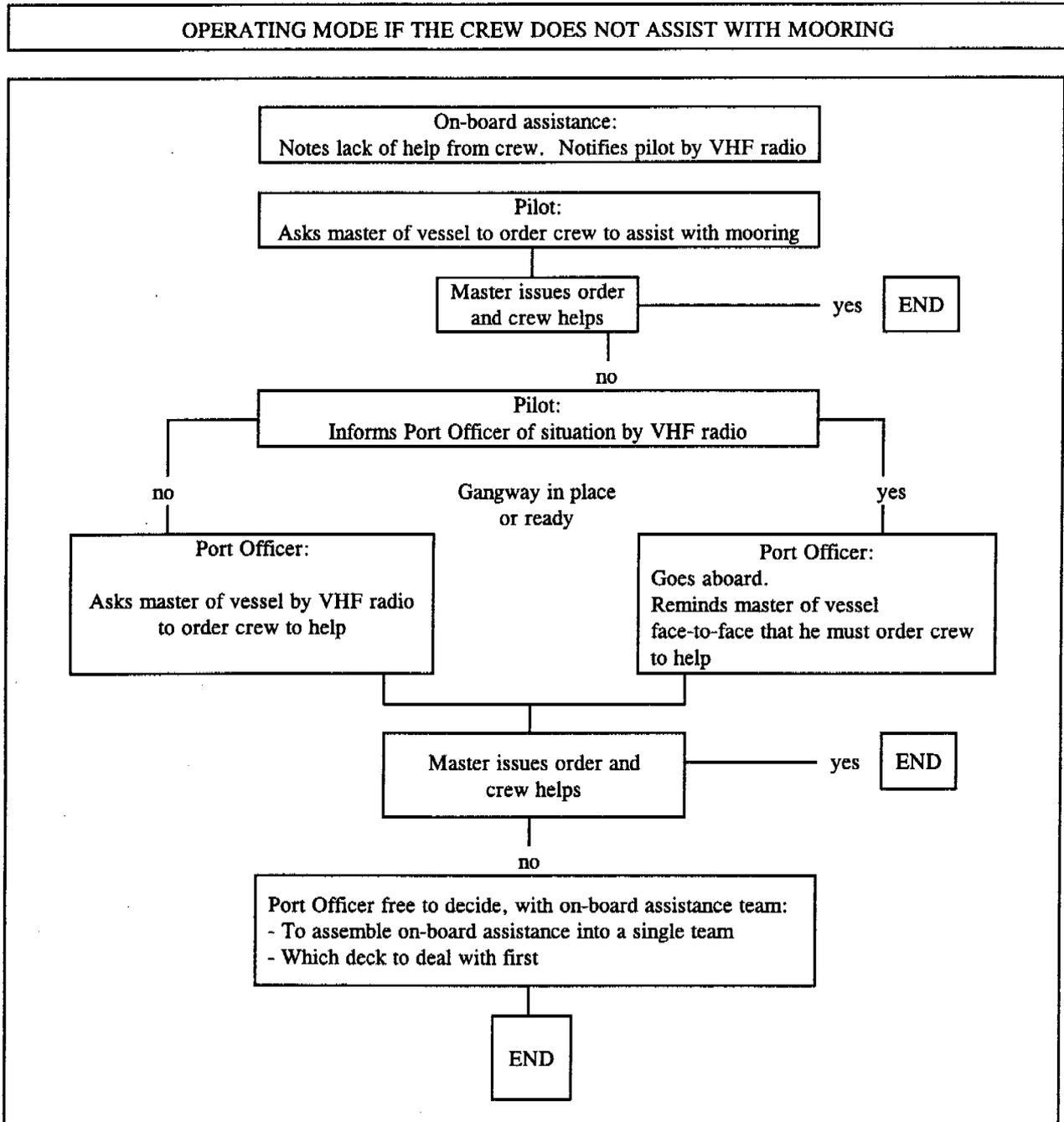
PORT AUTHORITY OF NANTES/ST. NAZAIRE

Function: 43.22: taking in slack: winch operation at the oil terminal										
Performed by: crew										
Effects on system or process	Failure mode	Causes	1. Detection 2. Remedial action (at the time)	G	F	R	C	Future preventive and/or corrective action	C'	Who responsible, deadline
E1 Mooring and discharging significantly delayed	M1 Winch failure	C11 Outright failure	R1 1. Finish establishing other moorings, keep tugs for pushing 2. Try to compensate with another winch		3	4	84	A12 Use synthetic mooring lines taken aboard from shore (rented) if the vessel is inadequately equipped (G' = 5, R' = 2)	20	
		C12 Winch disengaged (insufficient cooling)	3. Try to repair 4. If unsuccessful, compensate with mooring lines from shore	7	4	4	112	A22 Test winches before entering fairway (if in doubt?) (F' = 2 for C11 and C12)	40	
		C13 Winch frozen								
E2 Poor mooring (tension poorly distributed, possibly leading to moorings breaking)	M2 Winch not powerful enough	C21 By design (cost-cutting for shipowner)	R2 Keep tugs for pushing until low tide and significant lightening	7	5	3	105	A21 Improve port's mooring system: jacks on the breast lines to take up and balance the strain (G' < 5, R' = 2)	< 50	
		C22 Leak						(A22 Maintenance, vetting F' = ?)		
E3 Very serious situation: vessel cannot moor (or clear to return to sea if loaded)	M3 All winches on deck fail	C13 General failure of power system	R3 1. Berth with pushing tugs 2. Drop two anchors vertically 3. At the same time, mount anchor watch	8	1	8	64	A3 Check the possibility of using a tug to take in slack on moorings		
	M4 Crew unhelpful or incompetent Cf. 43.2, M1, M2, M4						< 30			

Annex VI

Safety analysis of berthing operations - mooring at the Donges 6 and 7 oil terminals

IV. CORRECTIVE ACTIONS



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