UNITED NATIONS

TD

United Nations Conference on Trade and Development

Distr,
GENERAL

UNCTAD/SDD/MT/2
10 November 1993
Original: ENGLISH

CONTAINERIZATION AND STANDARDS

Report by the UNCTAD secretariat

CONTENTS

Abbreviations

AFSA Association Fran‡aise des Societ,s d'Autoroutes
APC American President Company
ASEAN Association of South East Asian Nations
CFC Chlorofluorocarbon
COST European Cooperation in the field of Scientific and Technical Research
CPC Cellular Palletwide Container
ESCAP Economic and Social Commission for Asia and Pacific
ECE Economic Commission for Europe
ECMT European Conference of Ministers of Transport
IAPH International Association of Ports and Harbours
IICL Institute of International Container Lessors

ICHCA International Cargo Handling Co-ordination Association
IMCO Intergovernmental Maritime Consultative Organization
ISO International Organization for Standardization
TC 104 Technical Committee 104 - "Freight Containers"
TEU Twenty-foot equivalent unit (container)
USD United States dollar
WG 4 Working Group 4 - "Future Containers"

Introduction

1. In the work programme in shipping, ports and multimodal transport adopted at its first session, the Standing Committee on Developing Services Sectors: Fostering Competitive Services Sectors in Developing Countries - Shipping requested the UNCTAD secretariat to "monitor developments in containerization and related transport technology with potential impacts, particularly for developing countries, on countries' transport infrastructure and investment requirements, including developments in the field of standardization of containers."[1] This report summarizes the desk study carried out by the secretariat in the field of developments of international standards on containers and on related activities.

2. Chapter I outlines the present status and the modifications made to the ISO standard 668 - the most important from the point of view of the interchangability and modularity of containers used in international multimodal transport. In Chapter II the situation in the field of use of non-ISO containers in different regions of the world is outlined. The Chapter also describes the impact of the introduction of larger containers on the different links of the multimodal transport chain based on surveys conducted by different international bodies. In Chapter III the developments in container manufacturing industry are outlined from the point of view of the dimensional characteristics of new containers entering the industry. For these purposes the data on container production available from the desk study as well as from the sample survey conducted by the UNCTAD secretariat have been used.

3. Chapter IV describes the most important conclusions made by the second ECE Seminar on the Impact of Increasing Dimensions of Loading Units on Combined Transport. In Chapter V certain changes in the International Organization for Standardization (ISO) procedure as regards the adoption of international standards are described in relation to standards in freight containers and a thought on the desirability of international agreement on container standards is put forward. Chapter VI emphasizes the relevance of the principle of sustainable development to the aspects of containerization.

Summary and conclusions

4. Stability of international standards on container dimensions has a paramount importance for the development of multimodal transport. From the beginning of modern containerization it has been recognized that the impact of container standards on the international transport is so important that involvement of governments has proved to be necessary when major problems in this field arise.

5. Such an awareness has led to the formulation of the policy of ISO in the field of standards on freight containers: to keep them stable and to ensure their world-wide application thus permittings operators and manufacturers throughout the world to have confidence in the long-term developments and investments.

6. The developments of container transport systems based on the use of containers corresponding

to the ISO 668 standard on dimensions and ratings have confirmed that the adopted international standards on containers reflect a fair balance among various requirements of different modes of transportation from technical, economic, legal and safety points of view. As regards the quantity of containers in service and equipment put into operation to support this system the point "of no return" has long since been reached. About seven million TEUs are at present in operation world wide and almost all of them are ISO standard containers. Containerships, port cranes and facilities, railway rolling stock are designed to handle and move ISO standard containers.

7. Non-ISO containers are in use in domestic and some regional trades and up to now their presence in the world container trade has been negligable. As was stated at the second ECE Seminar on the Impact of Increasing Dimensions of Loading Units on Combined Transport, 99 per cent of the transportation community will never have any need of containers with dimensions going beyond those prescribed by the present ISO standard 668.

8. However, since, in some trades, operators have found larger-than-ISO containers profitable, and taking into account that these are the biggest operators that imposes the possibility of entering of such containers in international trades, standardization of bigger containers has persisted. This led to the elaboration of proposal for a second generation containers.

9. These containers, outlined in the ISO report "Future wide-body containers", have empirically established dimensions incompatible with the existing container systems. Their dimensions also go beyond the most existing infrastructure limits. The proposed dimensions have not been accepted by the transport community at large and have also been rejected by most governments. The proposed dimensions have not reconciled regional and worldwide requirements for the dimensions of containers based either on more generous road traffic regulations or on advantages provided by the efficient accomodation of regionally used pallets.

10. Up to now several countries, including developing ones in different regions of the world, have encountered problems with the handling non-ISO containers. Other countries and regions also may face practical problems if forced to handle such containers. The possibilities and modalities of dealing with non-ISO containers therefore have to be carefully studied on a case-by-case basis. In some cases it would be logical that during a transitional period, the cost of adaptation of the transport systems to handle such non-standard containers should be born by the operators interested in their introduction.

11. A trend towards the recognition of the second generation containers as a new international standard will certainly persist, especially with the development of trade in high-volume, low-density goods for which such containers are specially designed. In the present economic climate, however, the use of non-ISO containers has diminished dramatically. Furthermore, discussions and studies undertaken on the impact of new container dimensions on the transport industry have shown that the repercussions of the introduction of new generation of container standards will be enormous. It will require world-wide coordination of the dimensions of transport equipment for the future. In this connection the political aspect of the problem of container standards has acquiered a new dimension. The question may therefore be raised, whether the present institutional framework for the elaboration and adoption of international standards on container dimensions are still adequate.

12. In recent years certain modifications have been introduced in the ISO procedures of elaboration and adoption of international standards, ostensibly with the aim of streamlining and accelerating these procedures. These modifications, however, have not been undertaken without causing some damage to the democratic character of the procedures which permitted to developing and other countries, not represented at the stage of the elaboration of a draft international standard, to influence on the process of the adoption of the standard. Moreover,

ISO's Technical Committee 104 (ISO/TC104) - Freight Containers - a body responsible for the elaboration of container standards, has recently departed from its obligation to conduct the widest possible consultations on proposals which may compromise the interchangability and modularity of containers. Not denying the role of ISO in the elaboration of international standards, it would seem that the question of a such importance can no longer be left completely to a non-governmental body which has lost its strong safeguards to guarantee the interests of all parties concerned.

13. In this connection the proposal of safeguarding the interests of long-term investments by conclusion of a flexible but binding international agreement in the field of container standards for international multimodal transport put forward during the early stages of containerization, appears once again to have become relevant. Elaboration and adoption of such an international agreement would give all users and operators the necessary confidence in the stability of the international container standards. The agreement would provide the stability desired and establish an equitable regime for the introduction and application of future internationally agreed container standards and thus contribute to the orderly development of international container transport.

14. In consideration of the problems connected with international container standards it should be kept in mind that the transport industry is directly concerned with the aims set out at the Earth Summit - the UN Conference on Environment and Development (June 1992). Agenda 21 is a relevant item in this respect, attempting as it does to instill the virtues of "sustainable development" into all relevant development issues. In essence, it involves ensuring that current development processes give overriding priority to the needs of the poor and not compromise future economic and social development potentials. This requires adopting policies and technologies which do not endanger the natural systems that support life on Earth.

15. The impact of the transport sector from the ecological point of view in general is significant. Consequently, any new development, including the introduction of new international standards on containers, should be considered only if it takes into account this aspect, one that necessarily involves the process of trade-offs. In this context, preliminary consideration of the introduction of larger containers indicates that it may have a negative impacts on the environment.

CHAPTER I

Changing standards

16. The issue of container standards continues to be one of the most important factors influencing the development of multimodal transport. It is commonly recognized that the stability of international standards on containers is a paramount condition for the orderly and efficient development of container transport worldwide. Though ISO/TC 104 - the body entrusted with the work on container standardization - still in 1978 recognized that "work on the standardization of freight containers had reached the stage at which a high degree of stability can be maintained" (Resolution 71 of the 10th meeting of ISO/TC 104, see Annex 1),[2] further developments have proved that the basic container standard ISO 668 establishing external dimensions and ratings of series I containers has been changed since its first adoption on several occasions (see table 1).

17. The modifications had been justified by the need of the adjustment of standards to the changing trade and technological environment. Fortunately, it may be stated that none of these modification had affected the most important parameters of containers from the point of view of intermodality - their width and length, so that the modules 8' X 20' and 40' adopted at the beginning of standardization, had not been modified.

Table 1

Series I Containers (ISO 668 standard)

Designation	Year of introduction	Length	Width	Height	Rating
1AAA	1993	40'	8'	9'06"	30 480 kg
1AA	1969	40'	8'	8'06"	30 480 kg
1A	1964	40'	8'	8'00"	30 480 kg
1AX	1979	40'	8'	<8'00"	30 480 kg
1BBB	1993	30'	8'	9'06"	25 400 kg
1BB	1974	30'	8'	8'06"	25 400 kg
1B	1964	30'	8'	8'00"	25 400 kg
1BX	1979	30'	8'	<8'06"	25 400 kg
1CC	1974	20'	8'	8'06"	24 000 kg (from 1985)
1C	1964	20'	8'	8'00"	24 000 kg (from 1985)
1CX	1979	20'	8'	<8'00"	24 000 kg (from 1985)
1D	1964	10'	8'	8'00"	10 160 kg
1DX	1979	10'	8'	<8'00"	10 160 kg

Source: ISO 668 standard.

18. The most recent and the most controversial of the mentioned changes was the introduction of 9'06" as a standard container height (1AAA and 1BBB). However, containers with such height are gaining popularity and their share in the total world container population is at present more than seven per cent (see table 2). However, inland transportation of such containers raise many problems in many places and is often impossible. In the inventories of carriers and lessors, they continue to be considered as specials clearly indicating that they are not "standards". For this reasons many countries were reluctant to accept the introduction of containers with such height as an international standard (see further Chapter IV, a)).

Table 2

Proliferation of 20' and 40' long 9'6" high containers (in TEUs)

	1980	1983	1986	1990	1992
Number of 9'06" x 20' and 40' containers	41 160	86 366	188 509	310 050	457 155
Total number of containers	2 499 456	3 798 730	4 778 866	5 102 563	6 373 051
Share of total, per cent	1.65	2.27	3.94	6.07	7.17
Growth rate	1.00	2.09	4.57	7.53	11.10

Note:

For 1990 and 1992 only dry-freight containers (excluding thermal, tank, flatrack and other types of special containers) were taken into account.

Source:

Computed from the censuses carried out by Containerization International in 1980, 1983 and 1986, and by Cargoware International in 1990 and 1992.

19. It should be born in mind that resolution 71 of ISO/TC 104 on stability of container standards was adopted in 1978. It was a period when containerization had reached a certain degree of maturity, the ISO containers had become to be largely accepted by the transport community, the use of pre-ISO containers had been phased out, though, at the same time it had been recognized that the use of non-ISO containers would continue to have a place when it responded to the needs of particular trades.

20. The developments in containerization have since confirmed the trends outlined at that time and have proved that the adopted international container standards on dimensions and ratings, reflect a fair balance between the different technical, safety, operational, legal and economic requirements of marine, rail and road transport. The world container fleet since has increased fourfold and its homogenity has been steadily growing thus evidencing the worldwide acceptance of the ISO standard (see table 3). About 90 per cent of the world container population is now represented by 20' and 40' long containers with 8'6" height. If 9'6" 20' and 40' long high-cubes are included, it may be stated that the world container population in its overwhelming majority corresponds to the ISO standard 668.

Table 3

Share of 20' and 40' long 8'6" high containers (in TEUs)

	1980	1983	1986	1990	1992
Total number	2 439 456	3 798 730	4 778 866	5 874 084	7 320 400
8'06" x 20'	934 481	1 834 280	2 185 102	2 475 725	3 157 339
8'06" x 40'	945 668	1 417 338	2 026 636	2 542 952	3 290 166
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Per cent	75.2	85.6	88.1	85.4	88.0

Source:

Computed from the censuses carried out by Containerization International in 1980, 1983 and 1986, and by Cargoware International in 1990 and 1992.

21. Apart from some domestic (United States) and regional trades (Europe), non-ISO containers are, in general, in use only in specific international trades, where high-volume, low-density cargo is prevailing. Except for their length, they correspond to ISO specifications. The share of such containers in the world container population is negligable. As it is shown further in the present report (see chapter II), there is no universal use of these containers and it seems that there are no prospects of their general exceptance in the near future. There are some indications that the markets in which such containers are in demand are becoming saturated and the orders for such containers are consequently declining. Indeed, Maersk and other major vessel-operating multimodal transport operators (VO-MTOs) at the moment only use refrigerated 45' containers on the European continent, while Sea-Land has completely abandoned this length of containers.

22. However, certain persistance in the use of non-ISO containers has raised the problem of their possible standardization. TC 104 has taken the initiative in this respect and a proposal for a "second generation" of ISO standard containers was born. This proposal had been elaborated in the Working Group 4 "Future Containers" (WG4) convened within TC 104 in 1987. It finally formulated the new draft standards in its report entitled "Future wide-body containers" in 1991.[3]

23. This report proposed the following main external dimensions for future generation containers:

Height: 2,896 mm (9'6"); 2,591 mm (8'6")

Length: 7,430 mm (24'0"); 14,935 mm (49'0")

Width: 2,595 mm (8'6").;

24. It can be seen that as regards their length, the proposed containers differed from those adopted by the regional standardization bodies, which had been based, in general, on non-ISO units already in operation in the regions: domestic containers in the United States and swap-bodies and inland containers in Europe. In view of the strong opposition the proposal was not adopted for publishing as a formal ISO technical report. Instead it was retained as an internal TC 104 reference document, and WG4 itself was disbanded. This document had been put before the second ECE Seminar on the Impact of Increasing Dimensions of Loading Units in September 1992, which is discussed further in this report (Chapter IV).[4]

CHAPTER II

Situation in the field of use of non-ISO containers

a) IAPH study

25. According to a survey conducted by the International Association of Ports and Harbours (IAPH) in 1991[5] out of a total 154 responding ports a third (49) reported having handled non-ISO containers. A total number of such containers - 1,541,039 - constituted only 3.8 per cent of the total number of container handlings reported (40,849,311). This small number of non-ISO containers included some with a height of 9'06" (56 per cent of total non-ISO reported) which in the meantime had become a standard height. Of the 49 ports responding as having handled non-ISO containers, 26 ports (53 per cent) handled less than 1 per cent non-ISO containers, 15 ports (31 per cent) between 1 and 10 per cent, and 8 ports (16 per cent) between 10 and 100 per cent. From its survey IAPH has drawn the conclusion that because the handling of non-ISO containers remains confined to a certain range of ports, their handling cannot yet be identified as a global issue to be tackled as a whole by the world port community.

26. With regard to a specific dimensions the IAPH survey revealed that 99.7 per cent of over-height containers measure 9'6" and 94.3 per cent of over-length containers measure 45'.

27. The main Indonesian port, Tanjung Priok's container terminal may be cited as one example of the manner in which developing countries deal with non-ISO containers. When in 1987 some shipping lines tried to bring 45' containers to this terminal it was declared that the terminal would accept only standard containers because the design of the terminal and the container-handling equipment were conceived for ISO container handling only. But with the development of trade between the United States and the other South East Asia countries, non-ISO containers were gradually introduced. In order not to loose Indonesia's share of the market, the policy of not

accepting non-ISO containers was changed. To accomodate non-ISO containers the terminal introduced a special regulations according to which a limited number of such containers for each shipment were admitted to the terminal and the shipping lines were requested to pick up these containers from the terminal as soon as possible so that they do not cause operational constraints to the terminal. In the first half of 1992 the port handled 212 45' containers out of a total of about 455,000 TEUs.

28. If the terminal is to be able, in the long term, to handle a greater number of non-ISO containers, a serious upgrading of the facilities will be necessary. It might be necessary to allocatie a dedicated area in the terminal for handling such containers. In any case, according to the port authorities, the tariffs for handling non-ISO containers have to be adjusted in order to recover additional investments and the loss of the operational flexibility of the terminal.

Table 4

Regional Distribution of non-ISO Containers Handled

Region	Number of responding ports	Number of non-ISO containers handled	Share, per cent
Africa	5	0	-
South America	1	0	-
Australasia	14	14	-
Caribbean	2	1 709	0.1
Mid-East	14	2 618	0.2
Europe	53	252 299	16.4
Asia	46	439 217	28.5
North America	19	845 182	54.8
Total	154	1 541 039	100

Source:

Survey on the penetration of non-ISO standard containers. Compiled and printed by IAPH, Tokyo, Japan, August 1992.

29. In terms of geographical distribution, as shown in table 4, a great majority of the non-ISO standard containers are concentrated in the North America region, followed by the Asian region and Europe. This confirms that most of developing countries do not handle such containers. This conclusion is also confirmed by the census of the world container population carried out by Cargoware International in mid-1992.[6] According to this census North American owners control 72.5 per cent of all non-ISO length containers.

b) North American continent

30. According to the 1992 census of the world container population conducted by Cargoware International, about 80 per cent of all high-cube inventories (9'6" height) were held by owners in North America and the Far East. It is of particular significance that over 20 per cent of all high-cube containers (about 143,000 TEUs) were either 45', 48' or 53' non-ISO containers concentrated in domestic North-American trades.

Table 5

Composition of United States container fleet, 1991 (in real units)

Length	Carriers	Lessors	Total	Share, per cent
53'	1 200	-	1 200	*
48'	7 282	-	7 282	*
45'	21 263	997	22 260	1 21
40'	214 051	637 744	851 795	46 12
24'	12 438	-	12 438	*
23'	-	101	101	*
20'	69 191	882 636	951 827	51 54
10'	-	48	48	*
Total	325 425	1 521 526	1 846 951	100
TEUs	580 717	2 160 507	2 741 224	

Note: * Negligable percentage.

Source:

Inventory of American Intermodal equipment - 1991, Maritime Administration, U.S. Department of transportation, November 1992.

31. Of all the oversize containers, by far the greatest number, are the 45' length units. Certain number of these containers are specials such as flatracks and reefers. All the 45' units are 9'06" high, some are 8'06" wide, and have end-frames at 40'. Some of them are used in international trades: they are scattered in small numbers to the trans-Atlantic, Asian inter-port, Europe/Asia, and Caribbean trade routes. These containers were first introduced by American President Corporation (APC), other multimodal transport operators followed suit. At present ownership of such containers is approximately APC 33 per cent, Sea-Land 20 per cent, M'rsk 15 per cent, with over 20 per cent divided between a handful of other operators. Thus, wherever these carriers operate, 45' containers can be seen and despite the potential handling problems, increasingly appear in the ports of developing countries.

32. Contrary to the 45' units, 48' units are nearly all in domestic utilisation in the United States, but a few are built to marine standards and are on occasion sighted in east Asian ports (other than Japan).

33. Non-ISO wide-body (8'6"-wide) (United States) domestic lightweight containers have been progressively introduced at the expence of piggy-back technology by the American railroads in their competition with road carriers. The internal volume of container plays non-negligable role in the economics of this traffic. By 1990, about 40 states in the United States allowed trailer length up to 53' on their highways. That moved railways to introduce containers with such length in connection with the development of double-stack container trains. In the United States double-stack container trains are considered profitable when the distance of transportation is in excess of 800 miles (about 1,300 kilometers). Below this distance the cost of managing chassies and of terminal handling seems to outweight the advantages of long-haul transportation by rail.

34. However, in general, 53' long containers tend to be deployed in specific city-to-city corridors and are tailored primarily to individual customers' requirements. In 13 states they may not legally

be moved by road. Since the demand in 53' long containers is not very high, it is not expected that their number would be increased significantly in the near future. According to the 1992 data of the United States Maritime Administration, there was no such containers on order by railways or other transport or leasing companies.

35. In spite of the rapid increase of domestic intermodal traffic, most revenue for operators of double-stack trains in North America has come not from domestic but from international traffic carried in maritime ISO containers which represent the overwhelming majority of the container population in the United States (see Table 5).

36. The following example proves that the height of container is not any more limited to 9'6" (2.9 m). To meet the requirements of certain categories of domestic shippers, American President Companies (APC) introduced a prototype of a new lightweight 9'9" high container which is described as the largest intermodal container in the world. With dimensions 53' x 9'09" x 8'06", this container has a vertical door opening 110" extending along the container's inside. It is argued that many domestic shippers welcome such a facility provided usually only by road transport vehicles, and are not prepared to do business with a transporter who cannot provide the equipment having such loading opening.

37. It is worth while adding that even in the United States the introduction of bigger containers involves certain difficulties including the adaptation of chassies and handling equipment. Unlike highways, railways in the United States are not regulated by government dimension or weight reglementations. They are constraint only by economic, infrastructure and investment barriers. Infrastructure constraints are often difficult and costly to overcome and are usually borne by the railways themselves. For example, the length of rail wagons is limited to 89' (27.1 m) by the conditions of track geometry. As a result it is not possible to carry two containers longer than 44'06" in the lower tier of a double-stack wagon. Consequently, long containers (45', 48', and 53') have to be transported on top of 20' and 40' containers on the upper tier.

38. It has been estimated that as many as one third of the containers shipped in the United States may exceed the prescribed weight limitations. This results in serious road damage and creates safety problems in connection with their movements. The problem of overloaded containers has been so serious that a special law (the Intermodal Safe Container Act of 1992) was adopted requiring shippers to give initial (road) carriers accurate written information about the nature and weight of the cargo carried inside each container.

c) European Community

39. The use of non-ISO containers is not a monopoly of United States domestic transportation. Swap-bodies and inland containers with different lengths and with a width of 2.5m are in general use in the European logistics systems in conjunction with palletized goods. It is estimated that an equivalent of about 200,000 TEUs of such units are presently in operation. Among them the so-called "cellular pallet-wide containers" (CPC) should be mentioned as gaining popularity in short-sea and coastal trades. The main feature of these containers is that they have 8' wide endframes and a width of 2.5m along the sidewalls. They may thus be carried in standard containership cells while at the same time providing side-by-side stowage of 1,200mm-wide pallets. The fact that the attention of leasing companies has recently been attracted to such containers suggests that they are gaining popularity.

40. As an exceptional example of a specific case one may cite the use of 7.70m long and 3.10m high containers by a European company supporting the trade between Antwerp and Romania by railway. The use of specialized Multifret rolling stock which has a loading platform hieght of only 94cm above the railhead permits transportation of these containers by the European railways

having limited margins. The company has deployed this equipment in an effort to maximize the volume of a unit load in the trade whith long frontier delays and a big potential risk of pilferage. This example confirms the conclusions made in a document of the European Conference of Ministers of Transport (ECMT) that "broadly speaking, very large units can still be carried, but on an exceptional basis and subject to exceptional arrangements and provided that they meet a need"[7].

41. For the purposes of the second ECE Seminar on the Impact of Increasing Dimensions of Loading Units on Combined Transport, the European Cooperation in the field of Scientific and Technical Research (COST) carried out a world-wide survey on the consequences of an introduction of proposed new generation containers, the so called COST 315 study[8]. The study revealed that at present new generation containers are unexceptable for Europe. As an example as regards the European railways, the study concluded that the introduction of larger containers "will clearly have a negative effect on rail transport, at least in the short run, due to the difficulties and costs linked to the need to enlarge the loading gauge, adapt structures and terminals, invest in new rolling stock and operate a wider variation of different intermodal loading units".

d) Port equipment

42. Though many ports in recent years have ordered ship-to-shore container cranes with spreaders capable of handling longer-than-40'-containers, the majority of cranes presently in service are not suitable for handling overlength containers (see table 6). About one third of all container cranes capable handling non-ISO overlength containers are located in North America. European ports, despite their large share in the world container trade, hold under one fifth of such cranes. Ports in South East Asia have the largest share of container cranes equiped with spreaders capable of handling 40'-plus containers. Here the overlength units outnumber the conventional ones by 2 to 1. This indicates that most ASEAN terminals have been equiped during recent years when it has become increasingly used practice to order spreaders suitable for handling longer-than-ISO containers, mainly 45'-long containers coming from United States ports. Contrary to this and although the European ports have recently have made big purchases of this equipment, the small proportion of such cranes presently in service in Europe, suggests that port operators in Europe are not convinced of the necessity of 40'-plus spreaders, having experienced insufficient traffic of non-ISO long containers to justify the additional investments.

Table 6

Analysis of spreaders used in conjunction with ship-to-shore cranes by ability to handle containers more than 40' length

Ability to handle longer than 40'	Europe	North America	North Asia	South East Asia	Mid-East India	Other regions*	Total
Yes	72	123	91	57	26	9	378
No	510	260	183	27	97	197	1 274
Unknown	120	91	61	15	25	65	377
Total	702	474	335	99	148	271	2 029

Note: *Includes Africa, Australasia and Central and South America.
Source: Cargoware International, December 1991, p. 30.

43. In a report of ECMT at the second ECE Seminar on the Impact of Increasing Dimensions of

Loading Units on Combined Transport it was stated that the figures from five main container berths in Antwerp indicated that of a 120,000-container population handled, only about 30 were 45' long containers[9].

44. According to this report, the introduction of longer-than-ISO containers may bring the following consequences for a port:

- obsolescence of handling equipment;
- lower productivity;
- poorer safety; and
- desorganisation in operation.

Table 7

Extracts from the crane modification cost guide

Alteration activity	1,000 US$ (1992)
Raise gantry from 4.9 m to 6.1 m	580/670
Widen leg width (pass-through arch)	1,800/2,250
Increase outreach by 30' (9.1 m)	900/1,075
Increase hoist capacity by 33 per cent	670/780
Change shore power to diesel	425/515
Increase hoist speed by 40 per cent	680/790

Source: Cargo Systems October 1992, p.153.

45. A modern container ship-to-shore crane costs about 7.2 million USD. According to general cost guidelines in relation to different alterations of cranes in service, submitted by a company having significant experience in this field, a 20-year old crane can be rebuilt to required dimensions and speeds for one half the cost and one third the calendar time required for the purchase of a modern Panamax crane. In this case the service life of the crane can be extended for another 20 years or more. It is interesting to note that the subsequent modification of a container crane with widening the leg width (pass-through) is far the most expensive of all other crane refurbishments.

CHAPTER III

New containers entering the industry

a) Concentration in container industry

46. A remarkable trend towards concentration and further growth of the container industry has been observed during last several years. In 1985, the number of factories producing more than 10,000 TEUs a year was 26 with a combined total production reaching 438,320 TEUs. In 1991 the number of manufacturers with a production capacity over 10,000 TEUs had reached 54 with an annual production of 788,820 TEUs or about 90 per cent of all containers produced that year. At the same time, according to Containerization International Yearbook (1987 and 1992 editions), the number of manufacturers with the production capacity in the range below 10,000 TEUS

decreased from 97 to 79 and their share in the total production fell from 19 to 10 per cent.

47. In 1992, the one million TEUs production level was passed for the first time with the figure standing at 1.15 million TEUs. Many new-generation manufacturing facilities started their producing that period, especially in Asia, where about 80 per cent of all containers were manufactured. Almost half of that production came from the Republic of Korea, which kept its leading position among the producers of this region. However, the pattern of the world's container manufacturing industry is changing, and becoming more widely dispersed across the Peoples' Republic of China and the countries of South East Asia (Indonesia, Malaysia, Philippines, Thailand). It was estimated that by the end of 1992, China had developed a theoretical annual manufacturing capacity of 200,000 TEUs from 20 different manufacturers, Indonesia about 135,000 TEUs and Thailand 192,000 TEUs.

48. However, in the second half of 1992 the situation in the container market and, consequently, in the container production industry, changed radically. Demand had slumped, forcing the manufacturers in the different corners of the world to curtail their production and sometimes to close their just-commissioned facilities. It was estimated that in the first half of 1993, the industry in China had an over capacity of around 35 per cent, that of Indonesia was 50-60 per cent, and the figure for Thailand might have been even higher. The production in the Republic of Korea for the first three months of 1993 was almost 50 per cent below that of the same quarter of 1992.

49. Table 8 shows that the bulk of containers produced was represented by standard dry freight 20' and 40' containers, with the share of 40' containers in steady rise. Contrary to this, there is no growth in number of longer-than-ISO containers produced. This would seem to confirm that there is saturation of trades where such containers are in use.

b) UNCTAD survey on dimensions of containers entering the industry

50. The UNCTAD secretariat conducted a sample survey on the dimensions of dry freight containers entering the industry from certain container manufacturers. The survey covered about 25-30 per cent of the annual production output and its coverage reflected the changing pattern of the world container production industry, with most of 25 responders being in the countries of Eastern Asia. The summary of the statistics relating to the distribution of new containers by length is shown in Table 9 and that by height in Table 10.

51. Among non-ISO lengths only 45' long containers were noticable in the replies received by the UNCTAD secretariat (125 units), produced in one of new factories commissioned in the North American continent. The vast majority of the "others" in relation to the length was represented by 30' containers for dry bulk cargo, and the rest were 10'small containers.

52. In relation to the height, containers other than 8', 8'06" and 9'06", except for 1992, were almost equally represented by half-height 4'03" and 9'00" swap bodies. In the figures for 1992 all the "others" in relation to the height were represented by 9'00"-height swap-bodies.

53. As was the case of the previous study in this respect[10] the survey did not reveal any significant signs of proliferation of non-ISO dimensions (length and height) among new containers. Contrary to this, the survey confirmed the trend towards the increasing of the demand in 40' containers and a significant consolidation of the position of 8'06" high containers. High-cube 9'06"-high containers are steadily taking their place in the production lines since 1991. With the adoption of this height as an international standard, the trend to their further spread will certainly be confirmed.

Table 8

Estimated world container production by type for 1990, 1991 and 1992 (in TEUs)

Type of container	1992	1991	1990
Dry freight	1 080 000	870 000	750 000
Standard	1 020 000	810 000	700 000
Special*	44 000	42 000	25 000
Euro pallet-wide (over 40' long)	8 000	8 000	10 000
	8 000	10 000	15 000
Refrigerated	64 000	35 000	44 000
Tank containers	6 000	5 000	6 000
World total	1 150 000	910 000	800 000

Note: *Including open-top, flatrack, platform, ventilated, bulk, open-side types.
Source: Cargoware International, February 1993, p.27

Table 9

Distribution of containers entering the industry by length (in TEUs)

Length	1989 TEUs/Share	1990 TEUs/Share	1991 TEUs/Share	1992 TEUs/Share
20'	76,209/60.6	88,899/52.9	89,904/43.0	132,598/43.5
40'	49,569/39.4	78,998/47.0	119,218/57.0	172,366/56.5
45'	-	-	-	125***/**
Others*	-	214/0.1	-	-
Total	125,778/100	168,111/100	209,122/100	305,089/100

Note:

*Includes 10' and 30' containers.
**Negligable percentage.
***Real units.

Source: Replies to the UNCTAD secretariat questionnaire.

Table 10

Distribution of containers entering the industry by height (in TEUs)

Height	1989 TEUs	Share	1990 TEUs	Share	1991 TEUs	Share	1992 TEUs	Share
8'	6 244	5.0	2 156	1.3	219	0.1	-	
8'6"	119 304	94.8	165 347	98.4	204 497	97.8	291 104	95.4
9'6"	-		-		3 790	1.8	13 985	4.3
Others*	230	0.2	609	0.3	616	0.3	1 000	0.3
Total	125 778	100	168 111	100	209 122	100	305 089	100

Note: *Includes 9'0" and half-height (4'03") containers.

Source: Replies to the UNCTAD secretariat questionnaire.

CHAPTER IV

Second Seminar on the Impact of Increasing Dimensions of Loading Units on Combined Transport

54. The seminars on the Impact of Increasing Dimensions of Loading Units on Combined Transport convened within the United Nations system under the influence of the growing concern in relation to the possible impact of the introduction of a new international standard on freight containers have played an important role in the international debates on the developments in the field of international container standards. At these seminars the views on the acute problem of container standards development have been expressed not only by representatives of the industry but also by governments.

55. The second seminar took place in Geneva from 1 to 4 September 1992 under the auspices of the United Nations Economic Commission for Europe[11]. As in the case of the first seminar held in November 1989, this seminar was convened with the assistance of UNCTAD to enable UNCTAD member states, especially developing countries, to take part in the discussions and in the formulation of the recommendations adopted by the Seminar.

56. The participation in the seminar was fairly representative: overall 33 countries attended of which 10 had come in response to the invitation of the UNCTAD secretariat. More than 20 international organizations and representatives of the industry also took part.

57. The discussion confirmed that, at least in the short and medium term, it was not possible to arrive at a consensus on any new globally acceptable dimensional standards on containers, given different traffic regulations, infrastructure requirements and the huge investments made in container vessels, port equipment and inland rolling stock in many countries of the world.

58. The seminar adopted a resolution in which it took note of the concern of transport circles and many governments of the possible impact of increasing dimensions of containers on the organization of the transport chain and on transport infrastructure. It took into account the fact that many operators of maritime transport would face severe problems, particularly with regard to cellular ships and port equipment, if width and length of containers other than those of existing ISO series I containers would need to be handled. A similar concern was expressed concerning inland waterway and rail transport operators.

59. The seminar recommended that the existing ISO series I containers "which particularly in most developing countries had been the basis for recent large-scale investment in infrastructure, rolling stock and handling equipment, should continue to be the main container standard which should be improved in line with emerging market requirements".[12]

60. The seminar also recommended certain principles that should guide governments and international organizations concerned in their approach towards acceptance and standardization of new dimensions of loading units which would be acceptable to shippers and the transport industry worldwide.

61. The seminar concluded that for the foreseeable future regular inland transport of loading units with a length of 49' (14.9 m) and width of 8'6" (2.6 m) would be virtually excuded in most countries in Africa, Asia, Europe and Australasia. Equally the 24'6" (7.43 m) half-size container proposed by the ISO would not be acceptable because of its width.

62. With respect to operations in certain countries (i.e. European countries) the seminar concluded that "a container with a length of 7.43 m (24'6"), a width of 2.50m and a height of 2.60m would from a technical and legal standpoint, be acceptable for inland transport. While these countries felt that such loading units would be commercially attractive, for a large number of other countries such dimensions would be neither economic nor viable. Increases, particularly in width and height, beyond these dimensions would lead to an increase in difficulties for the handling and transport of such loading units. A world-wide use of loading units with dimensions beyond 2.55m in width and 2.90m in height would not seem to be possible."[13]

63. The discussions at the seminar confirmed that the problem of the international standardization of container dimensions will continue to be acute and one of vital importance for the development of multimodal transport worldwide. Consequently, the UNCTAD secretariat will continue to monitor these developments and contribute to discussions on this subject in order to safeguard the interests of member states in this field.

CHAPTER V

ISO changing procedure

a) Modifications in the adoption of international standards

64. The Ad hoc Intergovernmental Group on Container Standards for International Multimodal Transport, two sessions of which took place respectively in 1976 and 1978, unanimously expressed strong support of the ISO work on container standards and an appreciation of its procedures[14]. The ISO procedures have been considered as sufficiently democratic allowing everybody to express their concern or objections to new standards proposals. Unfortunately, as experience has shown, the lack of interest of many countries and the uncritical acceptance from the side of national authorities had often resulted in missed opportunities to express their views. Moreover, certain modifications have been introduced in the ISO procedures of the adoption of international standards recently which do not make them more democratic.

65. The introduction into ISO 668 of a new height - 9'6" - is a good example. At its sixteenth session in May 1991, TC 104 confirmed its earlier decision, taken at the London meeting in 1989, to introduce an additional container height of 9'6" inches (2.9m) into the ISO 668 standard with designation IAAA (40') and IBBB (30'). It may be recalled that in spite of that decision, the central ISO secretariat at that time did not take any further action on this proposal considering it as a new dimension under resolution 22/1978, and requested TC 104 to prepare a comprehensive report and evaluation showing that this newheight is in the common iterest of all parties concerned.

66. A draft international standard (DIS) in this respect was circulated by the ISO secretariat to all ISO member bodies for voting on March 19, 1992. According to new ISO Directives (Edition 1992), a draft International Standard "having been circulated for voting is approved if

- (a) a two-thirds majority of votes cast by the P-members of the technical committee or sub-committee are in favour, and
- (b) not more than one-quater of the total number of votes cast are negative.

67. Abstentions are excluded when the votes are counted, as well as negative votes not accompanied by technical reasons."[15]

68. In the previous edition of the ISO Directives it was stated that an International Standard required approval by at least 75 per cent of the member bodies casting a vote, and that the Secretary-General of ISO should make a special enquiry into cases where more than two negative votes had been cast, and consult, when appropriate, the interested parties. In the new edition of the Directives this last condition is absent.

69. The result of the voting was unprecedently controversial. Indeed, of 26 ISO member bodies participating in the vote, 6 cast negative votes in respect of the introduction of 9'06" height as standard. Two other member bodies abstained and, therefore, in accordance with the ISO Directives, their votes were not counted in the vote along with two other votes which arrived after the limit date (September 19, 1992). Among the P-members disapproved the standard were Australia, Belgium, Cuba, Czech Republic, India, United Kingdom - countries with non-negligable share in container trades.

70. Formally, in accordance with the mentioned above conditions of the ISO Directives, the draft standard was approved, since, among 21 P-members of the Technical Committee TC 104, 15 votes were in favour (71 per cent) and among 24 ISO member bodies cast only 6 cast negative votes (just reaching the required 25 per cent). Consequently ISO published Amendments to standards ISO 668, ISO 1496-1, ISO 1496-5 and ISO 3874 introducing containers 1AAA and 1BBB with a height of 9'6".

b) ISO Council resolution 22/1978

71. A change of the ISO Directive is not the only evidence of the departure from the procedures favorable to developing countries and in this regard more general remarks inevitably come to mind.

72. In response to the question of stability of container standards the need for which had been strongly advocated by all parties in the *Ad hoc* Intergovernmental Group on Container Standards for International Multimodal Transport, TC 104 adopted resolution 71 drawing attention to the fact that the work on standardization of containers had reached a stage at which a high degree of stability can be maintained. This idea was further elaborated in resolution 22/1978 adopted to the same subject by the ISO Council. This resolution, referring to a possible economic impact of substantial changes in the basic ISO container standards, requested that the proposals for revisions of these standards were widely circulated to permit the widest possible consultation. Moreover, a comprehensive report and an evaluation showing that these changes are in common interest should be submitted supporting such proposals.

73. A remarkable move in respect of this resolution took place at the last, seventeenth meeting of TC 104[16]. Under the pretext of the accelerating of the ISO procedures and eliminating "the discrimination" of TC 104 in comparison with the other ISO technical committees, the presidency of the Committee proposed and other developed countries supported the proposal of the withdrawal of the ISO Council resolution 22/1978.

74. The presidency of TC 104 considered this resolution injust and stated that the track record of the Committee "in no way demonstrates a blindness to the interests of developing countries."

75. Contrary to this statement, it should be underlined that this resolution, adopted under the influence of the deliberations on the subject of container standards within UNCTAD, is still very pertinent. There has been a permanent controversy in the Committee between the interests of developing countries, which have very limited representation in the Committee, and the push towards bigger and heavier containers from the side of some Western countries. Numerous

resolutions in this respect of the UNCTAD Committee on Shipping is an evidence of such a situation. Resolution 22/1978 several times played its role as a constraining factor preventing a premature adoption of some new standards on containers which did not meet the interests of all concerned parties, developing countries in particular.

76. That was the reason why the delegations of developing countries (China and India) were against the withdrawal of resolution 22/1978. However, the Committee adopted by a majority a resolution inviting the ISO Secretary-General to review resolution 22/1978 "as to its current relevancy".

77. The abolition of resolution 22/1978 may be considered as evidence of a shift in the TC 104 procedures which may lead to its convertion into a club of vested interests dictating its will to the rest of the industry. This step may undermine the significance of this standardization body itself as the recognized international authority which role in the field of container standardization has been highly appreciated worldwide. This is why the UNCTAD secretariat has manifested its anxiety before the ISO central secretariat insisting on the necessity to persuade the ISO Council to safeguard resolution 22/1978.

78. In this context it is worth to remember a warning by the UNCTAD Group of Experts on Container Standards for International Multimodal Transport which, when assessing the institutional framework within which ISO standards are developed, considered that the composition of experts who prepare a draft proposal is extremely important. Experts may to a certain degree exert their influence on the development of a draft standard. Since developing a standard is a matter of compromise among different interests, it is important that all interests are duly represented. The Group of Experts noticed the lack of adequate representation of developing countries and it should be recognized that the situation has little changed since that time in this respect[17].

c) International agreement on container standards

79. The desire to ensure stability and confidence in the standards was the main reason for the adoption, at the end of 1972, by the United Nations/IMCO Conference on International Container Traffic of resolution No.4 on Container Standards for International Multimodal Transport. That resolution invited the Economic and Social Council to consider the practicability of eventually drawing up an international agreement on container standards. In the opinion of a group of countries, such an agreement would ensure a reasonable stability of container standards elaborated by ISO, particularly concerning external dimensions and ratings of containers - the most important parameteres from the point of view of modularity and exchangability between different modes of transport. However, long discussions on this matter within the Ad hoc Intergovernmental Group on Container Standards for International Multimodal Transport had revealed a profound difference in the approaches of groups of countries which did not permit an agreement to be reached at that time.

80. However, the experience concerning the developments in the field of container standards during the period elapsed since that time has shown that an international agreement in this field would have represented a remedy of many problems permitting a representative and professional discussion of the issues arised. The need for a reasonably flexible but binding international document in this field has been evidenced by the recent attempts to develop and introduce an international standard for a new generation of containers, the need for which is felt, it should be recognized, in any case at present, for certain trades. It can be expected that the pattern of the future development of trade will force the industry to return to the question of the introduction of a new generation of containers.

81. It is remarkable that at the second ECE seminar voices appealing for measures to be taken which would prevent future uncertainties concerning international container standards as regards a proposed new generation of containers were raised. One of the reports stated that "the resulting implications of a possible system of co-ordinating the dimensions of transport equipment for the future at world level of are so great that an international convention should be concluded which would incorporate the provisions of the above-mentioned system and a time-table for its introduction in every region of the world."[18]

82. It is also remarkable, that at last meeting of TC 104 in June 1993 voices were raised by developing and developed countries concerning the pertinence of the conclusion of an international agreement safeguarding the necessary stability of the future container dimensions standards, in case they are adopted, and the scheduling of their worldwide introduction. A delegation from a developing country underlined in this respect that UNCTAD would represent the most appropriate place for forging such an agreement.

83. Confidence of all users and operators in the stability of the international container standards may be ensured by the elaboration and adoption of an international agreement on standards for containers designed for international transport. Such an agreement would provide the stability desired and establish an equitable regime for the application of internationally agreed container standards and thus contribute to the future orderly development of international container transport.

CHAPTER VI

Containers and sustainable development

84. The transport industry is directly concerned by the aims set out at the Earth Summit - the UN Conference on Environment and Development (June 1992)[19]. Agenda 21 is a relevant item in this respect as it attempts to instill the virtues of "sustainable development". In essence, it involves ensuring that current development processes give overriding priority to the needs of the poor and not compromise future economic and social development potentials. This requires adopting policies and technologies which do not endanger the natural systems that support life on Earth.

85. The impact of the transport sector from the ecological point of view in general is significant. Any new development should be considered taking into account this aspect that necessarily involves the process of trade-offs. The question of container dimensions is not an exception in this respect.

86. For example, Association Fran‡aise des Societ‚s d'Autoroutes (ASFA) considers that containers with the width of 2.6m present problems from the point of view of their transport on the French motorways. According to the present standards the width of the lane is 3.5m, and this is considered as insufficient for lorries from the point of view of road safety even with the present admissible width of 2.5m.

87. Reconsideration of the present motorway construction standards with the aim of increasing the lane width will require more land and will lead to a further degradation of the environment. In this respect, the introduction of containers wider and longer than the present ISO standard may be considered as environmentally harmful.

88. On the other hand, it may be recognized that as concerns larger dimensions of containers, for the same quantity of cargo fewer containers will be required. This could lead to savings in energy

consumption and air pollution because of the expected consequent reduction in the number of movements of containers and in road congestion. However, the COST 315 study reaches the conclusion that, as regards road transport, the introduction of larger containers will have only a very limited or perhaps even negligible effect on the number of trips made. The reason is the limited market share of voluminous goods and, as a consequence, a limited number of large loading units. At the same time, with larger dimensions of vehicles, road safety may be compromised.

89. In the production of containers new materials and processes are used with the aim of decreasing the ecological impact. For example, new water-based paints rather than spirit-based ones are used so that no solvents are released into the atmosphere during manufacture and the painting process.

90. The container industry is one of the principal consumers of tropical timber for floor construction. But the scarcity of resources and environmental considerations require the industry to adjust and to search urgently for replacement materials. There are alternatives to the use of tropical hardwood timber, such as plywood treated with certain chemicals to enhance its durability and the use of softwood species. However, despite current efforts, the development of satisfactory substitutes to hardwoods still appears to be in its beginning phases. It should be, however, taken into account that a preferance in container production should be given to the use of recyclable materials.

91. International action to prevent damage to the ozone layer has led to a treaty which requires that new insulated and reefer containers be manufactured without the use of chlorofluorocarbon (CFC) refrigerant agent and include insulation using non-CFC gas as a blowing medium. However, the old refrigerants will still be used in a large proportion of all reefer containers fleet for some years to come, as there is no ban on their use, but only for their production. In this respect experience should be exchanged among different owners with regard to reclaiming and recycling of this refrigerant.

FOOTNOTES

1. Report of the Standing Committee on Developing Services Sectors: Fostering Competitive Services Sectors in Developing Countries - Shipping (TD/B/39(2)/5 - TD/B/CN.4/13, Annex I).

2. The practicability and desirability of an international agreement on container standards (TD/B/AC.20/8, Annex 5).

3. ISO Series 2 - Freight Containers, ISO/TC 104 N 715, 1991-09-03.

4. Technical concepts available or proposed for larger containers, transmitted by the International Organization for Standardization (ISO) (TRANS/SEM.10/R.2).

5. Survey on the Penetration of Non-ISO Standard Containers, compiled and printed in Tokyo, Japan, August 1992.

6. Cargoware International, Special report: World Container Census, 1992.

7. Supplementary report on the developments of the dimensions of loading units, European Conference of Ministers of Transport (CEMT/CS(92)7).

8. Consequences for the organization of transport chain due to the introduction of larger containers. Transmitted by the secretariat of the European cooperation in the field of scientific and technical research COST 315 (TRANS/SEM.10/R.1).

9. Impact of larger containers for port and inland container handling, Transmitted by the European Conference of Ministers of Transport (ECMT), (TRANS/SEM.10/R.12), p.17.

10. Review of developments in standardization of containers and related activities, report by the UNCTAD secretariat (TD/B/C.4/329).

11. Report of the Seminar on the impact of increasing dimensions of loading units on combined transport (1-4 September 1992) (TRANS/SEM.10/3).

12. *Idem.*, Annex, p. 17.

13. *Idem.*, Annex, p. 19.3.

14. Reports of the Ad Hoc Intergovernmental Group on Container Standards for International Multimodal Transport, on its first and second sessions (TD/B/C4/20/6 and TD/B/AC.20/10).

15. ISO-IEC Directives, Part 1, Procedures for the Technical Work, second edition 1992.

16. Acceleration ISO/IEC procedures, Rescinding ISO Council resolution 22/1978 (ISO/TC 104 N 740).

17. Report of the Group of Experts on Container Standards for International Multimodal Transport, 5-15 April 1976 (TD/BAC.20/1, paras. 85-86).

18. Consequences for the organization of the transport chain due to the introduction of larger containers. Report transmitted by the European Conference of Ministers of Transport (ECMT) (TRANS/SEM.10/R.11, para. 8 (v)).

19. Cf. Policies and mechanisms for achieving sustainable development, report by the UNCTAD secretariat (TD/B/1304).

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