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THE LEGAL IMPLICATIONS OF THE 'CONTAINER REVOLUTION' AND THE POSSIBILITIES FOR A NEW ERA OF MARITIME TRANSPORT

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1. INTRODUCTION

Looking back in history, shipping has been one of the world's oldest industry/means of transportation and since ancient times, it is considered as one of the most important human activity[1]. This inevitable necessity of engaging vessels to transport goods and passengers had as a result to develop early shipping law[2]. While human society has conducted an evolution in all facets, shipping law in like manner, has experienced alterations, along with the progress and increase of navigation practices and international trade[3]. Thus, both shipping industry and shipping law have 'a long tradition of innovations motivated by constant struggle for improvement and efficiency'[4] because it is indeed a difficult industry to survive and prosper even it is profitable since its existence[5]. Hence, shipping has attempted to be improved technologically, beginning with the early canoes and advancing through numerous phases of development such as ships with sails and steam assisted ships[6]. The speed of innovation has, nonetheless, extremely augmented in the last 50-60 years, a phase which also links with the start of 'modern day globalization'[7]. In this period, transportation has fairly been named 'one of the four cornerstones of globalization, along with communications, international standardization, and trade liberalization'[8] as at that point, the shipping industry has experienced breaking technological improvements such as containerization, satellite communication, automation and integration,

[1] Víctor Hugo Chacón, *Due Diligence in Maritime Transportation in the Technological Era* (Springer 2017) 16
[2] Ibid
[3] Ibid 18
[4] Helen Sampson and Bin Wu, 'Compressing Time and Constraining Space: The Contradictory Effects of ICT and Containerization on International Shipping Labour' (2003) 48 Internationaal Instituut voor Sociale Geschiedenis 123
[5] David Lewin, Bruce E Kaufman and Paul J Gollan, *Advances in Industrial and Labor Relations* (Emerald Group Publishing Limited, 2011) 218
[6] Ibid
[7] Ibid
[8] James J Corbett and James Winebrake, 'The Impacts of Globalisation on International Maritime Transport Activity - Past trends and future perspectives' (Global Forum on Transport and Environment in a Globalising World, Mexico, 2008) 4

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jumboization, and mechanization[9]. These revolutions, especially containerization, have undoubtedly modernised and reformed the industry[10].

WD Agnus stated that there was 'no technological advance since the steamboat has had such a resounding impact upon the patterns and movement of international trade as has the modern land-bridge concept brought about by "containerization"[11]. The phenomenon most regularly known as 'Container Revolution' has been discussed, debated and analysed in detail by many international shipping publications during the last few years[12]. Yet, no unanimity has been agreed as to what is the eventual destiny of container revolution[13]. Some researchers have argued that the particular era will conclude in disaster while others support that 'containers are here to stay and that the revolution will continue to work inexorably until the bulk of world trade moves in unitized loads over vast integrated transportation systems'[14]. Despite the confusion as to how containerization will finally end up, it can be assured that the combination 'of transport and handling arrangements with the standard container' has already resulted to 'savings in capital utilization through economies of scale, through greater capacity utilization of both ship and pier facilities and through greater efficiency in labour utilization'[15].

The purpose of this essay is to analyse the controversy of 'containerization'. For this to be achieved, it is essential to start the essay with the history of containerization and the relevant legal regulations of containerships and container cargos. Then, the essay will explain why containerization is considered as a real revolution on shipping industry by analysing its achievements and its positive effects on the world trade. On the contrary, this essay should also discuss the legal implications and the problems that have been occurred through the Container Revolution in order to evaluate whether the drawbacks of the containerisation overcome the benefits. Finally, it will be examined how the maritime industry has attempted to cope with the aforementioned legal implications and the

[9] Ibid (n 5)
[10] Ibid
[11] WD Angus, 'Legal Implications of "The Container Revolution" in International Carriage of Goods' (1968) 14 McGill LJ 395
[12] Ibid
[13] Ibid 396
[14] Ibid
[15] Joseph P Goldberg, 'Containerization as a force for change on the waterfront' (1968) Monthly Labor Review 8

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possibilities for a new era of maritime transport after containerization.

2. THE TERM CONTAINER REVOLUTION/CONTAINERISATION AND ITS REGULATIONS

2.1. History

The concept of containership was introduced by Malcolm Purell McLean, an American entrepreneur, well known as 'the father of containerization'[16]. His 'big box' idea, which has revolutionized the old break bulk technique of handling dry goods, occurred in 1937 while he was waiting at port for a long time in order to deliver a big amount of cotton bales[17]. His words regarding the existence of the idea stated below:

> I had to wait most of the day to deliver the bales, sitting there in my truck, watching stevedores load other cargo. It struck me that I was looking at a lot of wasted time and money. I watched them take each crate off a truck and slip it into a sling, which would then lift the crate into the hold of the ship. Once there, every sling had to be unloaded, and the cargo stowed properly. The thought occurred to me, as I waited around that day, that it would be easier to lift my trailer up and, without any of its contents being touched, put it on the ship[18].

Afterwards, McLean managed to save money in order to demonstrate his idea[19] and finally, in 1956, the first container ship, a converted oil tanker named the Ideal X, was loaded and navigated from the Port Newark to the Port of Houston[20]. It was reinforced to lodge 58 well-filled boxes, called later as shipping containers, each some 30-foot (9 metres) long[21]. Despite the reasonable worries and doubts that McLean had for the very first attempt of sailing a container ship, the first voyage terminated without any trouble[22]. McLean's clients were pleased with the cost savings and the speed of the whole

[16] 'Malcolm McLean-The investor of ISO Shipping Containers' (*International Marine Consultancy*, 19 January 2009) <http://www.imcbrokers.com/blog/overview/detail/malcolm-mclean-the-inventor-of-iso-shipping-containers> accessed 4 December 2017
[17] 'The story of Malcom McLean' (*The Maritime Executive*, 8 December 2016) <https://maritime-executive.com/article/the-story-of-malcolm-mclean > accessed 4 December 2017
[18] 'Malcom McLean' (*The Economist*, 31 May 2001) <http://www.economist.com/node/638561> accessed 4 December 2017
[19] Ibid (n 18)
[20] Ibid (n 16)
[21] Ibid (n 18)
[22] Ibid

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process and so, containerization which has first been introduced in the United States (US) in the 1960s, it was expanded quite quickly on US-Europe routes in late 1960s, on US-Japan routes in the 1970s and lastly, on the developing countries in the late 1970s[23]. Within 40 years, around 90% of world trade was transporting in containers by using specially designed container ships[24]. McLean has fairly remained in history as the 'shipping's man of the century' and the 'inventor of the greatest advance in packaging since the paper bag'[25].

2.2. Definitions

Hence, the widely discussed term 'Container Revolution' indicates the huge amendment in current systems for the transportation of cargo in international trade by land, air and ocean and it 'connotes no more and no less than a box of freight in motion'[26]. More explicitly, containerized shipping or containerization is the placing of cargo into boxes at factories, or at any other similar location, and then shipping massive quantities of cargo around the world without separating and packaging each good separately[27]. Namely, containerization has simplified the shipping industry by saving huge amounts of shipping time, reducing shipping costs, lessening theft and creating a computerized network[28]. This concept, though, has also raised a myriad of problems and so solutions are needed before it may be too late[29]. The advantages and disadvantages of containerization will be further discussed later in this essay, as well as the existing prospects for improvement.

On that point, it is also critical to define 'the revolutionized box-now called a container'[30]. One of the most comprehensive interpretation of container can be found in the article of WD Agnus[31]. This describes a container as:

[23] David Hummels, 'Transportation Costs and International Trade in the Second Era of Globalization' (2007) 21 *Journal of Economic Perspectives 131, 141*
[24] Ibid (n 18)
[25] Ibid
[26] Edward Schmeltzer and Robert A Peavy, 'Prospects and Problems of the Container Revolution' [1970] Transp. L.J. 263
[27] Michael Sean Quinn, 'The Box: How The Shipping Container Made the World Smaller and the World Economy Bigger - Box Boats: How Container Ships changed the World' (2006) 37 12 J Mar L & Com 459
[28] Ibid
[29] Ibid (n 26)
[30] Ibid
[31] Ibid (n 11) 398

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> [A] closed receptacle of standard dimensions and rigid metal frame, designed: (a) to be lifted by mechanical means; (b) for the transport, security, protection and preservation of cargo contained therein; (c) for repeated use; and (d) for the through transit of cargo by different forms of transport with clear identification markings[32].

Moreover, it is useful here to note the definitions proffered by the United States Supreme Court in an attempt to clarify the term 'container' and eliminate any doubts[33]. In *Northeast Marine Term Co v Caputo (1977)* the Court affirmed that 'the container is a modem substitute for the hold of the vessel'[34] while in *Japan Line v County of Los Angeles (1979),* the court stated:

> A container is a permanent reusable article of transport equipment [...] durably made of metal, and equipped with doors for easy access to the goods and for repeated use. It is designed to facilitate the handling, loading, stowage aboard ship, carriage, discharge from ship, movement, and transfer of large numbers of packages simultaneously by mechanical means to minimize the cost and risks of manually processing each package.[35]

2.3. The Regulations of Containerships and Container Cargo

As it has been illustrated above by the definitions, containerization is a global concept that is constantly evolving and in order to work efficiently around the world, there is undoubtedly the need for having rules which 'deal with the dynamics of the public law basis of an international, uniform structure with specific inter-relationships between far-flung owners, shippers and governments'[36].

At first, Hague-Visby Rules, the slightly updated version of Hague Rules 1924 (formally the 'Protocol to Amend the International Convention for the Unification of Certain Rules of Law Relating to Bills of

[32] Ibid
[33] Timothy J Armstrong, 'Packaging Trends and Implications in the Container Revolution' (1981) 12 J Mar L & Com 427
[34] *Northeast Marine Term Co v Caputo* (1977) 432 U.S. 249, 271
[35] *Japan Line v. County of Los Angeles (1979)* 441 US 434
[36] Eric Rath, 'Containers: Their Definition and Implications' [1975] Transp LJ 53

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Lading') constitutes the universal convention for the global carriage of goods by sea[37]. The particular rules state the main duties of the carriers, namely that they should 'properly and carefully load, handle, stow, carry, keep, care for, and discharge the goods carried" and to "... properly man, equip and supply the ship' and to "exercise due diligence to ... make the ship seaworthy"[38]. Moreover, Article 4 indicates that 'any deviation in saving or attempting to save life or property at sea or any reasonable deviation shall not be deemed to be an infringement or breach of these Rules' although the common law provides that the carrier must not diverge from the agreed/usual route[39]. As can be observed, the above provisions are not harsh, but require from the carriers reasonable caring and professionalism.

Additionally, the Hague-Visby Rules attempted to eliminate the ambiguities occurred from the case law as to whether the container itself constitutes a unit or package for limitation purposes or whether units or packages inside each container are a unit or package[40]. The Rules clarify that 'if the bill of lading enumerates the number of packages or units stuffed into the container, that number shall be operative, but if not the container itself shall be taken to be the sole package'[41]. Relevant to the aforementioned is the very recent case of *Kyokuyo v AP Moller – Maersk* [2017][42] which raises many significant issues regarding limitation of liability for loss or damage of transport by containers under a contract of carriage under the Hague-Visby Rules[43]. In that case, the cargo was unpacked tuna loins being carried into three containers from Spain to Japan[44]. One of the containers had to be replaced upon discovery of a fault and then, the consignee claimed that the tuna was received in a destroyed state due to rough management at the replacement of the container[45]. The shipper could not request the issue of a bill of lading as the parties had previously agreed that instead of bills of lading, waybills

[37] 'Liability limits' (*Freight Transport Association*) <http://www.fta.co.uk/policy_and_compliance/sea/long_guide/liability_limits.html> accessed 4 December 2017
[38] Hague-Visby Rules
[39] Ibid
[40] Ibid (n 37)
[41] Ibid
[42] *Kyokuyo v AP Moller – Maersk* [2017] EWHC 654 (Comm)
[43] Simon Baughen, 'Something fishy in the containers. Package limitation under the the Hague Visby Rules' (The Institute of International Shipping and Trade Law, 31 March 2017) <https://iistl.wordpress.com/2017/03/31/something-fishy-in-the-containers-package-limitation-under-the-hague-visby-rules/> accessed 4 December 2017
[44] Sara QC Masters and Daniel Bovensiepen 'Kyokuyo v AP Moller – Maersk [2017] EWHC 654 (Comm)' (*20 Essex Street*, 2017) <http://www.20essexst.com/case/kyokuyo-co-ltd-v-p-moller-maersk> accessed 5 December
[45] Ibid

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would be issued in order to skip further delays at the port[46]. The question was whether the Hague-Visby Rules could apply here[47]. The particular case is significantly important as it offers recent discussions of issues regarding the package limitation of containerised cargoes. Specifically, the court concluded to the follow four statements: the Hague-Visby Rules will still compulsorily apply when the carriage contract is issued as a waybill instead of bill of lading; the term 'unit' as found in the Rules applies also to the separate units of tuna bags or loins and containers themselves cannot be considered as units of cargo; it is enough for the physical objects to be listed or numbered, and not essentially specified 'as packed' in the bill of lading providing that they are sufficiently documented for the purposes of the Hague Rules; and finally, cargo limits should be measured as per unit, not as a mass in the containers, and the balance cannot be moved so as to avoid damage[48].

A vital role on the regulatory framework of the shipping industry plays also the International Maritime Organization (IMO). The IMO is a specialized agency of the United Nations responsible to set up regulatory provisions regarding the security and safety of shipping industry and the prevention of pollution by ships[49]. These provisions should be efficient and fair, internationally adopted and internationally applied[50]. Regarding containerization, the IMO's work is focused on creating regulations that can avoid loss of containers or troubles with containerization and that can organise properly the shipping industry worldwide. In 1991, the IMO has adopted the *Code of Safe Practice for Cargo Stowage and Securing* (CSS Code)[51]. That Code provides measures which promote the safe stowage and securing of cargoes on board and the reduction of the large and frequent ship motions[52]. These measures have been updated many times in order to meet the developments occurred[53]. Besides, in 2014, the IMO has cooperated with the United Nations Economic Commission for Europe (UNECE) and the International Labour Organization (ILO), to implement the Code of Practice for

[46] Ibid
[47] Ibid
[48] Jamila Khan and Eleanor Scudder, 'Guidance provided for package limitation for containerised cargoes' (*INCE & CO*, 4 May 2017) <http://www.incelaw.com/en/knowledge-bank/guidance-provided-for-package-limitation-for-containerised-cargoes> accessed 5 December 2017
[49] 'Introduction to IMO' (*IMO*) <http://www.imo.org/en/About/Pages/Default.aspx> accessed in 5 December 2017
[50] Ibid
[51] Code of Safe Practice for Cargo Stowage and Securing *(CSS Code)*
[52] Ibid
[53] MSC/Circ.664; MSC/Circ.691; MSC/Circ.740; MSC/Circ.812; MSC/Circ.1026; MSC.1/Circ.1352; MSC.1/Circ.1352/Rev.1

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Packing of Cargo Transport Units (CTU Code)[54]. That non-mandatory Code is about the practice for the handling and storing of cargo units for carriage by sea and land[55]. Another useful implementation is the ISO standards which are revised by the International Organization for Standardization (ISO) at the request of IMO so as to include the latest improvements in container handling and securing equipment[56].

Recently, on 1 July 2016, the IMO has adopted the new amendments for the verification of the gross mass of a packed container under the International Convention for the Safety of Life at Sea (SOLAS)[57]. The declaration of the gross mass of cargo has always been a requirement under SOLAS but now the verification of the mass has added as requirement in order to ensure that the mass declared reflects actually the gross mass of the packed container[58]. The Verified Gross Mass (VGM) is unarguably a crucial safety measure because by ensuring correct stowage and packing, any loss overboard or any collapse of container stacks can be avoided. A good observation occurred from the aforementioned recent amendments and cases is that the regulatory framework of containerization still needs amendments in order to apply to the latest technological developments and safety needs. It has not yet disappeared from the table of the regulators as difficulties and ambiguities are still existing. Thus, it could be argued that containerization is not a revolution which has appeared and has ended in the previous century; more needs are arising and new provisions are implemented which remind us that containerization is alive and developing.

3. ACHIEVEMENTS AND DRAWBACKS OF THE CONTAINER REVOLUTION

3.1. Achievements

54 2014 IMO/ILO/UNECE Code of Practice for Packing of Cargo Transport Units *(CTU Code)*
55 Ibid
56 ISO 1161:Series 1 freight containers – Corner fittings – Specifications; and ISO 3874: Series 1 freight containers – Handling and securing
57 'Important information to all clients of Containerships Group' (*Containerships*, 22 March 2016) <http://www.containershipsgroup.com/news/company-news/important-information-to-all-clients-of-containerships-group**>** accessed 5 December 2017
58 'SOLAS container mass verification requirements' (*IMO*) <http://www.imo.org/en/MediaCentre/HotTopics/container/Pages/default.aspx> accessed 5 December 2017

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According to what has been discussed in this essay, the constantly upgrading concept of the Container Revolution seems to have strong presence in the shipping industry. The crucial question which arises here is how much effectively has it been operated so far and what are the prospects for its future. The above can be reached by discussing what are the achievements of the containerization and what are the drawbacks which produce its controversy and prevent it from operating absolutely efficiently. Then, based on its both advantages and disadvantages, it will be easier to submit some recommendations and predictions for the future of this debated era of containerization.

To start with, there is no doubt that the containerization has caused numerous benefits on the world trade which absolutely justify why it is considered a revolutionary concept. One of the most important positive effect that the Container Revolution brought to the shipping industry is the reduction in transportation costs[59]. Containers eliminate the regular cost of packing as it is no more necessary for the full crating or other arrangements for stowage distinct packages in the ships[60]. Another example of money saving results from containerization is the elimination of the storage costs in sheds as containers are just placed in the terminals until the departure time and not requiring storage at all[61]. What else, the fact that containerships are bigger than conservative ships, means that they are able to carry more cargo than before[62]. Therefore, the smaller number of ships needed for transporting the same amount of cargo causes further cost reductions, even though the containerships are more expensive than the conventional ships[63]. It has been also witnessed that the costs due to damages and losses are reduced when the containers are adequately loaded by shippers and appropriately protected by carriers[64]. A final financial benefit of the Container Revolution is the minimization of certain administrative costs, like the cargo insurance costs and 'the cost of freight-forwarders and custom brokers for handling port and airport clearances'[65]. Scholars have identified that 'containerization is promoting the vertical integration of firms in international logistics'[66] and Bill

[59] Ibid (n 26) 266
[60] Ibid
[61] Ibid 267
[62] Ibid 268
[63] Ibid
[64]'Advantages of Using Containers' (*How to export import.com*, 27 October 2016) <http://www.howtoexportimport.com/ADVANTAGES-OF-USING-CONTAINERS-491.aspx > accessed 6 December 2017
[65] Ibid (n 8) 24
[66] Ibid

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Clinton admitted that containerisation has assisted to 'fuel the world's economy'[67]. According to the cost savings, it is obvious to admit that the Container Revolution has been financially important for the trade world of the 19th century.

Beyond cost savings, containerization is an 'enabler of globalization' as it allows the disconnection of the financial activity from national borders[68]. A paper issued in 2013 cleverly illustrates the consequence of containers on international trade deals[69]. Based on 22 industrialised countries, the research discovers that 'containerisation is associated with a 320% increase in bilateral trade over the first five years and 790% over 20 years' while 'a bilateral free-trade agreement boosts trade by 45% over 20 years'[70]. The paper concluded that containerization 'boosted globalisation more than all trade agreements in the past 50 years put together' which is not bad for a simple box[71].

Another important benefit of containerization is found in the ship's in port time. While a conservative vessel needs three days for loading and unloading general cargo, a containership needs less than ten hours for the same quantity of cargo in containerized form[72]. Container Revolution has also reduced breakage and pilferage of cargo[73]. The shipper is now more confident that his package will never reach its destination and being useless because of breakage, and the supplier is more assured that his goods will arrive to the purchaser in good condition[74]. Thus, containerization seems to be a safer and more efficient method to transport goods. Lastly, simplification of foreign commerce is another advantage of Container Revolution[75]. Simpler documentation, better utilization of equipment and advanced in-port procedures have dramatically advanced and accelerated the shipping practices[76].

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[67] Ibid (n 18)
[68] Bill Gates, 'The Shipping Container Revolution' (*The timesheet chronicles*, December 2013) <https://timesheetchronicles.wordpress.com/2014/03/19/the-shipping-container-revolution/> accessed 6 December 2017
[69] E.H., 'Why have containers boosted trade so much?' (*The Economist Explains*, 22 May 2013) <https://www.economist.com/blogs/economist-explains/2013/05/economist-explains-14> accessed 6 December 2017
[70] Ibid
[71] Ibid
[72] Ibid (n 26) 268
[73] Ibid
[74] Ibid
[75] Ibid
[76] Ibid (n 26) 268

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What else, standardization of containers, which introduced in 1961 due to the work of the ISO, contributes substantially to the efficiency of the shipping industry[77]. By setting standard sizes for all containers, the stability and safety of the containers and the containerships have been improved and so, the loading and stacking of containers became more effective[78]. Before standardization, however, the various standard sizes of containers were the reason of accidents and losses[79]. Regarding the standardisation, Bill Gates correctly declared that:

> The plethora of container shapes and sizes that had blocked the development of containerization in 1965 gave way to the standard sizes approved internationally. Leasing companies began to feel confident investing large sums in containers and moved into the field in a big way, soon owning more boxes than the ship lines themselves. [Thus,] international container shipping could now become a reality[80].

The above statement illustrates that the industry of shipping always tries to find new ways to overcome any problem occurred. In the case of standardization, it seems that it made it.

3.2. Drawbacks

The Container Revolution seems to have 'triggered complementary technological and organizational changes that revolutionized global freight transport'[81]. Business experts and historians who have focused on containerization have claimed that 'the shipping container made the world smaller and the world economy bigger'[82] and particularly, Daniel Headrick argues that containerization is the greatest technological change of 20th century which "…has propelled the globalization of the world economy"[83]. As it was mentioned above, notwithstanding numerous assertions regarding the significance of Container Revolution in stimulating international trade, lots of problems have also occurred due to containers and the containerization itself has to overcome many challenges.

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[77] 'Containers' (*World Shipping Council – Partners in Trade*) <http://www.worldshipping.org/about-the-industry/containers> accessed in 6 December 2017
[78] Ibid
[79] Ibid
[80] Ibid (n 68)
[81] Daniel M. Bernhofen, Zouheir El-Sahli and Richard Kneller, 'Estimating the effects of the container revolution on world trade' (University of Nottingham, 2012) 1
[82] Marc Levinson, *The Box: How the Shipping Container Made the World Smaller and the World Economy Bigger* (Princeton University Press 2006)
[83] Daniel Headrick, *Technology: A World History* (OUP 2009) 146

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Possibly, the most complicated legal problem occurring from containerization is the multicity of legal regimes[84]. Goods in international commerce pass into the hands of numerous different carriers of different jurisdictions and many different transportation methods are used until the final destination[85]. In the circumstance of damage or loss to containerised goods, the damage cannot be discovered until the container is open at the ending destination[86]. Hence, it is extremely difficult to identify who was responsible for the damage caused and which jurisdiction should be followed. An example of this situation is the case of *St. Paul Fire and Marine Insurance Co.* v. *American President Lines Ltd [1966]*[87]. The court here absolved the ship-owners because it was evidenced that they had securely discharged the containers but it demanded from the Republic of the Philippines (the custody under which the ship-owners transported the goods) to recover the damage to the cargo owners 'as operators of the Bureau of Customs' [88].

Previously, the stowage of containers on deck has been considered as an advantage of containerization[89]. At the same time, it is supported that stowing containers on deck enlarges the insurance risk since serious damage or the fracturing of the stow on the deck are more possibly to be caused on deck due to heavy weather[90]. The container operators cannot specify which containers will be carried or not carried on deck, the shippers are often unknowing that their goods will be carried on deck and so they do not insure them with revealing that possibility of damage to underwriters or they do not take the appropriate measures to prevent those losses[91]. Containers on deck may also affect the seaworthiness of the ship[92]. The power of wave and wind upon 'a stack of containers towering above the decks' produces a substantial disaster to a ship's stability and as a result, there have already been containerships that have been capsized because of their bad condition[93].

Safety is another problematic issue that should be addressed here, even though it has been argued above that standardization of containers has increased the security on the containerships. It is well

84 Ibid (n 11) 400
85 Ibid
86 Ibid
87 *St. Paul Fire and Marine Insurance Co* v *American President Lines Ltd* [1966] A.M.C. (1873)
88 Ibid
89 Ibid (n 11) 405
90 Ibid (n 11) 405
91 Ibid
92 Ibid
93 Ibid

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said that 'people and machinery do not really mix very well and if there is a conflict then invariably the machinery wins'[94]. As such, 'containers themselves are very unforgiving and the environment they are handled in creates challenges, working at height being just one'[95]. Avery recent example occurred on 8th of December when a crew member of a cargo ship in Maryland fell 100 feet and was injury while carrying container'[96]. Thus, it is a myth that containerization is implemented under safe operational procedures and that standardization has been introduced in order to promote the security on the ships. The very frequent and fundamental accidents illustrate a completely different reality.

As it was claimed before, containerization encourages globalisation and reduces the transport costs in many ways. Nonetheless, this is not always beneficial. Bill Gates attested that after the tremendously decrease of transport costs, manufactures 'move from high-wage to low-wage countries, eventually causing wage levels in all countries to converge'[97]. These topographical modifications occur rapidly, having as a result, long-standing manufacturing infrastructure to be left underutilized or abandoned while financial activity moves on[98]. Furthermore, he continued by saying that containerization, as any growing industry, 'gave in to a bust, and to a new reality of depressed margins'[99]. This results to 'a new and painful experience for the shipping industry: a rate war'[100]. This is when demand cannot keep up with the explosion of supply, namely oversupply of goods[101]. In the case of containerization, overcapacity left 'alive' far fewer independent companies which have no prospects for the future[102]. Thus, shippers and carriers should be alert as at any time overcapacity may return and then, only those who are mostly prepared for a potential economic change will survive[103]. This is risking and stressful for both suppliers and shippers. Another crisis linked to economy is the

[94] Richard W A, Containers: opportunities and challenges (*Port Technology*) <https://www.porttechnology.org/technical_papers/containers_opportunities_and_challenges> accessed 6 December 2017
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[96] Crew Member Falls 100 Feet Aboard Cargo Ship Carrying Containers (*Maritime Herald*, 8 December 2017) <http://www.maritimeherald.com/2017/crew-member-falls-100-feet-aboard-cargo-ship-carrying-containers/> accessed 9 December 2017
[97] Ibid (n 68)
[98] Ibid
[99] Ibid
[100] Ibid
[101] Ibid
[102] Ibid
[103] Ibid

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layoffs 'due to slumping orders and internal restructuring'[104]. Two years ago, Maersk Line, the world's largest container shipping company, 'announced to cut 4000 jobs from its land-based staff of 23,000'[105]. If the largest container shipping company is 'forced' to proceed with great staff number layoffs in order to survive, imagine the impact that containerization and financial crisis have to the smaller shipping companies.

On the other hand, there is the belief that containerization does not reduce the transportation costs to the extent that most of the scholars have supported. The costs needed for adjusting the containers into the shipping industry and the capital intensiveness for the container equipment and infrastructures, seem to overturn the view that containerization lead to cost savings[106]. Thus, there is a huge controversy as to the financial aspect of containerization. The main ambiguity here is how the great cost savings of containerization can produce the problematic consequences of overcapacity and underutilization/abandon of manufacturing infrastructure while at the same time, there are views which question the existence of those cost savings at all. This is, of course, a remarkable enquiry which worth further research.

Site constrains is another inconvenience caused by containers as large consumption of space is needed on the final point (mainly for stowing)[107]. Thus, the fact that sheds are not any more used for the storage of cargo, does not only create a financial benefit but constitute to a misuse of the container terminals and so it is also a disadvantage. Additionally, some containers are usually transported empty (20% of all transports) but either full or empty, the same extent of space is needed on the ship and sometimes the cost of repositioning an empty container to another point is higher than the value of the used container[108]. Hence, 'this chain movement generates unproductive empty vehicle miles in the region'[109]. Growing concerns have been also added to the shipping industry by the implementation of the new SOLAS regulation discussed above, the VGM. Controversy in regards of time, billing and

[104] 'Challenges troubling the Shipping Industry' (*Pridel*, 5 September 2016) <https://www.pridel.com/blog/challenges-troubling-shipping-industry/> accessed 8 December 2017
[105] Ibid
[106] 'Advantages and Drawbacks of Containerization' (*The Geography of Transport Systems*) <https://people.hofstra.edu/geotrans/eng/ch3en/conc3en/table_advantageschallengescont.html> accessed 6 December 2017
[107] Ibid
[108] Ibid
[109] M Boile et al., 'Regional Repositioning of Empty Containers: Case for Inland Depots' (2008) 2066 Transportation Research Record Journal of the Transportation Research Board 31

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process of certification may occur if a shipper fails to present VGM elements[110]. In the meantime, terminal operators have to make it sure that there has been installed an appropriate system for sending and receiving VGM information[111]. Thus, there are yet 'operational challenges to deal with and the full impact of the regulation is yet to be known'[112]. Nonetheless, the IMO along with shipping societies and other related councils 'will have to put in cumulative efforts in ensuring the compliance as well work in tandem instead of exploiting VGM to their advantage or playing blame games'[113].

The use of containers for illicit trade of goods, such as hazardous materials, drugs and weapons, and for illegal immigration, is another problematic matter of containerisation[114]. Recently, there are also increased concerns that containers may be utilised to transfer terrorists[115]. Illegal transportation of either goods or people, is not an impossible or a remote scenario if it is taken into consideration that due to the huge number of containers, the most of them are never subjected to inspection. Therefore, the issue of unsafety and insecurity due to the improper use of containers reappears here. Last but not least on the list of drawbacks is the case of theft and losses. Vulnerability has been noticed during the transportation of high value goods between the initial terminal and the final destination[116]. The thefts cannot be easily discovered since the containers are only opened at the final destination and at that point, a large number of people had already involved in the shipping process which makes it impossible to start investigating who is the guilty. Apart from thefts, containers usually fall from containerships. Approximately 2000-10000 containers are missing at sea per annum[117]. For example, in 2006, thousands of bags of Doritos Chips which, the cargo of a container washed ashore, appeared on the Outer Banks of North California[118]. The lost containers are either damaged by cargo and waves

[110] 'How verified Gross Mass (VGM) Rules Under SOLAS will affect International Shipping' (*Pridel*, 30 August 2016) <https://www.pridel.com/blog/how-verified-gross-mass-vgm-rules-under-solas-will-affect-international-shipping/> accessed 8 December 2017
[111] Ibid
[112] Ibid
[113] Ibid (n 110)
[114] Ibid (n 106)
[115] Ibid
[116] Ibid
[117] Janice Posdada, 'Lost sea Cargo: Beach Bounty or Junk?' (*National Geographic News*, 19th June 2001) <https://www.nationalgeographic.com/latest-stories/> accessed 6 December 2017
[118] 'Photos: Spilled Doritos chips wash up on Outer Banks' (*HamptonRoads.com*, 30 November 2006) <https://pilotonline.com/news/photos-spilled-doritos-chips-wash-up-on-outer-banks/article_dfa8ef7b-d40f-5721-81ee-560ccf5ae293.html> accessed 6 December 2017

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and eventually sink or if not sink, they float below the water line making them undetected and a maritime hazard[119].

4. SUGGESTIONS AND THE POSSIBILITIES FOR A NEW ERA OF MARITIME TRANSPORT

Containers have both positive and negative effects. No-one, though, can say that drawbacks of the Container Revolution overturn its benefits and so containers should have been gradually subsided. It is well known that containers have revolutionised the shipping industry and so they are here to stay despite the difficulties. It may take years to iron out the drawbacks and make the processes running smoothly, but it is worth it because imagine how much the shipping industry will be evolved by perfecting the imperfect containerization. As Bill Gates correctly stated, the box has a significance presence 'in the areas of innovation, logistics and trade' as it 'has and continues to have such an impact on driving our modern' society. This innovation is still worth a second chance and that is the subject of the remainder of this essay, namely, suggestions for improving the containerization and possibilities for a new era of maritime transport through the use of containers.

First of all, a good recommendation that should be taken into account for the improvement of containerization is the uniformity of regulations. For example, in terms of the shipping of dangerous goods, shippers, carriers and ship operators in the United States have to comply with one national statute (GOSGA) and one international convention (SOLAS) and at the same time, to refer to un updated list of dangerous goods (LMDG Code) and the DOT'S version of that catalogue (HMR)[120]. Inevitably, it is extremely difficult to disentangle and then understand all these rules[121]. At the moment, there is no predominant approach, not only for the carriage of hazard goods, but for most of the issues related to containerization. Courts administer 'an admirable dissection of the details and the devil is there, buried in those details'[122]. As a consequence, 'parties are held liable for misunderstanding safety regulation that the judiciary itself struggles to interpret and apply'[123]. Until the manifestation of a uniform solution, at least on the aspects of law that can be uniformed easily,

[119] Ibid (n 106)
[120] Joseph Z. Cavanah, 'Dangerous Goods Liability in the Age of Containerization - WARNING: This Comment May (or May Not) Self-Destruct' (2012) 37 Tul Mar LJ 147
[121] Ibid
[122] Ibid
[123] Ibid (n 120)

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the courts will unavoidably continue to 'follow a compass of conflicting precedent and dated regimes'[124].

What else, one of the most fundamentally important issues that should be addressed is seaworthiness. To do so, it is essential to state the legal provisions and who is liable for the seaworthiness of the ship. In common law, the prevail definition of seaworthiness is found in *McFadden v Blue Star Line* [1905]:

> 'A vessel must have that degree of fitness which an ordinary careful and prudent owner would require his vessel to have at the commencement of her voyage having regard to all the probable circumstances of it (…) Would a prudent owner have required that it (i.e. the defect) should be made good before sending his ship to sea, had he known of it? If he would, the ship was not seaworthy…'[125]

Accordingly, in terms of carrier's responsibility, Article III Rule 1 of the Hague-Visby Rules declares that:

> The carrier shall be bound before and at the beginning of the voyage to exercise due diligence to— (a) Make the ship seaworthy. (b) Properly man, equip and supply the ship. (c) Make the holds, refrigerating and cool chambers, and all other parts of the ship in which goods are carried, fit and safe for their reception, carriage and preservation[126].

Finally, according to the carriage of Goods by Sea Act of 1924 which is governing the contractual relationship between the ship-owner and cargo owner, the ship-owners are under the duty to exercise due diligence before and at the beginning of the voyage[127]. Due diligence means 'reasonable conduct under time and place circumstances'[128].

A reasonable question that arisen here is how it is possible to discover who is actually responsible in the event of accident. For example, cargo owners usually try to find lack of due diligence and prove

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[124] Ibid
[125] *McFadden v Blue Star Line* [1905] 1 KB 697
[126] Article III Rule 1 of the Hague - Visby Rules
[127]'Seaworthiness & Cargoworthiness' (*SafeWaters Underwriting Managers*, 27 June 2016) <https://safewatersmarine.com/seaworthiness-cargoworthiness/> accessed 7 December 2017
[128] Ibid

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unseaworthiness in order to blame the ship-owners, specifically in huge damages[129]. The application of the International Safety Management (ISM) Code, though, constitutes the development from a 'culture of blame' to a 'culture of compliance'[130]. The ISM Code requires by the ship-owners and the ship operators, a safety management system (SMS) and safety management objectives[131]. A group of independent experts issued a study regarding the impact and efficiency of the IMS Code and the results showed that 'where the ISM Code had been embraced as a positive step toward efficiency through a safety culture, tangible positive benefits were evident; and ISM Code compliance could be made easier through a reduction in the administrative process'[132]. This Code has widely implemented and enforced, it seems better than the previous international regulations and so it is highly recommended to the countries that they have not already adopted it.

Furthermore, in order to advance land utilization effectiveness and reduce operational hours at the container terminals, a new stowage platform named the 'Split-Platform Automates Storage/Retrieval System' (SP-AS/RS) is now available to be implemented for achieving an effective temporary stowage of containers[133]. Adding to that, it is also suggested a 'Multi-Objective Mixed-Integer Programming' (MIP) model which is combined several interacting sub-tasks and intended to optimise the combined programming of storage and handling operations in container terminals[134]. The overall aim of the MIP model is to lessen delays in the loading and unloading process and also to reduce the time of platforms and vehicles in the SP-AS/RS[135]. In the meantime, a 'Simulated Annealing Algorithm' (SAA) is appraised and provides also near-optimal answers for the particular challenge in a rational calculation[136]. A study shows that the SAA is the most appropriate model to offer solutions for the combined programming of storage and handling operations in container terminals[137]. Hence, solutions for a more efficient operation of container terminals have already existed, the remaining thing is to be adopted.

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129 Ibid
130 Ibid
131 'ISM Code and Guidelines on Implementation of the ISM Code' (*International Maritime Organisation*) <http://www.imo.org/en/OurWork/HumanElement/SafetyManagement/Pages/ISMCode.aspx> accessed 7 December 2017
132 Ibid
133 Seyed Mahdi Homayouni and Sai Hong Tang, 'Optimization of integrated scheduling of handling and storage operations at automated container terminals' (2016) 15 WMU J Marit Affairs 17
134 Ibid (n 133)
135 Ibid
136 Ibid
137 Ibid

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As it has been discussed above, the last few years have been harsh for the container shipping industry due to 'overcapacities, low prices, bankruptcies, and a need to conduct acquisitions to survive'[138]. Nowadays, however, new innovations have been added to the container industry which gradually rise the rates again and so they are highly recommended form implementation. Smart shipping and particularly digitalization, are considered the greatest changes in the shipping industry of the 21st century, able to revolutionise again the containerization and for that reason they have been left last for analysis[139]. Smart Shipping emphasises on managing and advancing each department of container shipping industry by operating possible and recent methods from the developments of Information Technology and Communications (ICT)[140]. Dr. Martin Stopford sees the idea of Smart Shipping as 'the inevitable evolution of where shipping needs to go' and offers five instruments by which the companies can realise this concept: 'telematics, satellite communications technology, the cloud, apps and automation'[141]. He also supports that Smart Shipping can give solutions to diverse problems such as: 'integration with new direct global delivery systems, documentation for increased regulations, reduction of accidents, and greater "integration between ship and shore" for happier, more productive personnel'[142].

Start-up companies such as Freightos, Flexport, UShip are starting to create their own selling position in the container industry[143]. Through the establishment of online international freight marketplace, they have advanced the sales procedure and enlarge the shippers' convenience and prices[144]. One can say that ship operators and container shipping companies would understand this as a sign to get prepared for the digital world[145]. Nonetheless, the picture is blurring. Some companies have clearly

[138] Sven Wengler and Annette Ehrhardt 'Digitization challenges recovering shipping industry' (JOC.com, 15 Augast 2017) <https://www.joc.com/maritime-news/container-lines/digitization-challenge-recovering-shipping-industry_20170815.html> accessed 7 December 2017
[139] Ibid
[140] Martin Stopford, 'Smart Shipping and the Intranet of Ships - Possibilities for a new era of maritime transport efficiency' (8 February 2016) < http://mlecs.com/English/PDF/00007.pdf > accessed 17 November 2017
[141] Leah Kinthaert, '5 game changing digital technologies in the shipping industry' (Maritime, 22 December 2016) <https://knect365.com/techandcomms/article/1035205e-32c6-41f2-9c9e-6f32f280e7fb/5-game-changing-digital-technologies-in-the-shipping-industry> accessed 20 November 2017
[142] Ibid
[143] Ibid (n 138)
[144] Ibid
[145] Ibid

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recognized the benefits and have begun collaborating with start-ups companies or devoting in their own platforms while others 'are still failing to address the encroaching threat'[146]. Consultants and experts from the area, expect from digitalisation to introduce 'additional market consolidation in the future'[147]. Particularly, it has been recently stated that:

> Digitization is not a one-way street. If container shipping companies and forwarders play it right, they can also become big winners and improve their profit situation. The digital revolution will bring huge commercial opportunities to companies; increased data and customer transparency can significantly help companies make better and faster pricing and sales decisions that boost their profits.[148]

Therefore, smart shipping and digitization can inevitably alter and improve the container shipping landscape and especially if it is utilised properly. Hopefully, 'companies have learned from the commercial mistakes of the recent crisis, and will make more conscious decisions when it comes to preparing for digitization'[149]. If not, the following era of bankruptcies, layoffs and acquisitions will come back sooner than it is thought[150].

5. CONCLUSION

Change is not unavoidable, but as Aristotle Onassis stated 'We must learn that the sea never rests'[151]. History taught us that every maritime revolution is extremely different but they all have one theme in common, that they need 'decades of painful development, risk-taking and evolution'[152]. Each revolution comes with innovations, benefits, problematic aspects, controversial issues and so with numerous doubts regarding its utilization and its future. Containerization is fairly considered one of the massive changes of the last century having both great innovations and serious drawbacks. No one, though, can confidently and strongly support whether containerization is a blessing or a devil for the international trade and shipping industry and if he does, he would be absolutely wrong. The only thing that can be claimed with certainty is that the era of containerization has not ended, the Container Revolution stills alive and it is ready to re-revolutionised. The new era of Smart Shipping which involves Internet, telecommunication and digitalization is coming across and has already started to affect the

146 Ibid
147 Ibid
148 Ibid
149 Ibid (n 138)
150 Ibid
151 Ibid (n 140)
152 Martin Stopford, 'Smart Shipping - Revolution can be slow' (*The Naval Architect, September 2015)* <https://www.rina.org.uk/Smart-Shipping-Revoltion.html> accessed 20 November

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operational procedure, the performance and the efficiency of the container shipping industry[153]. Therefore, the shipping world is about to accept again enormous changes in the years to come. The question is whether this new era will be able to address the problematic aspects of containerization and build on its efficiency or whether it will burden even more the shipping industry. The future will show.

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