Chapter 10

A Legal Analysis of the Collision and Strict Liability Framework for the Shipowner of Unmanned and Autonomous Vessels (South Africa)

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10.1 Introduction

Technology is changing the world incredibly fast, and the digital age is now upon us. The introduction of artificial intelligence and complex algorithms is altering the way people live, work and interact with each other daily. The occurrence of the covid-19 pandemic has further shown people how easy and effective technology can make our lives, thereby pushing the world even closer towards the fourth industrial revolution.

Considering how far technology has come, it brings no surprise that the world is faced with the fact that unmanned and autonomous vessels may be navigating on the high seas in the near future. The reality is that these forms of vessels already exist and, although not yet widely in service, debates surrounding the issues and challenges that they bring with them have been ongoing since as far back as 2012. The most groundbreaking projects arising from these technological developments are the ones currently in the process of developing unmanned and autonomous cargo-carrying vessels.1

1The most prominent projects aimed at unmanned and autonomous vessel technology developments include Maritime Unmanned Navigation through Intelligence in Networks (MUNIN), the MV Yara Birkeland (by Yara International and Kongsberg) and the Jin Dou Yun 0 Hao (China’s first autonomous cargo ship).

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In order to understand and analyse the legal issues associated with these forms of vessels, it is first important to understand the definitions and distinction between an unmanned and an autonomous vessel.

### 10.2 Definitions

**What Are Unmanned and Autonomous Vessels?**

Unmanned vessels have been defined as ‘vessels without crew on board, but which are controlled remotely from the shore’ [1]. They are vessels that are ‘able to navigate from point A to point B, without requiring the support from a crew aboard the ship’ [2]. This broad definition indicates that these types of vessels still require some degree of human intervention and control in order to function properly. On the other hand, autonomous vessels have been defined as ‘pre-programmed vessels that operate using algorithms’ [1]. This indicates that these vessels have no human intervention whatsoever and contain no degree of control over them. Some tests currently being conducted in Norway involve cargo-carrying vessels that have the ability to alter the degree of autonomy with which they operate [3]. Thus, in order to not exclude any particular vessel of this nature, this paper will include both types of vessels and will use these terms interchangeably unless specified otherwise for a particular context or discussion. Only unmanned and autonomous merchant ships will be examined.

**Internationally Recognised Definition**

The International Maritime Organization (IMO) has acknowledged that the introduction of these forms of vessels is revolutionary for the maritime industry and has thus commenced investigations into the safety, security and environmental feasibility of these new forms of vessels. The IMO refers to the unmanned and autonomous vessel as MASS (Maritime Autonomous Surface Ships) and has defined them as ‘ship[s] which, to a varying degree, can operate independently of human interaction’ [4, 5].

**Will Unmanned and Autonomous Vessels Be Considered as ‘Ships’ Under South African Law?**

Under South African law, the Merchant Shipping Act 57 of 1951 (MSA) defines a ‘ship’ as: ‘… any kind of vessel used in navigation by water, however propelled or moved, and includes— (a) a barge, lighter or other floating vessel; (b) a structure
that is able to float or be floated and is able to move or be moved as an entity from one place to another; and (c) a dynamically supported craft; and “vessel” has a corresponding meaning’. ²

The South African Admiralty Jurisdiction Regulation Act 105 of 1983 (AJRA) defines a ‘ship’ as: ‘… any vessel used or capable of being used on the sea or internal waters, and includes any hovercraft, power boat, yacht, fishing boat, submarine vessel, barge, crane barge, floating crane, floating dock, oil or other floating rig, floating mooring installation or similar floating installation, whether self-propelled or not’.³

These definitions are significantly broad and allow for a large variety of vessel classifications to fall under their application and operation. Thus, it can be concluded that unmanned and autonomous vessels (including remote-controlled vessels) will also be considered as ships under South African law [6].

10.3 Legal Issues Relating to Unmanned and Autonomous Vessel Regulation

The main concern with the unmanned and autonomous vessel is how legal liability will be attributed to it should there be a defect or malfunction with its software which then causes a collision. In other words, since there are no longer a crew and master on board, the question that arises is whether liability can be solely attributed to the shipowner of the unmanned vessel and autonomous vessel.

10.4 Liability for the Negligent Operation of Unmanned and Autonomous Vessels

The law demands that legal liability be placed on a specific actor who bears the responsibility for when things go wrong [7]. Since an unmanned and autonomous vessel has no master or crew on board, this raises the issue of whether the negligence of any other party involved in their operation may then be attributed to the vessel for the purposes of the in rem action. There are currently two main actors who are responsible for and will be held liable for the damages caused by the collision of a manned vessel. These two traditional actors are the master and the shipowner. With the introduction of unmanned vessels to the maritime industry, however, we find ourselves faced with new legal actors who may be found liable for the same damages. These new actors are the shore-based control operators, the voyage programmers, the manufacturers and the software providers.

²Section 2 of the South African Merchant Shipping Act 57 of 1951 (MSA)
³Section 1 of the Admiralty Jurisdiction Regulation Act 105 of 1983 (AJRA)
Shipowner’s Liability

The shipowner is generally the party that is held liable for collision damage and is the one who is indirectly brought before the court to defend an action against his/her vessel(s). It has been suggested that the law as it stands regarding a shipowner’s liability should be left as it is, as the shipowner will be considered liable no matter how the vessel is operated [7]. The question that arises here, however, is whether the shipowner could still be held liable for collision damage where the unmanned vessel was operated and navigated independently from a SCC and by an independent SBCO or voyage programmer.

Liability for collision damage is currently determined using a fault-based liability system, in which a test of negligence is conducted. In general, maritime laws nationally and internationally have accepted this to be the correct method for determining liability. To determine collision liability on the current fault-based liability system means that there must be an enquiry into the conduct of the shipowner relating to the management of the vessel as well as an enquiry into the conduct of the shipowner’s ‘servants’ (being the master and crew) in the navigation and operation of the vessel. However, where the shipowner chooses to conduct his/her business using an unmanned or an autonomous vessel, the enquiry will no longer involve an investigation into the conduct of the master and crew as they will no longer be present on board the vessel.

Negligence, Strict Liability and Vicarious Liability

Under South African law, liability for negligence is based on the principle that the law disapproves of the defendant’s conduct in his/her actions towards causing the harm [8]. The enquiry, therefore, involves an evaluation of the defendant’s conduct compared against a standard of conduct that is socially acceptable by the public. Where the defendant’s conduct falls outside this socially acceptable standard, the defendant will be considered negligent and will be held liable for causing the resultant harm [9]. Thus, the defendant’s conduct is tested against an objective standard of the reasonable person (bonus paterfamilias) which is based upon the principle that: ‘a person is blamed for an attitude or conduct of carelessness, thoughtlessness or imprudence because, by giving insufficient attention to his actions, he failed to adhere to the standard of care legally required of him’ [8].

On the other hand, strict liability is a form of liability with no fault. It expresses the viewpoint that a society must hold a person liable for his or her conduct where he or she has chosen to act in a certain way, or where there is a risk associated with his or her action that then causes harm to another. Loubser and Midgely et al. describe the nature of strict liability (liability without fault) as follows: ‘…society determines that the nature of the conduct, or the risk associated with the conduct is such that the responsible person or entity should compensate anyone who suffers harm as a result of the conduct.’ [9]

There are various general characteristics that make up the essence of liability without fault. Neethling and Potgieter et al. set them out as follows: ‘(a) Fault is not
required for liability in claims for compensation; (b) *Vis major* (act of God) and fault on the part of the prejudiced person are generally recognised as defences; (c) Strict liability is usually imposed – either by legislation or judicial pronouncement – in cases involving activities which as a rule create extraordinary increases in the risk of harm to the community; (d) In instances where strict liability has been imposed by legislation, the extent of the liability is usually curtailed by fixing maximum amounts of compensation; and (e) Liability without fault is restricted in most cases to damage to life, limb and property (and therefore does not include pure economic loss).

In Continental systems, liability without fault originated primarily from legislation, while in Anglo-American law, case law played the dominant role. In South Africa, both the legislature and the courts have contributed to the development of liability without fault' [8].

There are two theories behind liability without fault. The first is the interest/profit theory. This theory states that ‘where a person acts in his own interest, and causes harm to another, he bears the burdens and disadvantages which his activities bring about’ [8]. Thus, someone who is acting in his/her own interests, and benefits as a result of that activity, should then bear the responsibility for any harm that results from that activity.4 The second theory is the risk/danger theory. This theory states that ‘where a person’s activities create a considerable increase in the risk or danger of causing harm, ie, an increased potential for harm, there is sufficient justification for holding him liable for damage even in the absence of fault’ [8].

Since the core principle behind delict law in South Africa is that there can be no liability where there is no fault, [8, 9] the question that arises, then, is whether there are any restrictions on imposing strict liability in South Africa. The answer is that there are many areas of South African law that already impose strict liability on individuals who undertake an action with an associated risk that could potentially have a harmful outcome on others. The most obvious example is found under labour law in the relationship between employers and employees.5 An employer can be held vicariously liable for an employee’s actions. Loubser and Midgely et al. state that vicarious liability can be seen as a form of strict liability: ‘This is where the employer is held liable without fault for the wrongdoing of an employee, and the liability of the employee, determined according to the normal principles of delict (including fault), is transferred to the employer’ [9].

This form of liability is already used under international maritime laws where the shipowner can be held liable for the wrongful conduct of his/her ‘servants’, being the master and crew on board the shipowner’s vessel. The issue that arises here is whether the SBCO of the unmanned vessel (or the voyage programmer of the autonomous vessel) will be considered as ‘servants’ of the shipowner for the purposes of determining collision liability. This further leads to the question of whether the

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4 This theory has been criticised by Neethling et al. [8].
5 Other examples of strict liability in South Africa can be found under the Aviation Act 74 of 1962; the Post and Telecommunication-related Matters Act 44 of 1958; and the Genetically Modified Organisms Act 15 of 1997 [8, 9].
current fault-based liability regime will continue to be the sufficient test to use when determining collision liability, or whether a new system should be adopted (such as the strict liability test). These two aspects will be discussed hereunder.

**Employees Versus Independent Contractors** Employees and independent contractors have been distinguished by South African courts by the type of contract of service that they hold. The main distinguishing feature is that: ‘an employee is under the control of the employer in respect of the nature of the work and the manner in which it is to be done, whereas an independent contractor is not subject to the control of the person paying for the services’ [9].6

An employee’s contract of employment usually terminates upon death or when the agreed period has expired, while an independent contractor is contracted to perform certain specified work which may not have a specified deadline or time limit. The courts will, however, take into consideration all the relevant factors under the circumstances in order to determine whether the person is an employee or an independent contractor. Some of the factors taken into consideration are the nature of the work; the manner of performing that work; the manner of payment; the state of the social and economic interdependence of the person; the authority to give instructions; whether any membership of medical or pension fund is involved; whether there is any provision for paid vacation; the number of working hours required; the use of the employer’s premises and equipment; and to what extent the person performing the work forms an essential part of the business organisation [9].7

**The Shipowner’s Liability for the SBCO and Voyage Programmer** In applying these general principles of fault liability to a Maritime Autonomous Surface Ship (MASS) collision, it is clear that each case will need to be decided on the basis of its own facts. This would entail at least two potentially complex factual enquiries.

Firstly, should it be decided that the SBCO, or voyage programmer, is in fact an employee of the shipowner, the shipowner could then be held vicariously liable for the damage caused by a collision in which the SBCO negligently operated the unmanned vessel, or the voyage programmer negligently input erroneous information into the autonomous vessel’s system.

On the other hand, should it be decided, instead, that either one of or both the SBCO and voyage programmer are not employees of the shipowner, but are rather independent contractors, the question arises as to whether a similar conclusion can be reached (but which requires an additional step in the analysis) under South African law as: ‘…a person is liable for the acts of an independent contractor only in respect of operations where there is a ‘non-delegable’ duty, in other words, where

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6 *Smit v Workmen’s Compensation Commissioner* 1979 (1) SA 51 (A)
7 See the test used in the cases of *Midway Two Engineering & Construction Services v Transnet Bpk* 1998 (3) SA 17 (SCA); and *Stein v Rising Tide Productions CC* 2002 (5) SA 199 (C).
engaging a contractor does not absolve the employer from a duty not to harm third parties, such as when the operations involve an abnormal level of danger’ [9].

South African courts have expressed that this enquiry is not a question of vicarious liability but rather a question of whether the employer had personal liability on the basis that he/she had the duty to take reasonable precautions to ensure that no danger ensued from undertaking the dangerous activity. In the case of *Langley Fox Building Partnership (Pty) Ltd v De Valence*, the court states as follows: ‘... if work entrusted to an independent contractor is of such a character that, if the contractor does the work and no more, danger will ensue, then liability for damages remains with the employer on the failure of his contractor to take precautions in addition to doing the work. It is the duty of the employer to take such precautions as a reasonable person would take in the circumstances’.

On the other hand, where an employer undertakes the services of a skilled independent contractor, ‘where the extent of the danger and the reasonably practicable measures to minimise it can only be determined by such skilled person’, the employer can be discharged from liability as he/she will be considered to have taken all reasonable measures to eliminate or minimise the potential dangers associated with that activity. This is an example of where the South African courts have recognised that there may be situations where it would be reasonable to rely solely on the expertise of an independent skilled contractor. The court states this as follows: ‘In my opinion, therefore, the duty to take care where the work undertaken is *per se* dangerous could in some cases be discharged by delegating its performance to an expert. In my judgment, the correct approach to the liability of an employer for the negligence of an independent contractor is to apply the fundamental rule of our law that obliges a person to exercise that degree of care which the circumstances demand’.

There are earlier decisions setting out the position that there is a non-delegable duty on an employer who appoints an independent contractor for an inherently dangerous activity to ensure that the proper precautions are taken. However, the SCA has made it clear that this is not an invariable rule as in certain circumstances it may be reasonable to rely solely on the skill of the independent contractor. In the latter circumstance, the employer would not be liable even if the independent contractor had acted negligently.

In any case, South African courts are required to consider the ‘extent of the danger, the degree of expertise available to the employer and the independent contractor

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8 *Langley Fox Building Partnership (Pty) Ltd v De Valence* 1991 (1) SA 1 (A). See also *Chartaprops 16 (Pty) Ltd v Silberman* 2009 (1) SA 265 (SCA) at 272A; and *Pienaar v Brown* 2010 (6) SA 365 (SCA).
9 *Chartaprops* ibid at 278E-F, para 29
10 *Langley Fox* supra note 8
11 *Langley Fox* supra note 8 at 11B
12 *Langley Fox* supra note 8 at 11C. See generally the full discussion at 10A–13C.
13 *Langley Fox* supra note 8 at 11D–E
respectively, and the reasonably practicable means available to the employer to avert the danger’ [9].

10.5 An Argument in Favour of the Strict Liability Approach

Neethling and Potgieter et al. state that the traditional basis in the law of delict is that of the fault theory, which stipulates that there can be no liability without fault. However, due to the industrial and technological revolutions from the eighteenth to the twentieth centuries, a new approach was developed to accommodate appropriately the new challenges that machinery and technology brought with them. This new approach is the liability without fault approach. Thus, it can be seen that liability without fault was a reaction to the technological developments of this new era, which is evidence in itself that liability without fault (also referred to as strict liability) has become the better method in determining liability for technological malfunctions [8].

In applying the general characteristics of strict liability (discussed above) to the unmanned and autonomous vessel scenarios, the following can be seen: Firstly, fault will not be a requirement when determining liability in claims for compensation for unmanned/autonomous collision damages; acts of God (vis major) and fault on the part of the prejudiced person will be recognised as defences; strict liability can be imposed through international conventions (governing collisions with unmanned and autonomous vessels) in cases involving activities which as a rule create extraordinary increases in the risk of harm to the community (such as the use and operation of an unmanned or autonomous vessel); in instances where strict liability has been imposed by legislation, the extent of the liability can be curtailed by fixing maximum amounts of compensation; and the liability without fault approach will be restricted in most cases to damage to life, limb and property (all of which the operation and navigation of an unmanned and autonomous vessel may involve).

Secondly, the two theories justifying the use of strict liability will apply to the unmanned and autonomous vessel scenario as a shipowner will be both investing a personal interest and benefiting from the profits thereof in conducting his/her business with autonomous technologies; and by choosing to conduct his/her business with an unmanned or autonomous vessel, the shipowner will be increasing the level of risk and danger associated with navigating a vessel at sea.

In order for this to apply, it needs to be expressly stated in international conventions that the operation of an unmanned and autonomous vessel should be

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14 Langley Fox supra note 8 at 13B
15 This would entail the various national laws imposing a monetary limit on collision liability. Under an international maritime context, however, this would entail a consideration of the issue on whether there should be an amendment to the current convention on limitation of liability for maritime claims or whether a new separate limitation of liability convention dealing with unmanned and autonomous vessels should be developed.
considered as an operation that involves an abnormal/increased level of danger. It has been suggested that such an approach should be taken for these forms of vessels [7]. Zampella indicates that adopting this strict liability approach may be the direction to go towards for collision liability involving unmanned and autonomous technology: ‘It might be considered as a solution to avoid the issues deriving from the investigation of fault and negligence regarding new kinds of activities closely dependent on technology. After all, if we consider the employment of an unmanned vessel as a type of activity inherently dangerous, this would justify the adoption of a strict liability regime, for a protection of the other users of the sea from the natural risks deriving from unmanned shipping …’ [7].

This would not be the first time that South African law has recognised the implementation of strict liability for an activity that is considered as inherently dangerous. The South African Aviation Act (AA)\(^{16}\) imposes strict liability on the owner of an aircraft where material damage has been caused by his/her aircraft. Section 11(2) states: ‘Where material damage or loss is caused by an aircraft in flight, taking off or landing, or by any person in any such aircraft, or by an article falling from any such aircraft, to any person or property on land or water, damages may be recovered from the owner of the aircraft in respect of such damage or loss, without proof of negligence or intention or other cause of action as though such damage or loss had been caused by his wilful act, neglect or default’ (emphasis added).

### 10.6 Conclusion

To devise a new strict liability system under either domestic or international maritime law would mean that liability will be linked directly to the actions of the SBCO or voyage programmer where their actions were the factual and legal cause of the collision. It would, however, not require a determination of their fault (negligence) or the shipowner’s fault in relation to such actions. Using this system would also mean that the negligence of parties such as the manufacturer and software provider would be excluded from the enquiry into the liability of the shipowner.\(^{17}\)

Since the shipowner has chosen to undertake the risk of conducting his/her business using an unmanned or autonomous vessel, where such an activity is considered as inherently dangerous, it can be justified that the law adopts a strict liability approach in holding the shipowner liable for any damage resulting from the use and operation of these new forms of vessels, such as where there is a system malfunction with the autonomous software/autonomous onboard systems, or even where there is negligence on the part of the shipowner’s ‘servant’, ‘agent’, ‘employee’ or ‘independent contractor’. Such a collision liability regime can appropriately

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\(^{16}\)Act 74 of 1962

\(^{17}\)A strict liability system should not, however, exclude the possibility of the shipowner seeking indemnification from manufacturers and software providers where technology failure or errors in the programming are showing to have contributed to the collision.
accommodate the use of this new autonomous technology in the maritime industry and can ensure that the general use of such vessels on the high seas is regulated and provides equivalent safety to the operation of conventional vessels.

The strict liability system has not been welcomed by many maritime nations in the past. It would not, however, be the first time that international maritime laws recognise the use of such a system when determining compensation for damages. In any case, should this new method be accepted by the various maritime nations, there is still the issue of uniformity. The determination of collision liability for the unmanned and autonomous vessel may begin to differ from one country to the next, which will promote a divergence from one of the core principles of international maritime law, that of uniformity, and this should be avoided across the international plane. Lastly, it must be borne in mind that introducing a strict liability approach will have additional implications on the shipowner’s cost of insurance cover for civil liability. While there is a great need to implement an efficient system to determine collision liability, the stricter the legal regime is, the more it becomes possible to discourage the adoption of these vessels, making them commercially unviable.

References

1. Shipowner’s Club, Unmanned and Autonomous Vessels – The Legal Implications from a P&I Perspective. Retrieved from https://www.shipownersclub.com/unmanned-autonomous-vessels-legal-implications-pi-perspective/. Last access 30 June 2020.

2. Pol Deketelaere, The Legal Challenges of Unmanned Vessels, Unpublished Master dissertation, Universiteit Gent, Belgium, 2016–2017, pp. 2.

3. C. Ellingsen, E. Tøndel, Maritime Law in the Wake of Unmanned Vessels (2017). Retrieved from https://svw.no/contentassets/f424f309bd304e99b39f11355e98571f/svw_maritime-law-in-the-wake-of-the-unmanned-vessel.pdf. Last access 30 June 2020.

4. IMO webpage, IMO takes first steps to address autonomous ships. Retrieved from http://www.imo.org/en/MediaCentre/PressBriefings/Pages/08-MSC-99-MASS-scoping.aspx. Last access 30 June 2020.

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18 This is evidenced by the reaction of the many maritime nations (under which the large carriers operated) to the United Nations Convention on the Carriage of Goods by Sea, 1978 (‘the Hamburg Rules’). These particular maritime nations refused to ratify the convention for fear of the strict liability it imposed on the Carriers in the exercise of their duties and responsibilities relating to the carriage of goods by sea [10].

19 One example is the International Convention on Civil Liability for Oil Pollution Damage, 1969 (CLC), which places a strict liability on the shipowner to compensate for oil pollution damage caused by his/her vessel [7].

20 Stated by Justice McReynolds in 1916 in the US case of Southern Pacific Co. v Jensen 244 U.S. 205, 215, 216 (1916) as follows: ‘The general maritime law as accepted by the federal courts constitutes part of our national law applicable to matters within the admiralty and maritime jurisdiction … no such [state] legislation is valid if it … works material prejudice to the characteristic features of the general maritime law or interferes with the proper harmony and uniformity of that law in its international and interstate relations’ [11].
5. Luci Carey, Report on BIMCO Autonomous Ships Seminar (Report 19/01) NUS Centre for Maritime Law, 2019, pp. 6.

6. CMI Maritime Law for Unmanned Ships, Questionnaire (2017) Completed by the Maritime Law Association of South Africa. Retrieved from https://comitemaritime.org/work/unmanned-ships/. Last accessed 30 June 2020.

7. P. Zampella, Maritime and air law facing unmanned vehicle technology. Unpublished PhD thesis, Università degli Studi di Cagliari, Italy, 2019, pp. 17, 215, 216 – 217, 219.

8. J. Neethling, J.M. Potgieter, et al., Law of Delict, 7th edn. (LexisNexis, Durban, 2015) pp. 137, 379, 380–381, 401–402

9. M. Loubser, R. Midgley, et al., The Law of Delict in South Africa, 3rd edn. (Oxford University Press, Cape Town, 2018) pp. 154, 458, 469, 471

10. F. Reynolds, The Hague rules, the Hague-Visby rules, and the Hamburg rules. Maritime Law Assoc. Aust. New Zeal. J. 1990, 30–33 (1990)

11. Harvard Law Review Notes, Uniformity in maritime law. Harv. Law Rev. 37(8), 1114–1118 (1924)