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SPECIAL SECTION

DRONE USERS' AND LANDOWNERS' RIGHTS IN ITALY AND THE NETHERLANDS: THE MEDICAL USE OF DRONES

Abstract

Background. Drones are increasingly integrated into recreational and economic activities, including for medical uses. In this scenario, drones carrying medical equipment or patients may fly over someone else's property. This raises the question of how conflicts between drone users and landowners arising from the medical use of drones are resolved. This question predominantly revolves around the vertical extension of property rights.

Aim and methodology. This article offers a comparative study of how these conflicts are tackled in Italy and the Netherlands, exploring the different operational solutions offered by their respective legal frameworks. In particular, the aim of the article is two-fold. First, the article intends to assess to which extent the Italian and Dutch operational solutions differ or converge, based on insights from the legislative, judicial, and doctrinal legal formants. Secondly, based on this comparative analysis, the article makes use of socio-economic considerations to assess the potential impact of the reconstructed Italian and Dutch operational solutions on the advancement of drone medical uses.

Conclusions: The article argues that the current legal framework fails both to facilitate the use of drones, also for medical emergencies, and to protect landowners' rights. A clear-cut height above which drones can fly (and under which drones cannot fly) can provide more clarity over the respective spheres of interest of the parties concerned.

JEL CLASSIFICATION: I18, K10, K11, K13

SUMMARY

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1 Introduction

The present article considers, from a comparative and socio-economic perspective, the role and limitation of property law in medical uses of drones (or unmanned aerial systems, UASs),[1] focusing on the Italian and Dutch legal systems and putting forth a proposal to regulate more clearly potential conflicts of interests between drone users and landowners.

The use of drones is becoming increasingly widespread in the recreational and economic activities of private individuals, with market forecasts generally optimistic in assessing the growth potential of the sector.[2] The delivery of medical products and patients is among the disparate use cases where the deployment of drones has been considered.[3] Indeed, the use of drones for medical purposes offers several advantages. These include rapid emergency response[4] and the possibility of reaching places (permanently or temporarily) inaccessible through more traditional means of transport.[5] In the context of epidemics caused by infectious diseases, the use of drones can also help minimize infection risks by limiting interpersonal contact.[6]

While drones are not yet widely employed in medical emergencies and in the transportation of medical equipment and patients, initiatives are underway in several European countries to facilitate the medical use of UASs. For instance, the Netherlands set up a nationwide experimental network of medical delivery drones in 2023.[7] Similar, albeit more local, initiatives have been launched in Italy.[8] The development and consolidation of such initiatives can benefit from a discussion of the legal and regulatory enablers and obstacles to using drones for professional or commercial purposes.

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[1] Thus, the paper does not cover manned systems such as eVTLOs (electric vertical take-off and landing), popularly known as flying cars or air taxis.

[2] Esteban Zanelli and Hendrik Boedecker, Global Drone Market Report 2023-2030 (Drone Industry Insights Report July 2023).

[3] James C Rosser and others, 'Surgical and Medical Applications of Drones: A Comprehensive Review' (2018) 22(3) Journal of the Society of Laparoendoscopic & Robotic Surgeons; Sara De Silvestri and others, 'Challenges for the Routine Application of Drones in Healthcare: A Scoping Review' (2023) 7(12) Drones 685. Regarding the transport of patients, see EHang Sets Up Aerial Emergency Channels to Help Fight Coronavirus in Guangdong, China <https://www.ehang.com/news/778.html> accessed 20 May 2024.

[4] Anna M Johnson and others, 'Impact of Using Drones in Emergency Medicine: What Does the Future Hold?' (2021) 13 Open Access Emergency Medicine 487; Christian Wankmüller, Maximilian Kunovjanek, and Sebastian Mayrgündter, 'Drones in emergency response – evidence from cross-border, multi-disciplinary usability tests' (2021) 65 International Journal of Disaster Risk Reduction 102567.

[5] Jalel Euchi, 'Do drones have a realistic place in a pandemic fight for delivering medical supplies in healthcare systems problems?' (2021) 34(2) Chinese Journal of Aeronautics 182.

[6] Esthera Justyna Król-Całkowska and Daniel Walczak, 'The Use of Drones in the Area of Minimizing Health Risk during the COVID-19 Epidemic' (2022) 106(40) Journal of Intelligent & Robotic Systems.

[7] 'The path to a nationwide network of medical delivery drones' (15 October 2023) <https://www.amsterdamdroneweek.com/news/use-cases-and-solutions/the-path-to-a-nationwide-network-of-medical-delivery-drones> accessed 11 March 2024.

[8] Eg, in Lombardy, Alessandro di Stefano, 'Trasporto di organi, sangue e medicinali. Le startup della drone economy decollano anche per la sanità' <https://startupitalia.eu/startup/trasporto-di-organi-sangue-e-medicinali-le-startup-della-drone-economy-decollano-anche-per-la-sanita/> accessed 11 March 2024; in Tuscany, 'Sangue ed emoderivati. Il trasporto anche via drone' <https://www.quotidianosanita.it/toscana/articolo.php?articolo_id=110885> accessed 11 March 2024.

In recent years, European legislation has increasingly addressed the complexities of UASs, leading to a diverse legal landscape encompassing UAS-specific, aviation-specific, and general-purpose laws.[9] UAS-specific legislation targets UAS activities directly, such as operational rules and the management of unmanned traffic systems. In contrast, aviation-specific laws provide a broader regulatory framework, treating UAS as a subset of traditional aviation. Additionally, general-purpose laws, including property, liability, criminal, and cybersecurity regulations, though not originally designed for UAS, can become relevant as these technologies intersect with various aspects of daily life and existing legal norms.

Against this backdrop, the European scholarly discussion has already generated valuable insights regarding the role of private law in the regulation of drones for civil and commercial uses.[10] This is because the use of drones may interfere with the legal sphere of third parties. This can fuel disputes and conflicts of interest between drone users and third parties, which call for appropriate resolutions. Compared to other aircraft, such as helicopters, UASs pose peculiar challenges in such contexts because they may fly substantially closer to the ground, thus creating the conditions for more direct interferences with the legal rights and interests of third parties.

In private law, important scholarly contributions have been made regarding the role of civil liability (or tort) law[11] and privacy or data protection law.[12] Conversely, property law is an area of private law that has attracted much less scholarly attention. While being extensively studied in the US legal scholarship,[13] the role of property rights has remained on the sidelines of the European scholarly discussion of the role of law in civil and commercial uses of drones.

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[9] Gijs van Dijck, Alexandru-Daniel On, Jasper Snel, and Rohan Nanda, 'Retrieving Relevant EU Drone Legislation with Citation Analysis' (2023) 7(8) Drones 490.

[10] Antohony A Tarr and others (eds), *Drone Law and Policy Global Development, Risks, Regulation and Insurance* (Routledge 2021); Giuseppe F Aiello, Maria A Biasiotti, and Erica Palmerini (eds), *Diritto dei droni. Regole, questioni e prassi* (Giuffrè 2018); Alexandre Cassart, *Droit des drones. Belgique, France, Luxembourg* (Bruylant 2017).

[11] *Ex plurimis,* Hyewon Hannah Choi, 'Delivery Drones: Inapt for Application of Current Negligence Theory' (2021) 86(3) Journal of Air Law and Commerce 435; Kristopher-Kent Harris, 'Drones: Proposed Standards of Liability' (2018) 35(1) Santa Clara Computer & High Technology Law Journal 65; Vivek Sehrawat, 'Liability Issue of Domestic Drones' (2018) 35 Santa Clara Computer & High Technology Law Journal110; Benjamin D Mathews, 'Potential Tort Liability for Personal Use of Drone Aircraft' (2015) 46 St Mary's Law Journal 573; Jordan M Cash, 'Droning on and on: A Tort Approach to Regulating Hobbyist Drones' (2016) 46 The University of Memphis Law Review 695.

[12] *Ex plurimis,* Ronnie R Gipson , 'The Rise of Drones and the Erosion of Privacy and Trespass Laws' (2020) 33(3) The Air & Space Lawyer 1; Timothy T Takahashi, 'Drones and Privacy' (2012) 14 Columbia Science and Technology Law Review 72; David Sella-Villa, 'Drones and Data: A Limited Impact on Privacy' (2021) 55 University of Richmond Law Review 991; Gregory S McNeal, 'Drones and the Future of Aerial Surveillance' (2016) 84 George Washington Law Review 354; Rebecca L Scharf, 'Game of Drones: Rolling the Dice with Unmanned Aerial Vehicles and Privacy' (2018) 2018 Utah Law Review 457.

[13] Tyler Watson, 'Maximizing the Value of America's Newest Resource, Low-Altitude Airspace: An Economic Analysis of Aerial Trespass and Drones' (2020) 95(4) Indiana Law Journal 1399; Brent Skorup, 'Drones, Airspace Design, and Aerial Law in States and Cities' (2022) 55(1) Akron Law Review 157; Hillary B Farber, 'Keep out: The Efficacy of Trespass, Nuisance and Privacy Torts as Applied to Drones' (2017) 33 Georgia State University Law Review 359; Troy A Rule, 'Airspace in an Age of Drones' (2015) 95 Boston University Law Review 155; Michael N Widener, 'Local Regulating of Drone Activity in Lower Airspace' (2016) 22 Boston University Journal of Science & Technology Law 239.

The present article aims to start filling this gap. This is important because the delimitation of the scope of landowners' rights, particularly their vertical extension, can help resolve conflicts arising between drone users and landowners.

Against this backdrop, the present article aims to critically consider the role of property law in the medical use of drones, focusing on the extension of the rights of the landowner on the 'air column' above their land.[14] In doing so, the article leverages the examples of two different European legal systems, ie, Italy and the Netherlands. While the selection of the relevant legal systems is always problematic in private comparative law and inevitably involves a certain degree of arbitrariness, the choice of the Italian and Dutch legal systems is driven by both practical and legal considerations. From a practical point of view, as already mentioned above, both Italy and the Netherlands are at the forefront in Europe in exploring ways to promote the use of drones in healthcare. From a legal point of view, the Italian and Dutch legal systems exemplify instances of the French and German branches within the Civil Law tradition, respectively. Although the results of the present article cannot be generalised due to the unique peculiarities of Italian and Dutch law, they can still offer some useful insights to other continental European legal systems belonging to the two main branches of the Civil Law tradition that are considering promoting the use of UASs for medical purposes.

Accordingly, the present article is structured as follows. First, the regulatory framework for the (medical) uses of UASs is outlined. Secondly, the Italian operational solutions are reconstructed by considering the potential application of relevant property law provisions from the Italian *Codice civile* (c.c.) to emergency and non-emergency medical uses of drones. In doing so, insights from Italian case law and legal scholarship are factored in as appropriate. Thirdly, a similar exercise is conducted for Dutch law, focusing on the relevant provisions of the *Burgerlijk Wetboek* (BW). Furthermore, the Italian and Dutch operational solutions are compared from a socio-economic perspective, with a view to assessing whether and to what extent, in practice, they seem conducive (or not) to medical uses of drones. Finally, based on the identified limitations of the selected legal systems, an alternative regulatory solution is proposed to policymakers to both protect the rights of landowners and facilitate the use of drones, including for medical emergencies and routine supply of medical products.

2 The regulatory framework for the medical uses of drones

A discussion of the role of private law in the conflicts between landowners and UAS users first requires a preliminary outline of the regulatory framework, focusing on the aspects thereof that contribute to defining the general regulatory boundaries where such

[14] Thus, the present article focuses on the role of property law. It only considers safety and privacy risks to the extent that they are relevant to the delimitation of the legal protection of the landowner's property rights. To this end, an extensive examination of safety regulations and privacy laws is unnecessary for the purposes of the article.

conflicts may arise.[15] From this point of view, particularly relevant are the European Commission Delegated Regulation (EU) 2019/945 and the European Commission Implementing Regulation (EU) 2019/947.[16] These regulations establish a framework for categorising UAS operations into three classes based on the associated risk levels: open, specific, and certified. The "open" category covers low-risk operations that do not require prior authorisation, but must comply with several restrictions, including UAS weight limits (up to 25 kg), operational conditions (such as maintaining the visual line of sight), and safety requirements (like geo-fencing and operator registration). This category is divided into three subcategories: flights over people (but not crowds), flights close to people while maintaining a safe distance, and flights far from people. Each subcategory has specific technical and operational limitations to ensure safety and minimise risks.

The "specific" category encompasses medium-risk operations that require authorisation from national aviation authorities. This authorisation is granted based on a detailed risk assessment and the implementation of risk mitigation measures. Operators in this category must provide a comprehensive operational risk assessment, known as the Specific Operations Risk Assessment (SORA), which outlines potential risks and mitigation strategies. The competent authorities may also recognise standard scenarios or grant a light UAS operator certificate with privileges for certain operations, streamlining the approval process.

The "certified" category addresses high-risk operations, which require certification for both the UAS and the operator. This includes operations over crowds, transporting hazardous materials, or using large drones (over three meters in dimension). Operators in this category might also need to obtain a drone pilot licence. The certification process ensures that safety standards akin to those in manned aviation are met. These operations undergo stringent scrutiny to ensure all risks are adequately mitigated.

Furthermore, the regulatory framework introduces provisions for cross-border operations within the EU, operational conditions for UAS geographical zones defined by Member States, and the competencies and powers of relevant authorities. Finally, the European Union Aviation Safety Agency (EASA) has developed Acceptable Means of Compliance (AMC) and Guidance Materials (GM)[17] to assist UAS operators and Member States in effectively implementing the rules.

UASs used to deliver medical products, such as vaccines, blood samples, and medicines, are likely to fall under the "specific" or "certified" categories, depending on the operational context and associated risks. For instance, if the delivery involves flying over urban areas or populated regions, the operation would require a detailed risk assessment

[15] Conversely, a comprehensive and detailed description of the applicable regulatory framework falls outside the scope of the present article.
[16] Antohony A Tarr and others (eds), *Drone Law and Policy Global Development, Risks, Regulation and Insurance* (Routledge 2021), chapter 13.
[17] European Union Aviation Safety Agency site <https://www.easa.europa.eu/en/document-library/acceptable-means-of-compliance-and-guidance-materials> accessed 20 May 2024.

and appropriate authorisation under the "specific" category. This would involve evaluating potential risks, implementing mitigation strategies, and securing approval from national aviation authorities. The "specific" category's requirement for a comprehensive risk assessment ensures that all safety measures are in place, making it suitable for such critical missions.

On the other hand, transporting patients or dangerous materials using UASs poses a significantly higher risk and would most likely fall under the "certified" category. The certification process for both the UAS and the operator under this category strives for the highest safety standards, akin to those in manned aviation. This includes obtaining necessary certifications, potentially including a drone pilot licence, and ensuring the UAS meets rigorous design and operational standards. The "certified" category's stringent requirements are essential for ensuring the safety and reliability of transport operations, given their critical nature.

Member States also play a role in defining the boundaries where UAS flights are permitted. In particular, Article 15 of Regulation 2019/947 allows Member States to establish geographical zones where certain UAS operations are restricted or prohibited. This is operationalised in Italian law by "*circolari*" of the Italian Civil Aviation Authority.[18] In the Netherlands, through Article 9 of the Flight Operations Decree, the law empowers these zones' designation via ministerial orders. Consequently, the ministerial order on Zoning Regulations for Unmanned Aerial Vehicles outlines prohibitions on UAS flights in specified zones.

The above shows that the EU and national regulatory framework restricts UAS flights on several levels. First, there are no-fly zones (which may also be enforced via geofencing solutions) where UAS cannot fly altogether. Secondly, mitigation strategies for UASs apply. Although the black letter of the law is not clear on this, these strategies may include measures to avoid flights over private properties.

While the approach of minimising UAS flights over private properties may be sensible when UASs are used for commercial purposes, its desirability may be more questionable when it comes to medical uses of UASs. Indeed, time is crucial in medical emergencies, and direct routes may be preferable, extending over someone else's property. Similar considerations apply to routine deliveries of medical equipment. In these cases as well, direct routes, albeit not required by emergency needs, may be much more convenient than longer and more time-consuming paths designed to avoid private properties. Indeed, it seems questionable that the delivery of critical medical equipment in the public interest should be slowed down to protect private property. The following paragraphs argue, more in detail, that Italian and Dutch property laws fail to provide the tools for a clear and

[18] Italian Civil Aviation Authority, 'Voli con droni (UAS): limitazioni e riserve dello spazio aereo', <https://www.enac.gov.it/sicurezza-aerea/droni/zone-geografiche-space/voli-con-droni-uas-limitazioni-riserve-dello> accessed 20 May 2024.

realistic regulation of the potential conflicts of interest between (medical) UAS users and landowners.

3 The role of Italian property law in medical uses of drones

Starting with Italian property law, a key relevant provision is Article 840, paragraph 2, c.c., which regulates the vertical dimension of land ownership.[19] This provision states that the landowner cannot oppose the activities of third parties at such a depth underground or at such a height in the space above the ground that they have no interest in prohibiting such third parties' activities. Thus, Article 840, paragraph 2, c.c. provides a flexible rule to resolve potential conflicts of interests between the landowner and third parties. The resolution of such conflicts depends on whether or not the landowner has an interest in excluding the activity of third parties. This, in turn, depends on an assessment of the concrete circumstances of the case.

The interest of the landowner must be somehow objectively assessable and cannot depend on the mere subjective will of the landowner.[20] In particular, the case law states that the landowner does have an interest in excluding third parties' activities if the landowner has a concrete possibility of using the air column.[21] This means that landowner can exclude third parties' activities if these actually undermine the possibility of using the space above the land. This is irrespective of the nature of the activity carried out by the third party, the legal status of said third party, or of the frequency of the flights (although the more frequent the flights, the easier it probably is for the landowner to demonstrate that the third party is undermining the use of the air column).

The case law had the opportunity to apply this test in disputes regarding apartment buildings. In particular, the *Corte di Cassazione* ruled that, regarding the air column above the co-owned courtyards of an apartment building, such courtyards provide air and light to the apartments from across them.[22] Thus, each individual owner has an interest in, and the right to, oppose the activity of third parties who intend to build protruding structures. On another occasion,[23] the *Corte di Cassazione* held that the plaintiff did not have an interest in opposing the installation of outward-opening windows in an apartment located at nine meters above their balcony. This is because the opening and closing of the windows could not limit the use of the balcony below, considering the significant distance between the balcony and the windows.

[19] Chiara Tenella Sillani, *I limiti verticali della proprietà fondiaria* (Giuffrè 1994).
[20] V Durante, *Proprietà (proprietà terriera)*, in *Enciclopedia giuridica* (Treccani 1991) vol 35, 3; Cesare Salvi, 'La proprietà fondiaria', in Pietro Rescigno (ed), *Trattato di diritto privato* (Utet 1982) vol 7, 38.
[21] Cassazione civile, 9 November 2001, no. 13852 (2002) 1 Rivista Giuridica Dell'Edilizia 596; Cassazione civile, 21 October 1991, no. 11117 [1991] Massimario di giurisprudenza italiana.
[22] Cassazione civile, 21 March 2016, no. 5551 [2016] Giustizia civile - massimario annotato dalla Cassazione.
[23] Cassazione civile, 16 October 2012, no. 17680 (2013) 4 Guida al diritto 32.

It follows that the landowner is entitled to oppose drone flights if these occur at such a low altitude that the integrity of people and things is jeopardised. Under these circumstances, it is hard to argue that the use of the drone does not limit the concrete possibilities for the landowner of using their land. In fact, the landowner's concrete possibilities of using their land can be limited even if the physical integrity of people and things on the land is not put at risk. This is because drones usually carry cameras, which may pose privacy concerns for the landowner even though recordings are not made. The prospect of being seen remotely can negatively affect the concrete potential uses of the land by its owner. This has the potential of further extending upwards the vertical scope of the right to exclude under Article 840, paragraph 2, c.c.

Thus, if a drone flies too close to their property, a landowner can seek a judicial injunction, seek damages, and even resort to self-defence, provided that its requirements under Article 52 *Codice penale* (the Italian Criminal Code), particularly those of necessity and proportionality, are met.

Against this backdrop, if the drone is delivering a medical product for an emergency, the drone user may invoke the state of necessity defence under Article 55 *Codice penale*. To save a life, infringing on someone else's property rights may indeed be justified. However, if damages are caused, the drone users will still have to pay an indemnity to the landowner according to Article 2045 c.c.[24] For the purposes of this Article, an indemnity is intended as a sum inferior to the level of full compensation.[25] This is a way to balance the interest pursued by the injurer and the interests of the individual concerned.[26]

Turning now to non-emergency situations, the drone user may intend to establish a routine supply route, for instance, to supply a hospital or clinic that is too costly or impossible to reach via more traditional transportation means or that can be reached more efficiently by an UAS. The drone user may prevent issues with the landowner by seeking their explicit prior authorisation to fly over their property. If, however, the land is bought by a third party, the drone user will need to seek the authorisation of the new landowner. A more stable contractual arrangement, which could be enforced against any new owner of the land, can be reached by establishing a servitude (or easement) on the land. Article 1027 c.c. defines servitude as the burden imposed on a land for the use of another land, which belongs to a different owner.[27] The land in favour of which the servitude is created is called dominant, whereas the other is defined as servient. The owner of the servient land must allow the owner of the dominant land to use the servient land for one or more

[24] Marco Comporti, 'Fatti illeciti: le responsabilità presunte. Artt. 2044-2048' in FD Busnelli (ed), *Commentario al Codice civile* (Giuffrè 2012).
[25] ibid 32.
[26] ibid 33.
[27] Paolo Vitucci, 'Servitù prediali', in *Digesto discipline privatistiche* (UTET 1998) vol XVIII, 495; Giuseppe Grosso and Giommaria Deiana, *Le servitù prediali*, I, (UTET 1963) 538; Giuseppe Branca, 'Servitù prediali', in *Comm. Scialoja e Branca* (Zanichelli 1967) 274, 267.

specific uses. These uses may consist in the greater convenience of the dominant land or pertain to the industrial destination thereof (Article 1028 c.c.).

Servitudes can be either voluntary or compulsory. A voluntary servitude is established by means of a contract or will (Article 1058 c.c.). The landowners concerned may agree to establish a drone overflight servitude between their respective lands. Conversely, it is unlikely that a compulsory servitude may apply. The owner of the land that will become dominant may demand the establishment of a compulsory servitude, under the conditions set in the law, even against the will of the owner of the land that will become servient. In lack of an agreement between the owners, the landowner that will become dominant can ask the judge for a sentence establishing the servitude (Article 1032 c.c.). For instance, Article 1051 c.c. provides that the owner of a land parcel that is surrounded by someone else's lands and does not have access to the public road is entitled to pass over a neighbouring land parcel for agriculture and the better use of their own land parcel. Likewise, Article 1052 c.c. grants the same right to the owner of a land parcel that does have access to the public road but where such access is unsuitable or insufficient for the needs of the land. This is provided that this fulfils agricultural or industrial needs. In both instances, the owner of the servient land is owed an indemnity (Article 1053 c.c.). Since healthcare facilities typically have viable access to the public road, their owners are unlikely to qualify for compulsory servitudes.

4 The role of Dutch property law in medical uses of drones

Turning now to Dutch property law, Article 5:21, paragraph 2, BW states that third parties may use the space above and under the surface of the land, provided that they make use of it so high above or so deep under the surface that the landowner has no interest in opposing it. Paragraph 3 provides that this does not apply to the right to fly in the airspace.

The parliamentary history offers some useful insights into the content and rationale of paragraph 2.[28] First, it clarifies that the burden of proof rests on the person who wants to use the space.[29] Secondly, it states that the owner's interest does not have to be financial and can be purely aesthetic.[30] Thirdly, it provides that paragraph 2 does not set any fixed

[28] Fokke J Vonck, 'Commentaar op art. 5:21 BW' in *Groene Serie Zakelijke rechten*. Arguing in favour of a tridimensional reinterpretation of traditional property rights see Arie J Mes and others, 'Eigendom van onroerende zaken, met name natrekking (titels 1 en 3), Flexibele eigendomsverhoudingen in het vastgoedrecht', in Leon CA Verstappen (ed), *Boek 5 BW van de toekomst* (preadviezen KNB) (Sdu 2016) 181, 183; Arie J Mes, 'Driedimensionaal eigendom' (2014) Weekblad voor Privaatrecht, Notariaat en Registratie 7043; Aart A van Velten and Fokke J Vonck, 'Appartementsrecht en aanverwante rechtsfiguren voor de privaatrechtelijke vormgeving van bouwwerken (preadvies VBR)' (IBR 2016) 116, 117; Arie J Mes, 'De historische ontwikkeling van natrekking van onroerende zaken in het perspectief van driedimensionaal eigendom' (2020) 3 Rechtsgeleerd Magazijn Themis 109, 122.

[29] T-M, *Parlementaire Geschiedenis BW Boek 5* 126. See also Carel JJM Stolker, 'Commentaar op art. 5:21 BW' in *Tekst & Commentaar Burgerlijk Wetboek*.

[30] T-M, *Parlementaire Geschiedenis BW Boek 5* 126.

height limit. This will depend on the circumstances of the case[31] and will therefore be determined on a case-by-case basis.

In this connection, an important test is whether the use of the space above the surface of the land can prevent the landowner from using such space. This refers not only to practical limits but also to legal limits. For instance, if the zoning plan only allows the land to be used as pasture, the landowner's interest to oppose the use of the air column by others will likely be limited.

Moving on to paragraph 3, this contains a provision regarding flying above one's own or someone else's land. The parliamentary history states that the question of whether flying is permitted should not be answered based on the rules governing the ownership of land.[32] This would create an unjustified difference in legal position between the landowner over whom the aircraft coincidentally flows precisely above and other landowners.[33] Whether a landowner can oppose a certain method of flying is a question that should, rather, be assessed in tort. In addition, attention must be paid to the special legislation in the field of air law, which is partly of a public law nature.[34]

At the same time, according to parliamentary history, flying means moving through the air above someone else's ground, with an airplane, a hot air balloon, a zeppelin, a spacecraft, or a means of flying that may yet be invented in the future. Based on this list of examples, Koops[35] states that the exception in paragraph 3 only refers to manned flying vehicles. Thus, the exception does not extend to unmanned vehicles, such as drones. This means that a landowner has the right to deny the use of the space to drone pilots, unless the drone flies so high that the landowner has no interest in it (paragraph 2).[36] Based on this, Koops reaches the conclusions that the landowner may be entitled to shoot the drone down in self-defence.[37]

Naturally, whether self-defence is actually warranted in a specific case depends on a number of further factors, such as whether or not the self-defence is proportionate. The court of Gelderland,[38] for instance, adjudicated a case where the defendant shot down a drone carrying a camera with an air rifle fearing that their neighbour was spying on them. The neighbour sought compensation from the defendant who had taken down their drone. The court held that the neighbour was indeed infringing on the privacy of the defendant; however, the reaction of this latter was disproportionate. Thus, the court held that the defendant should bear half of the damages. Unfortunately, the court did not take this opportunity to clarify the vertical extent of the right of private property of the landowner.

[31] ibid 128.
[32] ibid.
[33] MvA II, *Parlementaire Geschiedenis BW Boek 5* 127.
[34] ibid.
[35] Egbert Koops, 'Drones, grondeigendom en de luchtkolom van artikel 5:21 BW' (2014) Ars Aequi 610, 613.
[36] Carel JJM Stolker, 'Commentaar op art. 5:21 BW' in *Tekst & Commentaar Burgerlijk Wetboek* (Wolters Kluwer 2023).
[37] Egbert Koops (n 35). See also Mathijs Verbrugge, 'Civiel gebruik van drones' [2018] Verkeersrecht 13.
[38] Rechtbank Gelderland 10 May 2017, ECLI:NL:RBGEL:2017:2663.

At the same time, drone users can rely on justifications to avoid situations where they might end up paying damages to landowners, in accordance with Article 6:162, paragraph 2 BW. In terms of justifications that can rule out civil liability and the obligation to pay damages, Dutch law is quite generous and open to contributions from the case law and the legal scholarship.[39] Among the numerous justifications that can be found in the different legal formants, the one that is most likely to apply to emergency uses of drones is the *noodtoestand* (emergency situation).[40] As a specific instance of force majeure (*overmacht*), *noodtoestand* may be invoked by someone who is forced to choose between two mutually conflicting duties and interests and lets the most compelling (or higher) one to prevail.[41] It is settled case law that infringements on the property rights of someone are justified if necessary to prevent an imminent, serious danger to the life or health of third parties.[42] This means that, in an emergency, drones may be allowed to fly over someone else's land to deliver the needed equipment.

Turning now to a non-emergency situation, if a drone flies close enough to the ground, the landowner is, in principle, entitled to oppose the drone flight and use the reaction tools made available to them by the legal system (injunction, damages, self-defence).

On the other hand, the drone user can find a form of protection in Article 6:168 BW. This Article states that a court may reject an injunction claim if the behaviour that must be tolerated for 'compelling reasons of public interests'[43]. The injured party, nevertheless, remains entitled to claim damages. Furthermore, if a judgment awarding damages is not complied with, the court may still grant the injunction. Thus, in the pursuit of a compelling public interest - and it is hard to argue that the routine supply of medical products to a hospital or a similar facility is not in the public interest - the drone user may be allowed to fly over the landowner's property. However, they would still be required to pay damages to the landowner.

Besides specific contractual arrangements with the landowner concerned (which can raise what in Dutch private law is called *kwalitatieve verplichting*), drone users and landowners may contract to establish more stable supply routes through *erfdienstbaarheden* (servitudes or easements) in accordance with Articles 5:70 - 5:84 BW.

[39] Cees van Dam, *Aansprakelijkheidsrecht* (BJU 2020) No213; Ton Hartlief and others, *Verbintenissen uit de wet en Schadevergoeding* (Kluwer 2018) No 18; Louis Visscher, *Een rechtseconomische analyse van het Nederlandse onrechtmatige daadsrecht* (EUR 2005) 101; Cees van Dam, *Aansprakelijkheidsrecht, een grensoverschrijdend handboek* (BJU 2000) No 815 and 827; Ton Hartlief and Gerrit van Maanen, 'Hoe werkt de onrechtmatige daad?' (1995) 22 Ars Aequi 38.

[40] Kasper J.O. Jansen, 'Art. 6:162 BW', in *Groene Serie Onrechtmatige daad*, section 7.2.1.6.

[41] Hoge Raad 23 July 2011 ECLI:NL:HR:2011:BP5967.

[42] Hoge Raad 3 mei 1934 NJ 1934/1549.

[43] Siewert D Lindenbergh, 'Commentaar op art. 6:168 BW' in *Tekst & Commentaar Burgerlijk Wetboek* (n 36).

5 Comparative socio-economic analysis

Despite their unique characteristics, Italian and Dutch property laws share several features (possibly due to their common roots in Roman law). In particular, both laws tackle potential conflicts of interest between drone users and landowners with a flexible rule referring to the landowner's interest in excluding third parties from using the air column. This is, in turn, based on the extent to which the landowner can actually use the land and how drone overflights might affect this.

This means that neither legal system has a clear-cut rule on this. This is particularly problematic in non-emergency situations. It makes it difficult for drone users to identify the legitimate altitude for drone overflights. This may change significantly from one landowner to another. Thus, it is practically impossible for drone users to plan routine supply routes. In Dutch law, compelling reasons of public interests may be invoked to shield the drone user from injunctions, but damages would still need to be paid.

Relying on servitudes is also unrealistic for drone users in both legal systems. Compulsory servitudes are unlikely to apply, as the law imposes quite restrictive requirements that are typically modelled after agricultural and industrial needs. These will rarely apply to healthcare facilities. Conversely, voluntary servitudes require drone users to contract with each and every landowner between the source and the destination of the supply route. This can contribute to high transaction costs for drone users, making it economically prohibitive for them to establish drone-driven supply routes.

Turning now to landowners, the flexible rule at the core of both Article 840, paragraph 2, c.c. and Article 5:21, paragraph 2, BW can offer them useful reaction tools in exceptional circumstances only, e.g., when a drone flies so close to the ground that it poses an immediate threat to bodily integrity. Otherwise, it is hard for landowners to understand exactly when they are entitled to exclude drone overflights, including through self-defence, and potentially claim damages from drone users. As mentioned above, a drone may threaten not only bodily integrity but also the privacy of landowners, which may reasonably occur even if the drone is flying at a quite high altitude. This may be a frequent occurrence, especially, but not exclusively, in urban contexts. In such cases, *quid juris*? In its ultimate inconclusiveness, the decision by the court of Gelderland mentioned above is quite telling. The drone user was infringing on the landowner's privacy, but the landowner exceeded in shooting the drone down. Failing to offer a clear operational rule for such cases, the court issued a 'Salomonic' decision where the damages are shared equally between the individuals concerned.

From a socio-economic perspective, this lack of clear operational rules in both legal systems seemingly leads to what could be described as a *lose-lose* situation. This is because neither the interests of landowners nor those of drone users are adequately legally protected. This is due to the legal uncertainty stemming from a fundamental

tension between the (traditional) rule over the air column and the (emerging) possibility of low-altitude flights of drones.

In both legal systems, drone users seem to have more leeway in emergencies. However, neither offers a smooth pathway for this. Under Italian law, the drone user would still be entitled to pay an indemnity to the landowner(s) if the drone flew under the (flexible) threshold as per Article 840, paragraph 2, c.c.

6 Conclusions

The considerations above follow a recurring pattern when an emerging technology interferes with established legal solutions devised in a different socio-economic (and technological) context. While pre-modern property law tended to vertically extend property rights over the land *usque ad sidera* (up to the stars), the gradual developments in (manned) flying methods, from balloons to airplanes, challenged the feasibility of that traditional solution and led to devising more flexible approaches. Such a flexible approach, which is well exemplified in the Italian and Dutch Civil Codes, proved effective when flying vehicles operated far from the ground, protecting the latter from legal reactions from landowners. This was intended to favour an activity that was deemed socially and economically desirable.

Nevertheless, this flexible approach proves inadequate for promoting the use of drones and protecting landowners, even if drones are used for important purposes of public interest in the area of public health, such as in medical emergencies and for the (more) routine supply of medical equipment. The letter of the law, which heavily relies on case-by-case assessments, does not seem to offer courts sufficient space to propose clearer operational rules.

Similarly to what happened with the rise of aerial vehicles in the XIX and (early) XX centuries, the emerging use of drones offers the opportunity to update further and refine the rules governing the use of the air column over the land. Just like balloons and airplanes indicated the undesirability of extending property rights up to the stars, the use of drones shows how the test of the interest of the individual landowner to exclude third parties' activities is inadequate to tackle this emerging reality, which promises to deliver important socio-economic benefits.

Other legal systems are exploring ways to better advance the interests of both drone users and landowners. In the US legal literature, a proposal has been put forth to clearly define the navigable airspace by foreseeing a minimum height under which drones cannot fly.[44] The proposal is to set this at around 200 feet (about 60 meters) from the ground.[45] The proponent deems this reasonable in the US context as 200 feet corresponds to five

[44] Lane Page, 'Drone Trespass and the Line Separating the National Airspace and Private Property' (2018) 86 George Washington Law Review 1152, 1173.
[45] ibid 1174.

times the average two-story home and grants owners substantial control over their air columns by excluding anything that flies below it. Whether this or a higher altitude would be more appropriate in the context of a European country should the object of an open and reasoned deliberation of the policymakers or of the competent regulatory authorities, considering national and local specifies and the destination of use (e.g., residential or agricultural) of the land.

Based on a compromise where both sides relinquish some control over the air columns, a clear-cut threshold along these lines, to be adjusted to the economic and practical characteristics of landownership in the respective legal system, has the potential to provide both UAS users and landowners with a clearer legal framework: the former know exactly when they are allowed to fly UASs over someone else's land legitimately; the latter have a clearer idea of when they are entitled to react to drone overflights. Thus, substituting a case-by-case assessment with a clear-cut altitude seems to be able to contribute to a mutually advantageous situation where the legitimate interests of both parties may be more clearly and better protected.[46] The ultimate responsibility for the determination of the conventional minimum altitude for drone overflights should rest on legislators or regulators in an attempt to balance the competing interests of drone users and landowners with a compromise solution; a solution where both interested categories of parties concede a part of their potential sphere of control over the airspace to each other in exchange for a clearer delimitation of their respective spheres. Also, the proposal for a clearer delimitation is not expected to drastically increase the activity level of drone users. This is because the regulatory framework for the authorisation and licensing of drone operations should still continue to apply, thus avoiding that an excessive number of drones fly over the private properties of someone else.

This proposal needs, however, to be qualified. In respect of non-emergency uses of UASs, such a compromise solution seems adequate for operations in the public interest falling in the specific category, such as the delivery of (non-hazardous) medical equipment to public healthcare facilities. Conversely, the proposed solution seems less viable for drone flights that are not in the public interest (eg, commercial deliveries) or that pose substantial risks for third parties (eg, flight operations belonging to the certified categories, such as for the transportation of patients or hazardous materials).

Turning now to emergency medical uses of UASs, flying over private properties above a conventional minimum altitude should be allowed irrespective of the applicable operation category. This would facilitate life-saving operations without triggering indemnification or compensation mechanisms.

Incidentally, in an emergency, drone users should retain the possibility of flying below the normative conventional altitude, if needed. To make it clear to landowners that a

[46] Embracing rather than ignoring owners' rights can actually accelerate the use of drones. See Troy A Rule, 'Drones, Airspace, and the Sharing Economy' (2023) 84 Ohio State Law Journal 157.

drone is flying for an emergency, drones should carry recognisable signs and emit recognisable sounds, also to be determined normatively. This is also to avoid reactions in self-defence from landowners.

Naturally, in order to make the proposed legal arrangement effective, the massive information asymmetries between landowners and drone users should also be addressed. The proposed delimitation would indeed remain ineffectual in a situation where it is disproportionately difficult for the landowners to identify who is actually flying over their properties and at what altitude. As a UAS traffic management system, the U-space[47] can provide a viable information and infrastructural basis for interested persons to obtain such information and use their rights more effectively.

In conclusion, a revised normative arrangement revolving around a clear-cut minimum height for drone flights has the potential to facilitate the development of current initiatives to upscale the use of drones also for medical purposes, both in emergencies and (with some exceptions) non-emergencies, without completely forfeit the interests of landowners in respect of the air columns extending over their properties. By delimiting in a clear and foreseeable way their respective spheres, this normative exercise would also simplify the application of civil or tort lability law rules and privacy law rules to disputes between drone users and landowners.

[47] EASA, 'What is U-space', <https://www.easa.europa.eu/en/what-u-space> accessed 26 June 2024.