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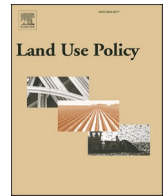
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# 3D real property in vertical mixed-use developments. A comparative analysis of common property and management aspects in selected jurisdictions – The case of British Columbia, Denmark and Sweden

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## ABSTRACT

Jurisdictions around the world are experiencing an increasing demand for formation of three-dimensional (3D) real property units, especially in the presence of vertical mixed-use developments. Since traditional real property formation is only in two dimensions (2D), jurisdictions are on different steps (levels) of transforming 2D real property legislation into 3D real property legislation. The objective of this article is to analyse and compare law and practice in jurisdictions that are on different steps of developing 3D real property legislation, but otherwise comparable in terms of societal development status. The predominant focus in academic literature is on formation of private 3D property rights. This paper has a somewhat different approach, focussing on formation and management of common property. The formation of common property is usually unavoidable in a vertical mixed-use development, e.g. due to a high degree of interdependence between layered and intertwined 3D property units. Legal aspects regarding common property formation and management have not been rigorously compared internationally. This article presents a comparative study including British Columbia (Canada), Denmark and Sweden. Each jurisdiction represents a unique step on the 3D transformation staircase where legal aspects regarding common property and management in each jurisdiction is analysed and presented. The results of the study can be beneficial for researchers and legislators as a tool to analyse 3D real property legislation.

## 1. Introduction

Vertical and lateral mixed-use<sup>2</sup> of real property have in recent years become a vital part of sustainable urban land-use. The economic and societal benefits of mixed-use are firmly established internationally, both in literature and practice (e.g. [Shen and Sun, 2020](#) and [Herndon, 2011](#)). However, one major prerequisite for a vertical mixed-use development to be economically justifiable is the possibility to subdivide the development in three-dimensional (3D) real property units (e.g. [Van Oosterom, 2018](#)). When it comes to facilitate subdivision of such 3D real property units, two main forms of legislation have been identified internationally, namely, a) the *condominium* and b) the *independent 3D property* ([Paulsson, 2007](#)). However, this categorisation is very general and on country level each form can be quite different ([Van der Merwe,](#)

[1994](#); [Paulsson, 2007](#)).

One method of addressing the different versions of each form of 3D legislation is to divide them into old and contemporary legislation. Thus, for the purpose of this article, legislation is classified into *first-* and *second-generation* legislation. First-generation legislation is synonymous with legislation adopted before the rise of mixed-use development, and thus not tailored to support such mixed-use developments. Whereas second-generation legislation is tailored to support the special requirements of vertical mixed-use developments.

The aim of the study is to analyse and compare how different versions of 3D property law and practice are implemented at national/state level. The legal and practical aspects regarding 3D property formation are investigated with special emphasis on the management structure and allocation of rights and responsibilities to the common property, which

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<sup>2</sup> Lateral mixed-use is different types of commercial and residential buildings in a dense urban area, whereas vertical mixed-use is different types of commercial and residential use in layers in the same development.

is shared by the unit owners. Three jurisdictions have been selected, as case study objects, based on maximum variation. Meaning, that they represent very different forms of 3D real property legislation.

First, we present British Columbia, Canada (case one) that introduced first-generation condominium legislation in 1966. It was replaced in 1974 with a second-generation condominium legislation and has been amended several times since then, among other reasons, to support complex mixed-use condominium developments. The 3D independent real property was introduced in 1971 with the Air Space Titles Act, however this was not related to mixed-use developments, but to subdivide the air above highways (Harris, 2011). Despite not intended to be used on mixed-use developments, it has in recent years been used to subdivide a mixed-use building as an alternative to the condominium concept (BCLI, 2017; Taylor and Tolensky, 2009).

Second, we present Denmark (case two), which still operates with a first-generation condominium legislation that has been in force since 1966. Since legislation has not been tailored to support vertical mixed-use developments, it has been necessary to develop sophisticated creative legal solutions (Overby, 2022). Thus, despite that legislation is not tailored for the purpose of subdividing vertical mixed-use developments, it is possible to form equitable management structures and allocate rights, restrictions and responsibilities (RRRs) to the common property.

Third, we present Sweden (case three) that quite recently (in 2009) introduced condominium legislation. However, condominiums are exclusively for housing purposes and thus not intended for subdividing a mixed-use building. Alternatively, the independent 3D construction property legislation introduced in 2004 is intended for subdividing mixed-use developments (Paulsson, 2007).

The different versions of 3D property law and practices, in each of the investigated jurisdictions, are analysed and compared with emphasis on management structures and allocation of RRR's in mixed-use developments. Differences and similarities are presented and discussed. The study confirms that 3D property law and practice in each jurisdiction is unique. The particular aspects in each jurisdiction is presented, compared and discussed.

## 2. Method and structure

Comparative studies regarding legal aspects and terminology of 3D real property are rare (see e.g. Paasch and Paulsson, 2021; Van Oosterom, 2018). However, comparing law and practice is relevant in order to evaluate national legislation and propose a way forward. There is, so to speak, no reason reinventing the wheel. The method used is comparative law and practise. Research data includes interviews, legislative documents, ordinances, national guidelines and articles from local commentators and researchers.

Preliminary to the presentation of the three case studies, in Section 4, an introduction to common property and tier management is presented in Section 3. The case studies are compared and discussed in Section 5.

## 3. Common property and management

Subdividing a 2D land parcel into a number of 3D property units usually requires formation of common property and a management structure. This is due to the high level of interdependence between layered and intertwined 3D real property units. For instance, the owner of the upper floor in a high-rise building must have a secure and enduring access to the ground and public road. Moreover, secure and enduring structural support is absolute paramount. In addition, there is a need for utility supply to water, heating, electricity etc. Condominium legislation provides for a standard definition of the common property. The independent 3D property does not provide a standard defined common property and thus the RRR's are drawn in reciprocal agreements. In order for such agreements to provide an enduring security they must follow the unit so future owners are obliged to inherit the agreements.

First-generation condominium legislation provides a standard allocation where the common property includes all parts of the original parcel that is not included within the boundaries of a condominium unit. For the purpose of this article, we call this the *general condominium rule*. The ownership right and the responsibility to contribute to the common expenses are allocated to all unit owners in relation to a co-ownership share. The method of calculating co-ownership shares differs across jurisdictions, but is often regulated based on the relative use of the common property and value of the unit (Çağdaş et al., 2020).

The general condominium rule states that all owners share in paying the expenses regarding the common property, even those units that clearly derive no benefit from a certain part of the common property. In many mixed-use developments (and even in some single-use developments) some units may benefit exclusively from a certain common facility. Therefore, it is often relevant to adjust the standard condominium rule by allocation rights and responsibilities to the unit(s) that derive benefit of a certain common facility. The solution in second-generation condominium legislation is to allow for part of the *general common property* to be transformed into *limited common property*.

First-generation condominium legislation has been implemented in many countries around the world in the first half of the 20th century for identical reasons, mainly relating to challenges regarding housing shortage in cities and to provide the possibility for homeownership to a broader segment of the population (Van der Merwe, 1994, p. 16–17). In the presence of vertical mixed-use developments, that arose in the latter half of the 20th century, the first-generation condominium legislation was replaced with second-generation legislation (see e.g. Van der Merwe, 1994; Rohan, 1978).

The second-generation legislation has been tailored to support more complex and mixed-use developments where it is necessary to separate the owners' association into so-called two-tier governance and divide the obligatory common property on which the condominiums are located into limited and general common property. However, first generation-condominium legislation can also, in certain jurisdictions, be fit to create two-tier governance and limited common property depending on how flexible the legislation is (Madsen et al., 2022).

Another aspect relates to management issues. First-generation condominium legislation only mentions a single management structure, and thereby a uniform regulation of both mixed-use and single-use schemes (Van der Merwe and Paddock, 2008, p. 574). In mixed-use developments, the different use types in the same building are so individual that a two-tier management structure is a more effective management solution (Madsen et al., 2022). Clearly, this is also the case in single-use condominium schemes that consist of multiple buildings.

Second-generation condominium legislation is amended with provisions that allows for changing the general condominium rule. It mentions and acknowledges limited common property and two-tier management structures. Thereby, second-generation legislation is tailored to support the more complex condominium developments. In other words: second-generation legislation introduces means to isolate parts of the common property as limited common property and split the owners' association in a two-tier management structure (Van der Merwe, 2015; 2018).

The independent 3D real property is more closely related to an actual subdivision of land. It stands out from the condominium concept because there is no obligatory common property. It is originally tailored to support 3D subdivision of land for underground constructions e.g. tunnels or buildings above a road, such as the air space parcel in British Columbia (Harris, 2011). However, despite the fact that independent 3D property is not combined with a legal requirement to create common property, as in condominium legislation, some form of common property is often unavoidable due to the high degree of interdependence between 3D property units (Paulsson, 2007).

#### 4. Case studies

In the following sections we present the results of the three case studies. Each case represents different means to establish an equitable management structure and allocation of rights and responsibilities to the common property in mixed-use developments.

Jurisdictions may belong to different law families. Comparing law families has however not been considered when selecting the investigated cases since focus is not on the legal structures themselves, but organisational and management aspects of 3D real property.

In British Columbia (BC) the first-generation condominium act, introduced in 1966, was replaced in 1974 and 1998, with second-generation condominium acts (BC Parliament, 1998). One major reason for amending the act was to solve the cost sharing challenges regarding common property management in complex mixed-use developments (BCLI, 2012). In addition, a major revision of the law was conducted between 2012 and 2019 by the British Columbia Law Institute (hereafter BCLI) which resulted in reports and working papers (BCLI, 2017, 2019). Therefore, the case study of British Columbia consist mainly of studying this comprehensive collection of knowledge as well as legislation.

In Denmark, the private chartered land surveyor has monopoly on property formation, including condominium formation (Danish Parliament, 2018, 2020a) and has therefore contributed to the development of practical solutions. The Danish study is based on interviews with expert chartered land surveyors working with 3D property formation (e.g. Jensen, 2022; Overby, 2022; Kristensen, 2022) (names withheld for peer review). In addition, official documentation, easements and articles of owners' associations from the land registry as well as legislation have been investigated.

In contrast to Denmark and British Columbia, Sweden has only quite recently introduced condominium legislation in 2009 (SFS, 1970a). However, five years earlier, in 2004, Sweden introduced the Independent 3D Property, among other reasons, to deal with the challenges of management in mixed-use developments (Eriksson, 2005, p. 7). The first steps towards new legislation were taken in the mid-1990 s. A large amount of publications has been published since the beginning of the 2000 s, see e.g. (Julstad and Ericsson, 2001; Mattsson, 2003; Eriksson, 2005; Eriksson and Adolfsson, 2006; Paulsson, 2007, 2008, 2011a, 2011b, 2013; Åstrand, 2008; Eriksson and Jansson, 2010; Höglblom, 2017). The Swedish study is based on legislation and literature research supplemented with interviews with a cadastral surveyor from Stockholm Municipality (Larsson, 2021), being one of Sweden's senior experts. Stockholm is one of 40 municipalities allowed to perform property formation within their jurisdiction, authorised by Lantmäteriet, the National Swedish Mapping, Cadastral and Land Registration Authority.

##### 4.1. Case one - British Columbia

British Columbia is a province in Western Canada. Legislators have been inspired by the Australian statutes and British Columbia has therefore adopted the Australian term *strata property* instead of the term condominium. It is however just two different words describing the same thing. The Strata Titles Act was adopted in 1966 and replaced by modified acts in 1974 and 1998 (BC Parliament, 1998).

Local terms from British Columbia are used in the following description that requires an introduction. The term *Unit entitlement* is the equivalent to co-ownership share and a *section* is the equivalent to tier governance. The term *types* is another local word that describes a special legal possibility to form limited common property. *Strata lot* is the equivalent to a condominium unit, *strata plan* is the equivalent to condominium scheme, *strata corporation* is equivalent to an owners' association.

British Columbia introduced the independent 3D property in 1971 with the Air Space Act (BC Parliament, 1971). It has since then been incorporated in the Land Title Act (BC Parliament, 1996). Independent

3D property formation is thus possible by using the *air space parcel*. The air space parcel was originally intended to facilitate formation of simple aerial parcels that was not possible to be formed by other means. For example, to provide for the possibility to subdivide land horizontally in order to separate it from Crown land owned by the state, thus creating incentive to use the space above a freeway for new building structures (Taylor and Tolensky, 2009). Today, air space parcels are also used to subdivide a mixed-use building in units instead of using strata legislation (Jones, 2017; BCLI, 2017), and therefore, a common field of application exists (Harris, 2011, p.701).

The first-generation Strata Titles Act from 1966 consisted of 25 sections (BC Parliament, 1966). It was replaced in 1974 with a second-generation act consisting of 67 sections (BC Parliament, 1974), which was more detailed and sophisticated, amended with provisions tailored to support the expansion of more complex condominium developments (BCLI, 2012, p. 11–13). For example, provisions regarding phase development and operating with different sections (two-tier governance). The 1998 act expanded earlier provisions and added new provisions directed at emerging issues, which resulted in a lengthy act containing approx. 300 sections (Strata Titles Act, 1998). Since 1966 “British Columbia has moved from skeletal act to a detailed and comprehensive legal framework” (BCLI, 2012, p. 14).

In 2012, a major revision was initiated by the BCLI to evaluate the need for amending the law in accordance to, among other things, more complex condominiums and mixed-use developments (BCLI, 2012). The project, named Strata Property Law Project, was divided in two phases. Phase one of the project was a preliminary investigation conducted to identify issues to be further investigated in phase two. Among other main issues to be examined in phase two of the project was the complex strata issue. Complex strata is not a term mentioned in The Strata Titles Act but is meant to comprise issues concerning topics as, mixed-use strata, sections, types, and phased strata plans. The phase-two proceeded from July 2013 to June 2019 (BCLI, 2019) and resulted in several recommendations for amending the act (BCLI, 2017).

The concept of sections and limited common property is incorporated in the Strata Title Act (1998). Sections form two-tier governance. Limited common property allocates rights over the common property to exclusive use by one or more units. Formation of types is a practical procedure that allocate expenses to adjust the general rule of cost sharing by amending the by-law (BCLI, 2017, Ch. 4). A strata subdivision is required to be accompanied by the certificate of a private chartered land surveyor.

##### 4.1.1. Limited common property

Common property is mentioned in the strata act both “exclusively”, as all parts of the original parcel that is not located within the boundaries of a strata lot, and “inclusively”, through a list of common facilities including technical infrastructure such as pipes and wires, etc. (BC Parliament, 1998, s. 1). The common property is owned in common by all lot owners according to the unit entitlement. The unit entitlement denotes each unit's ownership share to the common property and the contribution to the common expenses' of the strata corporation. If a strata plan consists of both residential and non-residential strata lots the schedule of unit entitlement must be approved by the superintendent of real estate (BC Parliament, 1998, s.s. 1,246). The superintendent of real estate has a consumer-protection dimension (BCLI, 2017, p. 214). In complex condominiums, the unit entitlement can either be determined by area or by the superintendent. The superintendent of real estate provides official control that protect the owners with fair allocations of common responsibilities.

Common property can be designated on the strata plan as limited common property for the exclusive use of the owners of one or more strata lots. In principle, limited common property remains common property but in practice it belongs to one or more strata lots, but not all (BC Parliament, 1998, s.s. 1,73). Limited common property can be designated by the owner developer before the first general meeting, or



by 2/3 votes at the general meeting. Examples of limited common property are balconies, parking space and stairwells.

A strata corporation or section can pass a by-law that allocates the responsibility to the common expenses regarding a facility to certain types of strata lots. Such types of strata lots are created to allocate the responsibility to maintain facilities only used by a certain type of lot. An example is, if only half of the strata lots in a building are installed with gas fireplaces, then only strata lots with fireplace would constitute a certain type and bear the responsibility alone to maintain fireplace related issues and paying for the gas (BCLI, 2017, p. 126).

#### 4.1.2. Two-tier governance

It has been formalised in the Strata Titles Act to organise certain types of strata lots in special interest sections (BC Parliament, 1998, s. 190). A section operates as a “mini strata corporation” with a council and by-law. A strata corporation with sections operates in two levels. One level operates in relation to matters of common interest as a whole and another level in relation to matters regarding only the section(s) e.g. residential strata lots in one section and non-residential strata lots in another section (BCLI, 2017, Ch. 3).

The owner developer can create sections when the strata corporation is created by amending the standard by-law. Sections are allowed only to represent different interests of, a) owners of residential strata lots and owners of commercial strata lots, (b) significantly different types of commercial strata lots, (c) owners of different types of residential strata lots (BC Parliament, 1998, s. 191).

It is possible to designate limited common property for the exclusive use of all strata lots within a section. Creation of sections that fit a concrete development is not required by law but left to the owner developer to decide. A section can also be created later by the strata corporation at the general meeting (BC Parliament, 1998, s. 193).

#### 4.1.3. Air space parcel

The Strata Titles Act includes provisions allowing the creation of different self-governing sections in a strata plan. The concept of sections has been implemented in legislation to support the organisation between owners in mixed-use and/or mixed-ownership development. However, it has become increasingly popular with owner developers in British Columbia to use the air space parcel as an alternative means to separate residential and commercial interests in a building (Taylor and Tolensky, 2009; BCLI, 2017, p. 29; Jones, 2017). The advantage of using the air space parcel is related to obtaining a higher degree of independence and easier delineate of cost allocation for non-shared building components. According to Jones (2017, p.1) the flaw in condominium is that “despite the relative degree of independence separate [condominium] sections

have, the use of separate sections will not help solve all conflicts between the residential and commercial components of the building.”. Air space parcels form three-dimensional space/volumes subdivided from a traditional land parcel. The air space parcel is treated as any other traditional parcel of land and can thus be subdivided into strata units, however it cannot be subdivided further in Air space parcels (Taylor and Tolensky, 2009).

In a mixed-used development the residential part of a building is subdivided in one (or a number of air space parcels as in Fig. 1.) air space parcel and the non-residential part in another air space parcel. The air space parcel including residential apartments can be subdivided further in strata units.

The air parcel diagram in Fig. 1. illustrates a mixed-use development with four independent residential volumes and two independent commercial volumes: the Hudson Residential (brown volume) and tower one (yellow volume), tower two (red volume), tower three (green volume) and the two independent commercial volumes (volume blue and volume light blue). In this case, each residential volume can be subdivided further in three individual strata developments.

Air space subdivision of land is governed by part 9 of the *Land Title Act* (BC Parliament, 1996). When subdividing the space of a land parcel in one or more air space parcels the original parcel remains as the remainder parcel. The remainder parcel becomes the residual part of the original parcel.

The individual air space parcels are independent only to a certain extent. It is of course inevitable that some kind of common property management is established for the development to function as one entity. The formation of an *Air Space Agreement* provides the necessary security and management. An Air Space Agreement consist of matters of mutual interest between owners such as reciprocal easements for access, service connections, structural support, future construction, cost sharing, maintenance, repair and common building services such as sewer, garbage and water (Jones, 2017). The British Columbia *Building Code* does not provide for air space parcels, so a code consultant is required to participate in the formation process to define and explain why exceptions to the building code requirements must be addressed and, in the end, allowed as an exception to the building code (Taylor and Tolensky, 2009). An Air Space Agreement is a lengthy and complex document including many regulations between owners and local government. Typically, a *Section 219 Covenant* of the Strata Property Act is required by the municipality to address the unique features of each development. A Section 219 Covenant is an agreement between a landowner and a municipality. It may address issues regarding the functionality of a development, including rights of access and responsibility for repair and maintenance (CHOA, 2015).

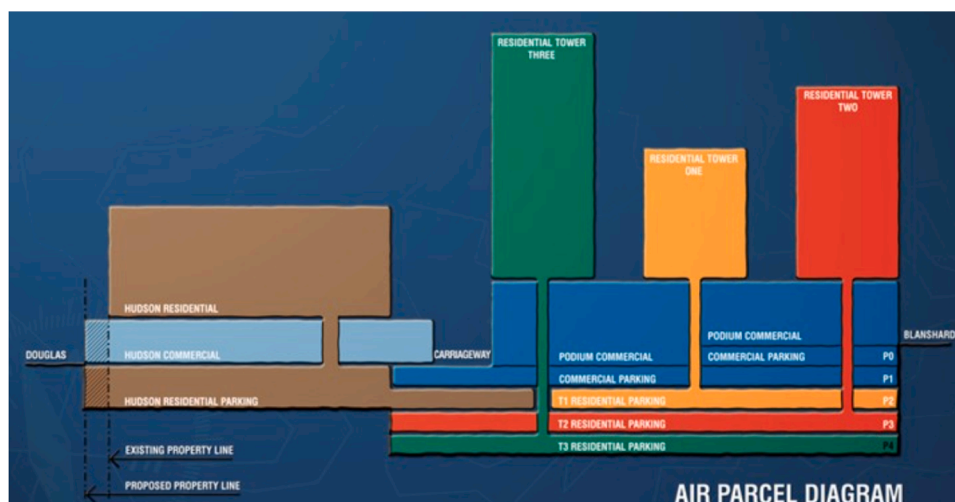


Fig. 1. Air Parcel Diagram of a mixed-use development including six independent air space parcels (Taylor and Tolensky, 2009, p. 13).

#### 4.2. Case two - Denmark

Denmark is one of the three Scandinavian countries located in the northern Europe, also including Sweden and Norway. Danish real property legislation includes three different types of real property namely, land parcel, building on leased land and condominium (Danish Parliament, 2014). Real property is registered in the cadastral registration. Interests in land including e.g. deeds, mortgages, easements and other RRRs are registered in the land registry and linked to the cadastral registration of the real property (Danish Parliament, 2009).

In 1963 a government committee (The Owner Apartment Committee) was appointed to investigate the possibility of implementing direct ownership to an apartment unit and other rooms in a building (Owner Apartment Committee, 1965). The reason for considering this was related to a general public demand for introducing a third possibility of obtaining dwelling in addition to the traditional options of purchasing a house or renting an apartment. Introducing the condominium concept was also considered as a solution to raise capital for new building projects and thereby overcome the problem of housing shortage in cities. Also mentioned in the committee report, is a request to meet shop owners desire for more security against termination of lease, which can be secured by ownership to the premises instead of leasing them (Owner Apartment Committee, 1965, p.p. 129–132).

The committee expressed prior to drafting a proposal to the condominium law that their study of law and practice experience in other countries showed differences in the level of detail in each law. In Germany and Italy, the level of detail was regarded high, whereas in Belgium the law was simpler. The committee chose the simple non-detailed law (a framework law). The reason is not directly expressed in the committee report, but it is mentioned that the system in Belgium seems to function well with the combination of a simple law and established law practice (Owner Apartment Committee, 1965, p. 117).

The Condominium Act (in translation of direct Danish wording: Owner Apartment Act) was introduced in 1966 (Danish Parliament, 1966). It originally consisted of only 12 sections. It has been amended throughout the years but mainly regarding issues related to housing policy e.g. the general restriction of subdividing old apartment buildings constructed before the law was introduced. A recent major revision of the law resulted in a modified version enacted in 2020 (Danish Parliament, 2020a), but even then there were no provisions in the new law and no discussion mentioned in the committee's report (Owner Apartment Committee, 2018) about the challenges of the more complex condominium developments. Today the law consists of 28 sections (Danish Parliament, 2020a). Thus, the authors argue that the Danish condominium legislation remains a first-generation legislation. However, in practice it is possible to deal with the challenges derived from mixed-use developments by using the existing legislation. Though, based on our interviews, it is a challenge to understand and use the possibilities in practice. The practical solutions are only partly described in literature, see e.g. Blok (1995) and Madsen et al. (2022), and most of this information cannot, at least to the authors knowledge, be obtained in written form, but only by learning from expert practitioners.

##### 4.2.1. Limited common property

The common property is two-layered. The first layer is the residual part of the land parcel including all parts of the building(s) located outside the unit boundaries. The second layer is common property located within the unit boundaries such as load bearing and outer walls. The law describes this as *common parts and facilities* but without further details. However, the travaux préparatoires to the law (the committee report) clarifies the intentions and mentions that the common property is to be understood as the land, outer walls, roof, staircase, common installations etc. (Owner Apartment Committee, 1965, p. 143).

All units have an undivided share in the common property and responsibility to contribute to the share expenses. There is no requirement of calculating an individual co-ownership share to each unit, but in

practice this is commonly done in accordance with the relative unit area and value. If no share is specified in the registration documents all units are equal (Danish Parliament, 2020a, s. 3). The developer is free to decide how the share is allocated/calculated in a condominium scheme and there is no official control (Jensen, 2022).

In mixed-use developments, where the land and common parts of a building are used to a different extent by different users, an equitable allocation is necessary so units that derive no benefit of a common facility are liberated from contributing to this specific common expense. However, the condominium law provides no regulation to form such an equitable allocation of expenses. In practice the formation of equitable solutions is therefore trusted to the developer. The developer's request to form an equitable allocation of rights and responsibilities is performed by the land surveyor or legal advisor (Overby, 2022). There are two ways of allocating the responsibility to specific parts of the common property in order to form limited common property. Either, by amending the standard by-law with provisions specifying the units that are exclusively responsible for a common facility or using an easement to specify the responsibility (Overby, 2022). In order to be protected against future owners, specifically allocated rights and/or responsibilities have to be entered in the real property register (Blok, 1995).

##### 4.2.2. Two-tier governance

In mixed use developments it is often desirable to isolate the management in a two-tier management structure (Madsen et al., 2022). In practice a two-tier governance structure is legally arranged by amending the standard by-law (Danish Parliament, 2020c) with provisions recognising that part of the units are isolated in a secondary owners' association e.g. consisting of all housing units. The developer can preliminary decide this arrangement before the land surveyor applies for condominium subdivision, or it can be decided later at the general assembly by the unit owners.

The owners' association, and the standard by-law regulating the management of the owners' association, is activated right after official cadastral registration (Danish Parliament, 2020b) of the condominium scheme. The owners' association is responsible for maintaining the common property. However, in mixed-use developments where there is a residential part and commercial part it is practical to establish a two-tier management structure. In a two-tier management structure, the residential part is isolated in a secondary owners' association thus creating a second tier of the management body. The secondary owners' association manages the affairs only concerning the relationship between the owners of residential condominiums. This includes the management of common facilities only intended to be used by the residential condominiums, such as an elevator. The board, of the secondary owners' association, represents the owners of residential apartment units, as members of the master association. Owners of commercial condominiums are all directly members of the master association. Two-tier management is not mentioned in the Danish condominium legislation. There is no regulation in Danish legislation and the responsibility to organise a two-tier management structure is left to the developer (Overby, 2022). Establishing a secondary owners' association requires amending the standard by-law with provisions that form the secondary owners' association and the intended rights and responsibilities. A secondary owners' association will have its own set of by-laws and work as a mini owners' association with respect to the master association. Even though the concept of two-tier governance is not mentioned in legislation, it is formed under the rules that apply to traditional 2D property. In theory, the lack of official control could lead to an unfair allocation of common expenses, for example in a situation where the developer favours the commercial unit(s) above the residential units. However, to the authors' knowledge, this has not caused problems that would lead to considerations implementing official control/approval. One explanation to this could be that the market is sufficiently controlling that the developer establishes an equitable allocation of rights and responsibilities. The

developer must know that the market value of a condominium unit is negatively affected if a condominium scheme is formed without equitable allocation of rights and responsibilities. Not only will such a development be difficult to sell, but it will also damage a developer's reputation and ability to attract investment to new projects. However, one visible drawback to the lack of support in legislation and lack of official control is that smaller developers intentionally neglect to establish a management of common owned facilities, based on the intended use, because they consider the cost too high. Large projects are not as economically sensitive. Changing or modifying a management structure at a later stage is possible but requires the approval from the owners and other stakeholders, such as mortgagees. A defective management structure can therefore be difficult to amend (Overby, 2022; Jensen, 2022).

In relation to the Danish non-detailed framework legislation, it is worth to notice that Paulsson (2007) concludes that "It might be possible to discover a tendency of having to make more changes when the legislation is detailed rather when it is not." (Paulsson, 2007, p. 321). Thus, indications are that the reason the Danish act is working without amending it, is because the original draft from 1966 is a non-detailed framework act.

#### 4.3. Case three - Sweden

Swedish real property legislation includes different types of real property, such as traditional land parcel, joint property, condominium and independent 3D property (SFS, 1970a, 1973a). Real property is formed through a cadastral procedure by a cadastral surveyor from one of the 40 municipalities allowed to perform property formation within their jurisdiction (Larsson, 2021) or Lantmäteriet, the national cadastral agency (SFS, 1970b).

Local terms from Sweden are used in the following description that requires an introduction. The terms *Joint Property Unit* and *Joint Facility* are two types of legal tools used to form general and limited common property. The term *Joint Property Association* is the equivalent to a condominium owners' association.

In contrast to Denmark and British Columbia, Sweden did not introduce the condominium until 2009. Prior to the introduction of the condominium, Sweden introduced the independent 3D property in 2004 (SFS, 1970b; Eriksson and Jansson, 2010). The Swedish journey towards new 3D property legislation began ten years earlier, in 1994, when a government committee was appointed to investigate the possibilities to solve problems in complicated mixed-use building structures. In addition, to propose a solution to facilitate separation of real property for tunnels, bridges and to build new structures on and below existing buildings (Paulsson, 2007, p. 80; Julstad and Ericsson, 2001). The investigation was originally meant to consider both the independent 3D property and condominium (apartment ownership). However, for legal and political reasons, the considerations regarding adopting condominium in Swedish property law were excluded (Paulsson, 2011b, p. 12). Since most countries in Europe only had experience with condominium legislation, the Swedish legislators looked towards systems in Australia and Canada for inspiration because they have many years of experience with the independent 3D property legislation (Paulsson, 2007, p. 301). The independent 3D property was introduced in 2004 and condominium in 2009, after political reconsideration (Paulsson, 2011b).

The independent 3D property and condominium are both categorised as 3D property in Swedish property legislation. Thus, the term 3D property includes both condominium and the independent 3D property. The condominium is merely considered as a special form of 3D property that is only intended to include one dwelling. However, the same rules that apply to the independent 3D property also apply to condominium. 3D property has been incorporated in the existing (2D) real property legislation, mainly the Land Code Act (SFS, 1970a) and the Real Property Formation Act (SFS, 1970b) which until 2004 only facilitated formation of traditional 2D property/land. In the Land Code Act it

is expressed that 3D property is to be considered as "land" (SFS, 1970a, ch.1, s. 1a). This means that the same rules that apply to traditional 2D property/land also apply to 3D property.

3D property is formed through a cadastral procedure conducted by an official cadastral surveyor. In order to qualify for 3D property, it is required that forming 3D property is deemed necessary and more appropriate than using traditional (2D) property formation. One criteria justifying 3D property above traditional 2D property is the need for horizontal boundaries. In the formation process the 3D property unit must be secured with rights so it can be judged to be suitable for the intended purpose (Åstrand, 2008, p.p. 3–4). This includes that the official cadastral surveyor must consider all necessary common property and easements that need to be formed as part of the cadastral formation process. It is mandatory that each 3D property unit has access to the ground. This can in practice be secured either by forming a stairwell into common property or by granting a right of way using an easement.

In the case studies of British Columbia and Denmark, limited common property is described as a method to allocate rights and responsibilities to the common property in a condominium scheme. It can therefore be considered as a transformation of general common property (common for all unit owners) to limited common property (common for a limited number of unit owners). However, in Swedish property legislation, there is no general condominium rule, so common property and management is created in each case for the particular purpose (ad hoc) to perfectly fit the conditions in each individual case. Thus in Sweden, the concept of limited common property, is not a tool used to change a condominium standard. Therefore, it does not fit so easy into the categorisation used in the case studies of British Columbia and Denmark. Perhaps a more appropriate description in the Swedish case study would have been "formation of RRRs to common property and facilities". However, for the purpose of this article, to uphold a coherent description in the three case studies, then, the subsection titles that are used in the following are similar to those used in the two previous case studies.

##### 4.3.1. Limited common property

Prior to the introduction of the independent 3D property legislation in 2004, a legal framework already existed in Sweden to regulate co-operation between different property owners of traditional 2D land parcels. For example, facilities of common interest to homeowner land parcels such as playgrounds, roads and sewer, pipelines etc. can be formed as a joint property unit or a joint facility under the Joint Facility Act (SFS, 1973a). The idea is that the same legal solution also applies to 3D property units when forming common property (Eriksson, 2005, p. 9).

There is no general condominium rule specified in legislation, but only recommendations, describing what is common property. The reason Swedish legislators refrained from implementing detailed control in legislation is because they knew conditions in individual developments can vary to a great extent, and so can the appropriate equitable allocation of rights and responsibilities to the common property (Julstad and Ericsson, 2001). In addition, the existing legislation already included a regulatory structure concerning co-operation through the Joint Facility Act. A local commentator describes that: "3D properties are just like ordinary properties created in a cadastral procedure." (Åstrand, 2008, p. 1). Formation of general common property and limited common property is part of the cadastral procedure in the formation process. The cadastral surveyor follows certain recommendations expressed in an official guideline to establish an equitable allocation of rights and responsibilities to the common property (Lantmäteriet, 2022).

The land parcel, from where the condominium units are subdivided, is normally converted into a joint property unit. A joint property unit can also include features of general common interest such as load-bearing beams (Çağdaş et al., 2020, p. 4). The cadastral surveyor creates a joint property association with the purpose to manage the joint property unit. Each condominium unit has a co-ownership share in the joint



property unit and owners automatically become members of the joint property association.

A joint facility is used to arrange rights and responsibilities to facilities of common interest for several property units. This include e.g. an elevator, staircase, the roof and the facades of the building. A joint facility is regulated in the Joint Facility Act (SFS, 1973a) and formed through a cadastral procedure. There can be several joint facilities within one development and several facilities can be included in one joint facility. Thus, general common property and limited common property can be formed. As mentioned in Section 3, then rights and responsibilities to general common property are shared by all units, whereas rights and responsibilities to limited common property are shared by a limited group of units.

In some situations, easements are used as an alternative to create a joint property unit or joint facility. For example, when only one 3D property unit is assured an enduring access to the ground surface, then an easement is sometimes preferred as the most appropriate solution (Eriksson and Adolfsson, 2006). Two types of easements exist with different levels of security; the *official easement* (SFS, 1970b, Ch. 7) and the *agreement easement* (Mattsson, 2003, p.4). The official easement is formed through a cadastral procedure. To be formed, it must be judged to be of significant importance in order to secure that the property unit is enduringly suited for its intended purpose, such as e.g. structural support. The official easement is registered in the cadastre registry in written form and visualised on a map. It can only be formed, altered or terminated through a cadastral procedure (Lantmäteriet, 2023). The agreement easement is formed through agreement between the unit owners. In order to be protected against future owners, it has to be entered in the real property register (SFS, 1970, ch.14).

#### 4.3.2. Two-tier governance

Management of common property is regulated in the Joint Property Unit Management Act (SFS, 1973b). Management can be governed directly by the co-owners or by an association where the co-owners are members. Management governed directly by the co-owners is regulated by the rules in Section 6-16 of the Joint Property Unit Management Act. This solution is used if the situation involves a few co-owners (Çağdaş et al., 2020, p. 5). Management governed by an association is regulated in section 17–65 of the Joint Property Unit Management Act. Provisions include e.g. requirements to the content of the associations' by-laws, maintenance funds and voting rules at the general meeting.

An association can be formed for each joint facility, thus creating a two-tier governance structure. If a condominium development includes two or more buildings, a joint facility is formed for each building and a joint property association is established for each building to manage the joint facility (Çağdaş et al., 2020, p. 5).

#### 4.3.3. The independent 3D property

As mentioned above, the independent 3D property in Sweden follows the same rules as the condominium when forming RRRs. They are both merely considered as two different types of 3D property. The major difference is that the independent 3D property is tailored to be used in mixed-use developments and the condominium can only accommodate dwelling.

In a mixed-use development, only one commercial use-type can be formed as an independent 3D property unit. Only in rare situations, can identical commercial use types be formed as individual independent 3D property, but that is more the exception than the rule. The reason for this is, that the view taken in Sweden is that the number of units should be kept at a minimum (L, 2022). This contrasts with e.g. the situation in Denmark where there are no such limitation (Overby, 2022; Jensen, 2022).

The independent 3D property unit must be intended to accommodate a building or a construction, or part of such. Thus, a 3D property cannot consist of pure air as the air space parcel of British Columbia. However, the independent 3D property in Sweden is not bound to the land parcel,

as the air space parcel in British Columbia, and can extend across several land parcels (Paulsson, 2007, p. 33).

## 5. Comparison and discussion

First-generation condominium legislation was implemented in Denmark and British Columbia in 1966. However, today the Danish condominium act remains a skeletal first-generation act, with only 28 sections while the British Columbia strata act has developed into a largely second-generation of approx. 300 sections including provisions regarding limited common property, sections, types. Such provisions are intended to deal with the challenges in complex and mixed-use developments. The strata legislation in British Columbia is a more contemporary version than the Danish condominium legislation because it has been amended with provisions to improve the allocation of common property rights and management to better fit mixed-use developments. Whereas the complexity in British Columbia is addressed in legislation, it is solved by practice in Denmark. It could be argued that the Danish practical solutions to a large extent are formalised in British Columbian legislation. In contrast to the condominium in British Columbia and Denmark, Sweden introduced condominium much later, in 2009. Prior to this, the independent 3D property was introduced in Sweden in 2004. The independent 3D property was implemented in Sweden as a respond to the challenges regarding vertical mixed-use developments. The use of either condominium or the independent 3D property is rigidly regulated and there is no common field of application as is the case in British Columbia, where both strata property and the air space parcel is used to subdivide a mixed-use development in 3D property units.

In the following sections, the specific characteristics of each jurisdiction are compared and discussed. Section 5.2 focuses on the formation of limited common property and Sections 5.3 and 5.4 focus on the key findings of the study regarding air space parcel vs. strata property/condominium and the level of official control in the formation process.

### 5.1. Specific characteristics of each jurisdiction

Based on the case studies, the authors believe that it is possible to derive a distinction between legislation that is fit to support mixed-use developments and legislation that is tailored to support mixed-use developments. In Denmark, for example, the first generation of condominium legislation is fit because it works in practice. However, the concepts of limited common property and two-tier management are not mentioned in the act and therefore it is not directly tailored to support mixed-use developments. Oppositely, the British Columbia strata act (a second-generation condominium act) is tailored to support mixed-use developments because limited common property and two-tier management is mentioned in the strata act. In the present authors' opinion, first-generation condominium legislation may be fit to support vertical mixed-use developments, but it is not tailored by legislators to support mixed-use developments. Second-generation legislation is tailored by legislators to support mixed-use developments. First-generation legislation can be fit to support mixed-use developments if there is a large degree of flexibility left to the individual developers/owners to draft the details that regulates a condominium scheme, as in Denmark.

Each of the three jurisdictions studied represents 3D property rights legislation that facilitates a unique formation of limited common property and two-tier management in mixed-use developments. Table 1 below summarises unique features of condominium and independent 3D property.

#### 5.1.1. Special characteristics in Denmark

Denmark represents a jurisdiction with a first-generation condominium act (The Owner Apartment act). The condominium act has a multipurpose field of application, and therefore it is fit to support 3D property formation in vertical mixed-use buildings. In practice, it is

**Table 1**

Specific key characteristics regarding condominium and independent 3D property in Denmark, British Columbia and Sweden.

	Denmark	BC	Sweden
<b>Condominium property</b>	x	x	x
1. Individual act	x	x	x
2. Incorporated in an existing act	x	x	
3. First-generation legislation			
4. Second-generation legislation			
1. Framework legislation	x	x	x
2. Tailored to complex mixed-use developments	x		
3. Fit to complex mixed-use developments			
1. Official control of sustainability		x	x
1. Multipurpose (mixed-use)	x	x	x
2. Exclusive for dwelling			
Formation process:	x	x	x
1. Performed by official cadastral surveyor			
2. Performed by a private chartered land surveyor			
<b>Independent 3D property</b>		x	x
1. Individual act		x	x
2. Incorporated in an existing act			
1. Framework legislation		x	x
2. Tailored to complex mixed-use developments		x	x
3. Fit to complex mixed-use developments			
1. Official control of sustainability		x	x
Formation process:		x	x
1. Performed by official cadastral surveyor			
2. Performed by a private chartered land surveyor			
Can be combined with condominium		x	x

possible to change the standard allocation of the common property and split the management in a two-tier structure. The standard by-laws for associations can be amended with provisions to form two-tier management and easements provide for the creation of limited common property. Such customised allocation of the common property and formation of a two-tier management structure is not mandatory and only formed if decided by the owner/developer. The land surveyor has monopoly on property formation, including condominium formation. There is no official control to secure that a fair and impartial (equitable) allocation of RRRs has been formed. The independent 3D property has not been introduced in Danish property legislation.

### 5.1.2. Special characteristics in British Columbia

The state of British Columbia represents both a second-generation condominium legislation (the Strata Act) and the independent 3D property (the air space parcel). Condominium has a multipurpose field of application customised to facilitate 3D property formation in mixed-use developments. The Strata Act is tailored with special provisions to support a customised allocation of common property and two-tier management structure. A customised allocation of the common property and formation of two-tier management structure is not mandatory and only formed if required by the owner developer. However, in mixed-use (residential and commercial) developments the unit entitlement must be approved by the superintendent of real estate. The air space parcel has been incorporated in the existing land titles act. It facilitates 3D subdivision of land. It is bound to the land parcel and can consist of pure air, a whole building or part of a building or other construction. It is fit to support mixed-use developments, but is not tailored as its original intention was to incentivise the use of space above highways. Common property is not mandatory when forming an air space parcel. The air space parcel is independent from the underlying land parcel and common property is only created based on what is deemed necessary in each specific case. Management of common property is secured in an *air space parcel agreement* formed by the owner developer and approved by the superintendent of real estate. In a vertical mixed-use development the superintendent of real estate provides the official control to secure a fair allocation of RRRs. Property formation must be accompanied by the certificate of a private chartered land surveyor.

### 5.1.3. Special characteristics in Sweden

Sweden represents a jurisdiction with a special condominium property and independent 3D property. The condominium and independent 3D property have been incorporated in the existing legislation, mainly the land code and property formation act. They both follow the same rules, and the main difference is that the condominium is only to be used for dwelling purposes. Condominium in Sweden is special compared with traditional condominium legislation because it is only used on dwelling units. 3D legislation was introduced in 2004 to address problems in vertical mixed-use developments and is therefore specifically tailored to vertical mixed-use developments. There is no common field of application between the condominium and the independent 3D property because they each are designed/tailored for a specific purpose. There is a high level of official control to secure that an enduring, fair and impartial (equitable) allocation of RRRs has been formed.

### 5.2. Formation of limited common property

The Danish condominium legislation provides a standard solution for allocating rights and responsibilities to the common property. Even complicated developments can easily be formed as condominium property without specific considerations to the actual use and benefit of the standard common property in each case. The advantage is that formation of condominium property in a vertical mixed-use development is not difficult and resource-intensive. The disadvantage is that there is no official control and thus no guarantee that an enduring, equitable and fair allocation of RRRs has been established. This is the reverse situation in Sweden, where a cadastral procedure is mandatory and the condominium formation in each case is thoroughly considered by the cadastral authority. The quality of the common property management is thus questionable in Denmark, as it is largely up to the developer and private individuals to ensure this. The Danish condominium legislation is a framework legislation that is fit to deliver an equitable allocation of rights and responsibilities to the common property, but there is no official control from any authority and the market forces are left to fill the role as regarding the main control. One result is that different solutions exist depending on the interests and experiences of the parties responsible in the formation process.

The Swedish 3D property legislation, introduced in 2004, is tailored to the present conditions, but it is built primarily on the traditional real property legislation. The *Joint property* and the *joint facility* had been in use for many years, before 2004, to support land parcels with a network of common property. The same network principle is now used to support 3D property with complex 3D common property arrangements. Compared to British Columbia and Denmark, there is a more clear official procedure to subdivide mixed-use developments in Sweden. Condominium is only for dwelling, and the formation is conducted through an official cadastral procedure. Common property and management are created for the particular purpose (ad hoc) to fit the conditions in each individual case. This provides a high degree of trust that ensures that an equitable and sustainable allocation of RRRs is legally established. Transaction costs in the property formation process are perhaps much higher in Sweden than in Denmark, due to the high level of official involvement. However, in the long term, transaction costs may be higher in Denmark than in Sweden if private individuals have failed to establish a sustainable arrangement of RRRs.

In British Columbia, the Strata Act is tailored to secure an equitable allocation of RRRs by describing the concepts of limited common property, sections and types (two-tier governance). In Denmark, it is possible to use limited common property and two-tier governance in vertical mixed-use developments. However, the concepts are not clearly mentioned in legislation and therefore the results and quality regarding organisation and allocation of RRRs differ in each case. The implementation of limited common property, types and sections in the British Columbia strata act facilitates more clarity and official regulated guidance, whereas in Denmark only few practical experts know how to use

the concepts of limited common property and two-tier management structures.

### 5.3. Air space parcel vs. Strata

The British Columbia study indicates that in vertical mixed-use developments, developers are increasingly preferring the Air space parcel above condominium property. This is quite interesting as the Strata Act is specifically tailored to support vertical mixed-use developments. In Denmark and Sweden there exists no such common field of application between condominium and the independent 3D property. In Denmark the condominium is the only means to form 3D property and in Sweden the condominium is merely a special form of 3D property, exclusively to be used for dwelling purpose, and thus not possible to use on vertical mixed-use. In Sweden, the independent 3D property is the only means to form 3D property in vertical mixed-use developments. The situation in British Columbia implies that condominium legislation, despite tailored to mixed-use condominium, is too complex to use because the standard allocation of RRRs must be altered by the use of limited common property and two-tier governance (types and sections). When the Air space parcel is used, the developer is not bound to a standard allocation of RRRs. The differences between strata property and the Air space parcel are thus also closely related to the differences between detailed legislation and framework legislation. Thus, the authors believe that the situation in British Columbia also indicates that framework legislation is preferable in vertical mixed-use developments due to the high level of flexibility.

### 5.4. Level of official control

The airspace parcel in British Columbia and the 3D property in Sweden are treated like any other traditional 2D land parcel, whereas the condominium property in British Columbia and Denmark are regulated through individual legislation either in a detailed act (as in British Columbia) or by a framework act (as in Denmark). The level of official control differs in each jurisdiction. In Denmark, the developer can decide the allocation of RRRs and the market forces are the only control. Both British Columbia and Sweden have official control to secure that the formation includes a fair and impartial (equitable) allocation of rights and responsibilities over the common property. Even though the level of official control in Denmark is low, it does not seem to cause major problems. However, Danish surveyors note that sometimes a fair, equitable and sustainable allocation of RRRs is neglected for financial reasons in order to save the cost of legal advice.

## 6. Conclusion

The objective of this paper was to compare different versions of 3D property law and practice in selected jurisdictions with as much variation as possible. The selected jurisdictions were British Columbia, Denmark and Sweden. The study outlines and compares key characteristics of the law and practice in each jurisdiction.

Although the law and practice vary widely in each jurisdiction, they serve the same purpose of providing a means of establishing a structure for the management and allocation of rights and responsibilities in mixed-use developments.

An important finding is that flexibility in legislation is preferred over rigid and detailed legislation. The Danish 3D property legislation is not tailored to vertical mixed-use developments, but it provides the necessary flexibility for developers to create and legally secure arrangements that fit the development. The British Columbia 3D property legislation includes a condominium law that is very detailed and tailored to mixed-use developments. Despite this fact, developers prefer to use the Air space parcel as an alternative because of the greater degree of flexibility. In Sweden, the legislation is tailored to mixed-use developments and offers a high degree of flexibility. Comparing the independent 3D

property with the condominium, then the independent 3D property is preferred in British Columbia and Sweden because of the flexibility it provides. While in the Danish legislation the independent 3D property has not been needed as the condominium provides the necessary flexibility for practice to establish legally binding arrangements that fit vertical mixed-use developments.

However, the study suggests that the Danish legislation could benefit from more regulation in the condominium legislation to ensure a fair, equitable, and enduring allocation of RRRs and management structure in vertical mixed-use developments.

The study did not clearly reveal why the Danish Condominium Act remains a first-generation act and the British Columbia Strata Act has evolved into a second-generation act. Both were adopted in 1966, but today they are very different in detail, which is clearly reflected in the number of sections, where the Danish act consists of 28 sections, while the British Columbian act consists of approximately 300 sections. The findings of Paulsson's (2007) suggests that the more detailed a law is, the greater the need to amend it is in order to meet the changing demands of society. However, both the Danish and British Columbia condominium acts of 1966 were simple framework acts consisting of only 12 and 25 sections, respectively, and they developed in different directions. This study therefore suggests that there may be an additional explanation. According to the authors, an additional explanation could be related to the different legal traditions in each jurisdiction. Perhaps this is the reason why only the British Columbian condominium act evolved into a second-generation detailed act and the Danish remains a first generation framework act. However, this is a topic for future research.

## 7. Future research

Only limited information regarding common property and management in vertical mixed-use developments has been identified in research publications. Only a few jurisdictions are represented in academic literature to an international audience. This issue has also been addressed by Paasch and Paulsson (2021). To these authors knowledge, it seems that mostly those countries that have been through a process of amending condominium legislation, or introduced the independent 3D property, are represented. Countries that still preform 3D property formation with the traditional legal solutions, as Denmark, are not so widely represented in the 3D property literature. 3D real property legislation in Denmark remains almost unchanged, however it works without major complaints. Therefore, it seems that there is little incentive to investigate and write about national law and practice. However, a more in-depth study about the practical challenges in such jurisdictions as the Danish are yet to be performed and presented.

As mentioned earlier, the present paper does not provide clear evidence why the Danish condominium act remains a first-generation act and the British Columbia strata act evolved into a second-generation. Understanding the legal tradition in such countries, as Denmark, that has yet to adopt the independent 3D property, is a subject for future research. More knowledge within in this area could provide a possible explanation.

One final comment: It also remains to be discussed to what extent jurisdictions with non-detailed legislation would benefit from more detailed, regulatory legislation and official control. In Denmark, it seems to work in practice that common property arrangements and management structures are left to private individuals, rather than being subject to official control, as in Sweden, or detailed condominium legislation, as in British Columbia. In addition, in-depth research and discussion of the possible positive and negative outcomes of the implementation of the independent 3D property in Denmark and other countries that has not yet adopted the independent 3D property remains to be addressed.

## CRediT authorship contribution statement

**Madsen Morten Dalum:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Conceptualization. **Paasch Jesper Mayntz:** Writing – review & editing, Validation, Supervision.

## Declaration of Competing Interest

The authors hereby declare that there is no financial/personal interest or belief that could affect their objectivity of the study presented in the article.

## Data Availability

No data was used for the research described in the article.

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