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Circular economy and real estate: the legal (im)possibilities of operational lease

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Abstract

Purpose – A paradigm in circular economy (CE) is that suppliers retain ownership of their products and materials, and that the users “only” pay for services. In many legal systems, however, elements incorporated in a building are considered to be fixtures, and therefore legally part of the building. This means that ensuring multi-cyclic behaviour of individual building elements (e.g. the facade or a window) is not so evident. This paper explores, from the perspective of Dutch law, how to secure the ownership of the supplier or to find alternatives within the existing system of property law.

Design/methodology/approach – The authors performed a literature review of both CE and (Dutch) property law. The results of these reviews are discussed and illustrated by legal case studies.

Findings – The options principally advocated within CE to retain ownership of building parts leave legal uncertainties and do not offer a solid basis for the development of circular business models, especially considering immovables and fixtures. For these categories, buy-back and take-back contracts, and models for reuse and recycling seem more promising.

Research limitations/implications – The research is limited to a literature review. Although the legal principles discussed in this paper are valid for both civil and common law systems, and similar findings might, therefore, be expected internationally, this study focused on the specific Dutch legal context. Comparative legal research and research of best practices in the building industry is needed to test the applicability of the findings in an international context.

Practical implications – Following the findings, CE initiatives within real estate and the construction industry should focus on alternative implementations of the operational lease concept, taking into account CE's ambitions to reduce the extraction of raw materials.

Originality/value – At the moment the challenges that property law poses CE, real estate and operational lease are hardly discussed within the literature. This paper explores this gap.

Keywords Real estate, Circular business models, Circular economy, Operational lease, Property law, Service providing

Paper type Research paper



1. Introduction

In recent years, circular economy (CE), although in essence, given its constituent concepts not a new idea, gained worldwide popularity as the new sustainability paradigm. The popularity of the idea of a transition from the current linear economic model of “take-make-use-dispose”, to a CE based on continuously cycling loops of materials, might be explained

by the accent on the economic rationale behind CE thinking. As the basic elements of this thinking are price increases on raw materials, combined with [Stahels' \(1982, 2006, 2016\)](#) concept of service providing, together assumed to ensure materials' multi-cycling behaviour ([Mohammadi et al., 2015](#)).

The concept that suppliers retain the ownership of products or materials and provide the use of those products or materials under operational lease is more or less advocated as a CE paradigm ([Ellen Mc Arthur Foundation, 2013](#)). However, in many legal systems, elements incorporated in the building, e.g. the facades, windows, staircases, roof, elevators and HVAC systems, will be considered "fixtures", and therefore, by the rule of *accessio* owned by the landowner, even when a contract between landowner and the supplier (e.g. about ownership of an elevator or a window) would stipulate otherwise. Therefore, ensuring multi-cyclic behaviour within the so-called technical loop of CE might not be evident in the building industry. In current literature, these legal aspects and their implications in relation to CE have not been taken into consideration yet.

To bridge this literature gap, this paper explores the concept of service providing in real estate through operational lease.

First, CE and the relevant principles of property law will be discussed. The four principles of property law and ownership of land and buildings, as discussed in this paper (Section 4.2), are valid for those countries with either a civil law system (as in most countries of continental Europe), a common law system (England and Wales, USA) or a mix between these two (e.g. Scotland, South Africa) ([Chang and Smith, 2016](#)). However, the legal solutions for a supplier to secure the ownership of the elements of a building will be different according to the specific rules within the national context. Therefore, whilst addressing the basic concepts of real estate law, this paper and its conclusions will focus on the context of Dutch property law. Next, the implementation and possibilities of service providing through operational lease in the building industry will be discussed; these will be illustrated by Dutch legal case studies. The paper ends with alternative approaches for the operational lease concept in the Dutch context, taking into account the ambitions of CE for reducing the amount of extracted raw materials.

2. Research methods

The implementation of the ideas of CE in the building industry entails a series of challenges. This paper will elaborate upon the challenges posed by a very specific part of property law: the ownership of products and materials used in buildings related to the concept of operational lease.

First, a literature review of both CE and property law will be presented. These literature reviews yield an overview of the definition and axioms of CE, as well as an overview of the traditional ownership model in real estate. Although property law is considered to be very nationally oriented, a comparison at the level of general principles and ground rules is possible ([Van Erp and Akkermans, 2010](#)). Indeed, our review of real property law will first discuss some general principles of the ownership of land and buildings that are valid for systems based on both the common and civil law, being the two main legal systems in Europe ([Akkermans, 2008](#); [Chang and Smith, 2016](#)). For comparative legal research, the so-called "mixed legal systems", such as South Africa and Scotland, offer a "linking pin", as they have been shaped significantly by both the civil law and common law ([Du Plessis, 2006](#); [Akkermans, 2008](#)). Secondly, the paper focuses on the application of those principles in Dutch property law, a species of the civil law system as applicable in continental Europe. This choice has been made because of a recent legal debate in this country on the introduction of business models based on CE in the building industry and the potential

trigger of the need of a reinterpretation of existing legal principles or even a change in the current Dutch Civil Code to facilitate CE initiatives (Van der Veen *et al.*, 2014; Mes *et al.*, 2016; Chao-Duvis, 2017; Koolhoven, 2018). At the moment, such a debate seems absent in other jurisdictions.

These overviews are subsequently confronted with each other and the resulting complexities, opportunities, challenges and (im)possibilities are illustrated through legal case studies. Based upon these findings, we introduce and discuss alternative models. Finally, some concluding remarks are given.

3. Circular economy and the building industry

3.1 *The need for sustainability*

In the 1970s, the topic of the finite available natural resources came high on the sustainability agenda. This was mainly under the influence of the reports and models of the Club of Rome published under the alarming title “Limits to Growth” (Meadows *et al.*, 1972) and the 1973 oil crisis. A movement started that advocated reduced energy consumption and the use of less and cleaner materials. More recently, the idea that in sustainable production products are recycled has become particularly known for the book by Braungart and McDonough (2002) “remaking the way we make things”. One may observe that even earlier authors like Stahel (1982) and Kristinsson *et al.* (2001) followed this line of reasoning, nowadays known as the cradle-to-cradle (C2C) approach. But the concept of CE seems to take the answer for the need for sustainability even a step further.

3.2 *Circular economy*

Although the concept has a longer history (Lieder and Rashid, 2016; Winans *et al.*, 2017), CE has been given a boost by the reinterpretation in the so-called “Butterfly Model” (Ellen Mc Arthur Foundation, 2013). This diagram (Figure 1) shows two “wings” of material flows (or loops), one consisting of biological nutrients and the other consisting of “technical nutrients” (Piscicelli *et al.*, 2016). Using this model, CE may be described as (Ellen Mc Arthur Foundation, 2013):

An economic and industrial system that is restorative and regenerative by design, and which aims to keep products, components and materials at their highest utility and value at all times, distinguishing between technical and biological cycles.

Essentially, CE is based on the premise that we no longer produce waste. Therefore, only materials and products (“commodities”) are used that are either regenerative within biological loops or will continuously “ride” the so-called technical loops. The biological loop relates to all those materials that can be considered to be regenerative within the ecological system. All other commodities are expected to continue to circulate (multi-cyclic behaviour) in technical loops (Mohammadi *et al.*, 2015). An axiom within CE thinking is the use of renewable energy (e.g. sunlight, wind, waves and geothermal heat) to power these loops, as well as that this energy is available to a sufficient extent. In addition, people need to respect general principles of sustainability such as: no pollution, non-toxicity, no child labour, etc. These first two axioms are similar to those found in the other approaches to sustainability mentioned in Section 3.1. The third axiom of CE, however, states that prices of raw materials will increase throughout the future, as a result of global population growth and the overall increase of wealth. This third axiom ties together both economics and sustainability and is what sets CE apart from the other approaches to sustainability: it makes the reuse of raw materials the most obvious economical solution. In other words, CE provides businesses

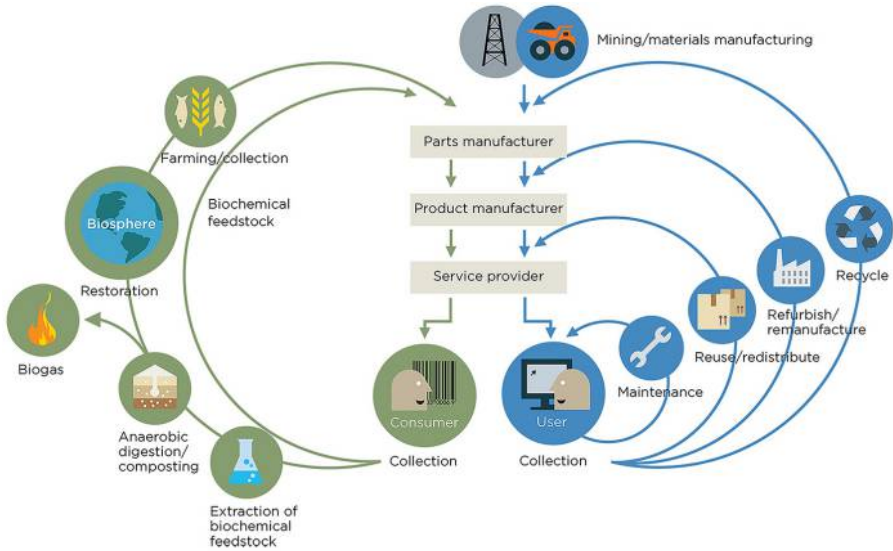


Figure 1.
“Butterfly” model
of CE

Source: Ellen MacArthur Foundation (2013), available at: www.ellenmacarthurfoundation.org/circular-economy/interactive-diagram

with an incentive to use reused materials, as these will be (and remain) cheaper to use than raw materials that still need to be mined or extracted from the earth.

From a C2C perspective, CE is often considered with a focus on recycling. However, any form of multi-cyclical resource conservation (secured by either contracts or by the applied business model) meets CE standards or will be preferable from the aim to avoid embodied (e.g. labour and energy) capital destruction. This solution could involve a product that can be reused as a whole, or a product of which all components can be reused, or recycled at materials level. In terms of CE, a preferred solution does not exist; following the third axiom, market parties will need to elaborate this for each specific case.

3.3 Use instead of ownership

For consumers as well as suppliers to reap the benefits of the economic perspective described in Section 3.2, CE puts forth the concept of “sale of functionality” (Lieder and Rashid, 2016), or in other words, “service providing” (Ellen Mc Arthur Foundation, 2013). Pay-per-use and operational lease are the most used examples of service providing and “selling products as a service”. A major shift from the traditional, linear economic model is that the functional use of a product is crucial and not the possession (ownership) of it (Stahel, 2016). This means that customers no longer acquire the products they want to use. Instead, the supplier retains the ownership of the product (e.g. the light bulbs, the elevator) and clients pay for the services provided by those products (e.g. light, vertical movement, interior design), including use, monitoring and maintenance (Schulte, 2013; Lewandowski, 2016; Lieder *et al.*, 2018). This kind of disruptive thinking has already been embraced by firms such as Philips[1], Mitsubishi Elevators[2], Alstom[3], Rolls-Royce[4], Desso (carpet lease)[5], Desko (office furniture lease)[6], Grundfos (pump supplier for heating, air conditioning, irrigation and water treatment) and others[7]. This is supposed to benefit all

involved and even the economy as a whole (Ellen Mc Arthur Foundation, 2013; Bastein *et al.*, 2013; Stahel, 2016). Because, apart from the benefits for the supplier, the consumer does not have to pay anymore for expensive short supply of the product and the expensive, scarce materials it contains, but merely for the purchase of the services required.

3.4 Specific challenges for the implementation of CE in the building industry

In general, the wider implementation of CE inside the building industry is not unproblematic (Prins, 2017). As many individual buildings elements and buildings as a whole, are in fact characterised by:

- a relatively high initial investment, associated with a relatively long service life. Therefore, operational lease will result in a fast-growing asset part on the balance sheet of suppliers, thus strongly and negatively affecting their solvability and liquidity rates (it has to be remarked that the lessee has the advantage of a reverse situation maintaining his liquidity);
- being entirely or in part project-specific (custom-made one-offs) and belonging to a complex entity with different life spans of the constituting parts, resulting in difficulties concerning demounting, as well as all other forms of reusing. Often, a high number of different service providers are also involved, so that under CE they could all be potential building owners; and
- irreversible technical degradation, limiting the possibilities for reuse.

Although the importance of people's behaviour and the role of policy towards the success of CE in the building industry are acknowledged (Pomponi and Moncaster, 2017), up till now, this does not seem the case for the applicable rules of property law within this context. We observed that internationally the challenges from a legal perspective are under-researched. As we will demonstrate, based upon the axioms discussed in Section 3, property law sets out some challenges for the implementation of CE in the building industry. The next sections will elaborate upon these challenges.

4. Traditional ownership model of real estate from a legal perspective

Although the legal aspects of CE are hardly described in literature (Backes, 2017), these are closely connected to the financial aspects of a CE model for the construction industry. Project financing, for instance, has traditionally been collateralised by the real estate object itself, whilst the value of such an object can only be accurately estimated if all of its functional components remain part of it. To provide an example: the facade, when removed from the building, will lose its functional value, whilst a building without a facade is incomplete and can no longer be valued as a finished and fully functional property object. This section will elaborate on this, discussing the concept of ownership, and four relevant principles in property law.

4.1 Ownership

From an international perspective, the exact definition of the right of ownership will be different per jurisdiction, as this is influenced by the concepts the national legal system is based on and the demands and needs of the society this system serves (Mostert, *et al.*, 2010). For instance, Book 5, Article 1 of the Dutch Civil Code describes ownership as “the most comprehensive property right that a person, the ‘owner’, can have in a thing”, legal literature from South African gives a definition as “the most complete real right” (Mostert *et al.*, 2010), whilst a lawyer from a common law country will be more familiar with the concept of the

“bundle of rights” approach to property interests and ownership (Bevan, 2018). Leaving these legal-doctrinal approaches aside, looking at it from a functional perspective (Chang and Smith, 2016), the primary interest of ownership will always be that it provides the owner the competence to use and enjoy the object, with the power to exclude others. Furthermore, the owner has the right to transfer the object or to use it as collateral (Van Erp and Akkermans, 2010).

4.2. Relevant concepts in property law

In property law, four concepts are relevant in the context of CE:

- (1) An important distinction in property law is the distinction between *movables* and *immovables*. The term real estate refers in law to those objects that are immovable (Smith and Zaibert, 2003). Land itself (the soil) is immovable. How this distinction is made for objects that are built on or in land (e.g. a house or a shed) differs per jurisdiction. In general, it can be said that the decisive question is if an object cannot be easily moved or destined to remain on its location permanently (Mostert *et al.*, 2010; Ramaekers, 2014; Bartels and Van Velten, 2017). In Dutch law, the intention of the builder is not taken into account into this question as it is deemed to be subjective (Van Vliet, 2002).
- (2) *Accession* is a term that means that the owner of the land is the legal owner of all immovable constructions attached to it. In short, the ownership of everything that is built on or in land follows the ownership of the land. *The rule of accession*, as applied to real estate, can be traced back to the maxim *superficies solo cedit* in Roman law. This principle applies not only in the civil law, as based on Roman law, such as Dutch property law (Van Vliet, 2002), but also in common law (Gray and Gray, 2011; Bevan, 2018). As explained by the Roman lawyer Gaius in his *Institutes* (2.73), this rule has two aspects. If Alex builds a house on his land using bricks and wood of Barbara, Alex, as being the owner of the land, by law becomes the owner of the house, regardless of the fact that the materials used to belong to Barbara. On the other hand, when Alex builds a house using his own materials on the land of Barbara, she becomes the owner of the house, despite the fact that the materials belonged to Alex. The result in both cases is that original owner of the materials cannot reclaim his/her ownership (Van der Walt and Sono, 2016).
Not only the (immovable) building is considered to be part of the land, but also fixtures are considered to be part of the building.
- (3) *Mortgage law*: the rule of *accessio* protects the right of the mortgagee (the funder) to hold as *security* everything which is part of the immovable property, such as the building on the land, or the fixtures of the building (Mostert *et al.*, 2010; Loof and Berlee, 2015; Thomas, 2015; Chang and Smith, 2016). In the case of an interest payment or repayment default of the debtor, the mortgagee is entitled to sell the mortgaged property (so land, buildings and fixtures) in public by auction and to recover the secured debt-claim from the sale proceeds. In this foreclosure procedure, the mortgagee can ignore most rights of third parties, especially those with personal rights (e.g. based on contracts with the land owner) or – as a result of the prior *tempore* rule, see (4) below – proprietary interests that are established after the mortgage.
- (4) According to the *prior tempore rule*, which origin lies in the Roman law maxim “qui prior est tempore potior est jure” (he who is earlier in time, is stronger in law), in case of conflicting property rights in the same object the first in time will prevail

over the others (Van Erp and Akkermans, 2010). An example is the case when there is more than one mortgage on the same piece of land. In case of foreclosure, the holder of the older mortgage will be paid first. The prior tempore rule is only relevant for property rights, as personal right (e.g. the right of a buyer from a contract of sale) competes against each other with an equal rank (*paritas creditorum*, i.e. the parity of creditors). That said, national law may recognise specific priority rights: claims that will have preference over other creditors, even holders of the right of mortgage (Akkermans, 2008). An example from the USA is the mechanic's lien, being a security interest in the property for the benefit of those who have supplied labour or materials that improve the property.

4.3 Fixtures according to Dutch property law

Although the concepts discussed above will be valid for most legal systems in Europe, the question whether an object becomes a fixture of a building will be decided according to national law. In Dutch civil law, the following two tests will be applied:

- (1) Firstly, that the component cannot be physically removed without causing considerable damage to the main object or the attached component.
- (2) Secondly, “accessio” will also take place if such an attachment is lacking, but the component is a fixture according to general opinion. The Dutch Supreme court (*Depex/Bergel Hoge Raad 15 November 1991, NJ 1993/316*) provided two relevant factors: a) the main object will be considered to be functionally incomplete without the component, or b) the component is specially adapted to the main component. For instance, a curtain wall facade would be covered by the second point, even if most current envelope systems are already engineered in such a way that they would not fall into the first point. Important to note is that the intentions of the parties involved are excluded from the legal test, as being subjective.

Case law based on these two tests suggests that the outcome depends on the specific characteristics of the case. To provide some examples of fixtures: reinforced concrete iron rods in a floor of a building under construction (Hof 's-Hertogenbosch 30 January 2018, ECLI:NL:GHSHE:2018:384), drying rooms in a sweets factory (Rechtbank Noord-Holland 20 April 2016, ECLI:NL:RBNNE:2016:1896), a kitchen in a house (Hoge Raad 9 July 2004, ECLI:NL:HR:2004:AQ0130), watering installation in a greenhouse (Hof Arnhem-Leeuwarden 11 October 2016, ECLI:NL:GHARL:2016:8202). Examples of non-fixtures are illuminated advertising on a garage (Hof 's-Hertogenbosch 19 December 2017, ECLI:NL:GHSHE:2017:5796) and a step mill for horses in a riding school (Rechtbank Rotterdam 19 December 2014, ECLI:NL:RBROT:2014:10818).

4.4 Fixtures and CE: the challenges

To sum up: everything which is fixed property on a piece of land owned by a specific party, is by definition part of the “real estate” of that owner. It has to be noted that in the literature on implementing CE within the construction industry, series of examples exist of which are already listed within Section 3.3. An example is Philips with its pay per lux concept, selling light as a service. Other examples concern furniture (Desko) and carpet tiles (Interface and Desso). However, all these cases are from a property law perspective uncomplicated, because they concern non-fixtures. In other words, the rule of accessio does not apply. However, the rule of *accessio* means that a supplier cannot retain ownership over, for example, a door. This because the door is a fixture of the house, and therefore part of the property.

Principally, this rules out possibilities for third-party ownership of fixtures in CE business models through operational lease. Although one should notice that this challenge for the construction industry is not new as the rule of *accessio* also sets limits to the classic retention of title clauses (commonly known as *Romalpa* clauses) used in contracts of sales, implying that the supplier retains the ownership of the goods until the purchase price has been paid (Akkermans, 2008; Loof and Berlee, 2015). In this case, the supplier will also lose the ownership at the moment the object becomes part of the building. However, in specific cases, property law may allow involved parties to create exceptions to the rule of *accessio*. What these exceptions are will depend on the specific national rules. Therefore, we will discuss this further for Dutch law under Section 5.

5. How to retain the ownership of a constituent part of a building? The Dutch practise

According to Book 5, Article 1 of the Dutch Civil Code, the owner of a thing is the owner of all its components (fixtures), as far as the law does not provide otherwise. The latter means that the law can allow for exceptions on this rule. To gain insight into the extent to which real estate law allows opportunities for CE initiatives as described above, it is important to study the motives for the rule of *accessio*.

5.1 Motives for *accessio* and its validity under CE

In literature, two motives can be found (Van Vliet, 2002; Mostert *et al.*, 2010; Van der Walt and Sono, 2016; Mes *et al.*, 2016):

- (1) legal security: for third parties, legal ownership of objects would be hard to determine if it was based on parts. From an economic perspective, one may, therefore, say that the rule of *accessio* reduces transaction costs (Merrill, 2009; Thomas, 2015); and
- (2) preservation of value: this presupposes that the sum of the parts together is worth more than all parts taken separately. Once different objects have been joined, the law should prevent the loss of the added value of the unity.

In other words: the purpose of property law is to offer legal security and to minimise transaction costs and to maximise and preserve real estate values in society.

The first motive could move in a different direction in the near future through the use of building information modelling (BIM) and more standardised interfaces. This would mark components according to supplier (and eventually owner) through an ongoing BIM documentation of building components, such as facilitated by building passports and the recently introduced “Madaster” initiative, offering “a public, online library of materials in the built environment, by facilitating the registration, organisation, storage and exchange of data”[8]. Furthermore, the introduction of “blockchain technologies” introducing radical different financing and ownership models of complex products and services might enhance this shift (Swan, 2015; Prins, 2017). In this respect, we refer to the developments in the field of Geo-Information Systems (GIS) in the direction of “3D Cadastre”, offering clear information about rights and restrictions with 3D components in real estate (Van Oosterom and Dimopoulou, 2018). However, until now, systems of land administration that offer the possibility of a 3D registration focus on multi-level properties (legal volumes within building complexes, such as tunnels, underground railway stations, or buildings on top of other buildings) (Stoter *et al.*, 2017). Research in registration of rights in smaller components,

based on an integration of BIM and GIS, and the question how data can be obtained from BIMs for input into a 3D Cadastre is still in the early stages (Oldfield *et al.*, 2017).

The second motive (preservation of value), seems fully valid under the principles of the traditional, linear economy. If a component of the building were to be removed, for example, the stairs or the facade, the building would become unusable, leading to loss of economic value. On the other hand, after removal the component itself could also be subject to a loss of value, because the component becomes damaged or the component is specially adapted to the building (i.e. substitution risk). As worked out above, under CE principles, however, it is just the fact that suppliers retain ownership rights (and therefore, the right to remove and reuse the component and its materials), hence aiming for, if not preserving, value retention. This leads to components that could be removed easily, standardisation and e.g. take-back contracts, including maintenance services, see Section 6. Therefore, one may argue that CE practices based on the concept of service providing in terms of operational lease urge a radical change from the traditional ownership model on which property law has been based since Roman times (Mes *et al.*, 2016). Here, it is sufficient to make the observation that changes in fundamental rules of property law are not easy and can hardly be expected in the coming decades.

Whilst a departure from the rule of *accessio* is not to be expected in the near future, in specific cases Dutch property law allows for exceptions. That means, even when a component is considered to be a fixture of land, ownership of land and fixture can be separated.

5.2 Building lease

The main exception is a building lease, or right of *superficies* (opstalrecht). This is a limited property right (a right in rem), which enables the lessee to have the ownership of buildings or constructions (or even vegetation) in, on or above land owned by someone else (Akkermans, 2008; Bartels and Van Velten, 2017). Therefore, the building lease would allow the manufacturer (or a third party such as a service provider) to retain the ownership. However, the Civil Code puts some limits: the object of such an ownership, separated from the land, must be (according to the definition in Book 5, article 101 Dutch Civil Code) a building or a “construction”. The exact meaning of the latter is not completely clear. However, from literature and case law it can be concluded that in Dutch property law, only a component which has sufficient (economic) independence can be separated from the land or a building (Mes *et al.*, 2016; Bartels and Van Velten, 2017). Common examples are radio towers, wind turbines, or utility pipelines. In addition, in practice, building leases are established for elevators and HVAC systems in buildings (Stoter *et al.*, 2017).

To the best knowledge of the authors, in Dutch real estate, only one case of split ownership based on service providing has been implemented in The Netherlands. Under the name of “M-use”, Mitsubishi Elevators Europe offers the possibility to the owner of a building to lease the elevator. Based on the case of Mitsubishi Elevators, bankruptcy on either end of the service contract can be dealt with through traditional means: If the supplier files for bankruptcy, value is held not only by the physical asset (in this case the elevator), but also by the ongoing performance contract in which the asset is included. It is expected that the rights from the contract can be purchased and then be operated by another service provider (Azcarate-Aguerre *et al.*, 2017). In the event of a client bankruptcy, the nature of the asset limits the capacity of the service provider to simply claim it back without resulting in significant losses due to removal and reprocessing costs. In such case, the service contract could stipulate, for example, that the next owner of the building (if it is to be sold to repay the client’s debt) must continue the service contract, or purchase the asset from the service

provider in a traditional, linear procurement process. However, at the moment, mainly because of lack of case law, it is uncertain if this will work in practice. In addition, it should be noticed that, because of the *prior tempore rule*, a right of superficies cannot be upheld against older property rights in the same real estate, e.g. an existing mortgage. At this moment, it is not clear whether there will be a market for this kind of service contracts within a CE context. Currently, a similar approach is under research for facades of buildings (Azcarate-Aguerre *et al.*, 2017).

5.3 General opinion influenced by contractual standards

Another approach can be found in the 1979 case of the Dutch Supreme Court, which would offer perspectives for a leasing scheme based on third-party legal ownership. In such cases, an essential part of the construction would not be considered to be a component of it, in case a general opinion can be derived from the lease contracts. An example is the navigation system for ships in the *Radio Holland* case, Hoge Raad (Supreme Court) 16 March 1979, NJ 1980/600. In this case, the question had to be answered whether an electronic navigation system fitted in a ship was a fixture because it was crucial for operating the ship. At that time, such a system was only manufactured by a single supplier (Radio Holland), who held the *de facto* market monopoly over this specific system, and who only distributed it under a leasing scheme. In this case, the Dutch Supreme Court ruled that the fact that normally necessary equipment is *only* leased, and not transferred in ownership, might indicate that this equipment is not a fixture according to common opinion. In other words: the common opinion can be influenced by contractual standards.

It must be noted that, in this specific case, the market power of the supplier was enough to allow him, as a third party, to retain ownership of all such systems installed on clients' vessels. Such a case of concentrated supplier power is, however, difficult to imagine in the construction industry. On the other hand, this case law demonstrates that although if under Dutch property law a thing might be functionally incomplete without a certain component, this does not automatically lead to the conclusion that the component is legally a fixture.

5.4 Assessment: *accessio* and operational lease

As stated, according to Book 5, Article 1 of the Dutch Civil Code (legal), ownership is "the most comprehensive property right that a person, the 'owner', can have in a thing". In addition, based on the rule of *accessio* the owner of a thing is the owner of all its components (fixtures), as far as the law does not provide otherwise.

The building lease (as applied in the M-use case), seems to provide some, but rather complex, perspectives to implement CE in the building industry based on the concept of service providing. By establishment of a building lease for building components. Based on the *Radio Holland* case, it would theoretically be possible by use of leasing contracts by the building industry to create a general opinion that the leased component is not a fixture. However, it might take a long time before suppliers can establish a market monopoly for certain components, if they are allowed to do so from a legal point of view. Furthermore, more specific contractual arrangements need to be established considering bankruptcy of either the client or the supplier. Considering collateral risk, operational lease, therefore, seems only possible for clients with a very high non-disputable credibility or otherwise in contracts in which revenue streams for funders one way or another are reduced in risk (Hieminga, 2015).

Therefore, from a legal perspective, our conclusion is that the options to retain ownership of building parts as described above, leave uncertainties, and therefore, do not offer a solid basis for the development of a circular business model. Or in other words, CE business

models based on direct third-party ownership in the building industry (such as operational lease) seem to be incompatible with the main aspects of (Dutch) property law.

6. Alternative approaches

As we have described, a CE business model based on operational lease for fixtures and immovables meets some serious obstacles on the point of Dutch property law. In this section, we elaborate on two alternative approaches, based on existing legal concepts that might offer perspective to reach the goals.

6.1 Economic ownership

A first alternative might be offered by the concept of “economic ownership”.

Economic ownership describes the situation where someone obtains the full enjoyment of the object, including bearing financial risk for it, whilst not being its legal owner (indirect third party ownership). Economic ownership is a concept in Dutch tax law, but it has no fixed legal meaning in real estate law (Akkermans, 2008). Decisive is the right of the user. Long-term leasing of land under Dutch law is an example of such a situation (Ploeger and Bounjough, 2017), but economic ownership can also be based on a contract (e.g. a contract of sale, providing the buyer all the rights to use the property before the transfer of the legal ownership itself). However, the success of the specific legal relationship depends on whether the economic owner can invoke hi/he/she rights against third parties, such as a new legal owner of the property, or the mortgagee.

The right of removal is a right, which the economic owner can invoke against third parties. If the economic owner has the right to remove components, which he/she placed in a construction or building, an economic separation will be composed between the construction or building and the applied object. The right of removal is, therefore, a way to avoid an unjust enrichment-action. Because of the right of removal, applied objects can be removed at all times from the construction or building where it is placed in. If the right of removal would not exist, these objects would be applied by operation of law and, thus, would be entitled to the ground owner.

However, the right of removal is legally limited to cases where the economic owner is also the user of the building (and land) itself, e.g. the holder of a ground lease or the tenant in case of renting (a part of) a building (Abas, 2007; Bartels and Van Velten, 2017). Therefore, apart from some incidental applications, the wider use of the concept of economic ownership to further promote the transition to CE within the building industry seems not to be so self-evident.

6.2 Take-back and buy-back as construction industry-specific CE solutions

Given the challenges as described in Section 5, the CE paradigm that suppliers retain ownership rights of products and materials, is probably not feasible for fixtures in the construction industry. Other CE-compliant legal solutions that are not hindered by these legal complications could be provided by take-back and buy-back contracts, initiatives for reusing and recycling building components, and second-hand building product trading.

Buy-back contracts appear in several forms, varying from an obligation to buy back larger parts of a building at the end of the contract period by the different suppliers, in case the client prefers to do as such (depending on assumed possible competing alternative offers) at that very moment, to an agreed residual value for taking back the building as a whole whether or not being translated into a shortage on the cost at the initial delivery of the building.

A remarkable example is the recently completed building for the District Court of Amsterdam, which has a contract period of five years after which the building had to be removed[9]. The architecture firm that won the tender, an SME also delivering engineering and contracting services, designed a rather traditional building that, however, can be easily de-mounted and re-mounted at another site. The residual value of the materials was translated into a reduction of the clients' investment. This example clearly shows that shortening the life span, as long as multi-cyclic behavior is modeled, from a CE perspective doesn't necessarily reduce sustainability (Prins, 2017).

Take-back contracts guarantee returning the components to the supplier, as for example, advocated by Interface supplier of carpet tiles. Maintenance services are included in this type of contract.

6.3 Reuse and recycling

At a component level, more and more start-ups are entering the market, often specialised to certain segments, and working with internet-based market platforms. A rather innovative concept is a Dutch start-up acting as a broker between demolishers on the one hand and architects and their clients on the other, this for all imaginable building components. The start-up aims to stimulate designers and their clients to think more CE wise, by considering buildings to be demolished as a stock of to be reused materials and components. Recently, several –larger- Dutch municipalities are exploring this concept, also known as “urban mining” on a regional level (Van der Voet and Huele, 2016).

Industry-initiated recycling can be CE-compliant. Besides high recycling percentages (as for concrete), being partly based on Dutch and partly on EU (sometimes already rather dated) waste regulations. Sometimes, these regulations are also based on long existing commercial models, concerning, for instance, the treatment of plastics, metals, electronic waste, etcetera (Tukker *et al.*, 2016). The gypsum industry is an example of the latter, which, although now regulated in The Netherlands, already organised itself in collecting gypsum waste to make new gypsum with a 99 per cent purity grade, which is highly CE compliant. Rockwool collecting insulation waste and up-cycling it into its Rockpanel product is another example of a firm having set a rather optimal if not ideal CE standard, even before it was set.

7. Conclusions

One of the CE paradigms is the concept that suppliers retain the ownership of products or materials, and provide the use under operational lease. For non-fixtures and movables, several functioning examples do exist. In this paper we explored the challenges posed by Dutch property law concerning CE, real estate and operational lease. It was found that, from a legal point of view, the options that are available with operational lease to retain ownership of constituent building parts leave uncertainties. Therefore, they do not offer a solid basis for the development of circular business models in the building industry. This is especially true considering fixtures of buildings. The alternative interpretation of “economic ownership” in Dutch law does not seem to provide a basis for the split-ownership of a building's constituent parts.

Operational lease in the construction industry might be possible for rather specific – discrete – components, of which the functioning is heavily reliant on the service providing. Considering collateral risk, operational lease seems only possible for clients with a very high non-disputable credibility or otherwise in contracts, in which revenue streams for funders one way or another are reduced in risk. From a financial point of view, only suppliers with high equity will be able to cope with the issue of balance stretch (growing amount of long

term fixed assets) and for those delivering the more capital extensive parts of the building, the model might be questioned anyhow beyond the level of a few business cases.

CE practices based on the concept of service providing in terms of operational lease urge a radical change from the traditional ownership model, on which property law has been based since Roman times. Changes in fundamental rules of property law are not easy and can hardly be expected in the coming decades.

CE initiatives within real estate and the construction industry should, therefore, focus on alternative implementations of the operational lease concept, taking into account CE's ambitions to reduce the extraction of raw materials.

Buy-back and take-back contracts, and reuse and recycling models do seem to work to a certain degree. On the larger scale of the building as a whole, buy-back types of CE models already appeared to be possible to the benefit of both suppliers and clients without being hindered by property law in case one tries to implement operational lease. However, in these cases, real multi-cyclic behaviour of materials behind a – reasonably to be expected – single loop is not guaranteed within the business cases. Parts of the construction industry applying specific production procedures (Rockwool) or making sector-wise innovations (gypsum sector, and concrete sector) are able to cope with the CE concept by applying all sorts of take back procedures mostly based on existing waste recycling models. At the level of building components new start-ups are entering the market trying to implement CE thinking, of which a brokerage between demolishers and architects seems the most innovative at the moment.

Further comparative legal research and research of the best practises in the building industry is needed to test the applicability of the findings in an international context.

Notes

1. Available at: www.signify.com/global/sustainability/sustainable-lighting
2. Available at: www.mitsubishi-liften.nl/m-use/
3. Available at: www.alstom.com/innotrans2016/renew/
4. Available at: www.eco-business.com/news/why-the-circular-economy-is-big-business/
5. Available at: www.desso-businesscarpets.nl/service/carpet-lease/
6. Available at: www.circle-economy.com/the-desko-case-diving-into-its-circular-best-practice
7. Available at: www.grundfos.com/products/product-sustainability/product-recycling.html
8. Available at: www.madaster.com
9. Available at: www.cepezed.nl/projects/170-tijdelijke-rechtbank-amsterdam

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