ISTANBUL MEDENIYET UNIVERSITY
INSTITUTE OF GRADUATE STUDIES
DEPARTMENT OF PRIVATE LAW

The Impact of Digitalisation on Company Law

Master's Thesis

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THESIS JURY APPROVAL

This Master's thesis titled "The Impact of Digitalisation on Company Law" written by Aybüke Keskin at the Department of Private Law was accepted by our jury.

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STATEMENTS

Style and Reference Manual Statement

Having reviewed this thesis written under my supervision, I confirm that it has been written in accordance with the Chicago Manual of Style 17th Edition and used its footnote reference format consistently throughout the entire text.

Signature

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Declaration of Originality

I hereby declare that all information in this dissertation has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conducts, I have fully cited and referenced all material and results that are not original to this work.

Signature

Aybüke KESKİN

GENİŞ ÖZET

Dijitalleşmenin Şirketler Hukukuna Etkisi

Keskin, Aybüke

Yüksek Lisans Tezi, Özel Hukuk Anabilim Dalı

Danışman: Dr. Öğr. Üyesi Meltem Karatepe Kaya

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Gelişen teknolojiyle birlikte yapay zekâ ve blok zinciri sistemleri başta şirketler hukuku olmak üzere pek çok alanda kullanılmaya başlanmıştır. Şirketler hukukunun dijitalleşmesi, şirketlere yeni fırsatlar sunmak için dijital teknolojilerin kullanılması olarak görülebilir. Kurumsal aktörler açısından yapıcı bir etkileşimi kolaylaştıran dijital bir ortam sağlamayı amaçlayan dijitalleşme konusunda yapay zekâ ve blok zinciri büyük önem arz etmektedir. Dijitalleşmeye ilişkin doktrinde de yapay zekâ ve blok zinciri teknolojilerine odaklanılmaktadır. Doktrinde, yapay zekâ öğrenme yeteneği olan ancak insanlar gibi düşünemeyen, bunun yerine verilerden öğrenen akıllı bir yazılım olarak görülmekte; blok zinciri ise merkezi olmayan, halka açık dağıtılmış defter teknolojisi olarak tanımlanmaktadır. İşbu tezde dijitalleşme şirketler hukukuna etkileri açısından ele alınmaktadır. Teknolojinin kurumsal yönetime etkisi de incelenmektedir.

Yapay zekâ genellikle yönetim ve denetime sağladığı faydalar açısından incelenirken blok zinciri ise kuruluştan sona ermeye kadar şirketlerdeki kullanım alanları bakımından irdelenmektedir. Yapay zekânın yönetime katkısı, yapay zekâ ve bağımsız denetim, blok zinciri teknolojisi, akıllı sözleşmeler ve merkeziyetsiz otonom organizasyonlar dijitalleşmenin şirketler hukuku üzerine etkileri konusunda en çok tartışılan kavramlar arasındadır. Yani, şirketler hukukunun dijitalleşmesi hem kurumsal yönetimi hem şirketin tüzel kişiliğini kapsamakta; ayrıca söz konusu özerk kuruluşları içermektedir.

Bahsedildiği üzere doktrinde yapay zekâ ve blok zincirine odaklanılsa da bu teknolojiler nispeten yeni alanlar olduğu için özellikle şirketler hukukuna olan etkileri üzerine aslında yeni yeni yazılmaya başlanmıştır. Bu çalışmada dünya genelinde yapay zekâ ve blok zincirinin nasıl düzenlendiği araştırılmaktadır. Kurumsal yönetimde yapay zekâya çeşitli konularda başvurulabilir. Denetim sürecinde şirkete güvenilir bilgi sağlanmasında, ciddi miktarda verinin analizinde ve özellikle de yönetim kurulunun otomasyonunda yapay zekâ verimli bir şekilde kullanılabilir. Blok zincirinin kurumsal yönetime etkilerine baktığımızda ise pay sahiplerinin kimliklerini saptama, e-oylama ve yönetim kurulu toplantılarının ve genel kurulların sanal ortamda düzenlenmesi gibi pek çok alan karşımıza çıkmaktadır.

Söz konusu teknolojiler yeni ortaya çıktığı için hukuk sistemlerinde henüz uygun düzenlemeler mevcut değildir. Ancak dijitalleşmeyi hayata geçirmek için dünya genelinde pek çok girişim yapılmaktadır. Yeni düzenlemeler bakımından özellikle Avrupa Birliği (AB) son yıllarda yaptığı çalışmalarla standardizasyonu sağlamak istemektedir. Ayrıca çeşitli ülkeler AB düzenlemelerini iktibas yoluyla iç hukuklarına aktarmaktadır. 31 Temmuz 2019'da yürürlüğe giren 2019/1151 sayılı Dijitalleşme Yönergesi ile şirketlerin dijital uygulamaları gelişecek ve çevrimiçi şirket kurulumu kolaylaşacaktır. Dijital Tek Pazar Stratejisi ise dijital işletmelerin gerçekleşebilmesi için kuruluşlarından sınırlar ötesi çevrimiçi operasyonlarına kadar düzenleme yapmayı hedeflemektedir. Bu amaçla Dijital Pazarlar Yasası geçen sene yürürlüğe girmiştir.

Tezin ilk bölümünde yapay zekâ ve şirketler hukuku ele alınmaktadır. Yapay zekânın mevzuatta nasıl düzenlendiği karşılaştırmalı bir şekilde incelenmektedir. Öte yandan yapay zekânın şirket yönetiminde yer alıp almayacağı bir süredir tartışılmaktadır. Doktrinde yapay zekânın yönetim kuruluna ne şekilde dâhil olabileceği araştırılmaktadır. Yönetim kurulu üyesi olarak yapay zekâ, yapay zekâ destekli karar alma süreçleri ve yönetim kurulu üyelerinin atanmasında yapay zekâ, yapay zekânın kullanılabileceği temel

alanlar olarak incelenmektedir. Mevzuata bakıldığında yapay zekânın hâlihazırda yönetim kurulu üyesi olması mümkün görünmemektedir. Günümüzde yapay zekâ, birçok ülkede üyelerin gerçek kişi olma zorunluluğu nedeniyle yönetim kurulu üyesi olamamaktadır. Buna rağmen tüzel kişilerin üyeliğinin mümkün olduğu yerlerde bile yapay zekânın üyeliği söz konusu olmayacaktır. Çünkü yapay zekânın hukuken tanınmış herhangi bir kişiliği yoktur. Tüzel kişilik verilmesi hâlinde tüzel kişi yönetim kurulu üyelerine cevaz veren bazı ülkelerde üye olabileceği söylenebilir. Başka bir ihtimal ise yapay zekâya elektronik kişilik gibi yeni bir kişilik türü tanımlanıp şirketler hukukunda da bu tür kişilerin yönetim kurulu üyeliğine izin verilmesi durumudur. Bu ihtimalde yapay zekânın yönetim kurulu üyeliği söz konusu olacaktır. Karar alma süreçlerinde yer alan yapay zekâ daha objektif olan ve ayrımcılık taşımayan kararlar alınmasını sağlayabilir ve dolayısıyla yönetim kurulu üyelerini seçerken ise taraflı davranmaktan kaçınabilir. Ancak tüm bunların gerçekleşmesi için ise yapay zekânın beslendiği verilerin yanlı olmaması gerekmektedir. Bu gelişmelerin yönetimde paradigma değişimi sağlayacağı ve uzun süredir devam eden sorunları ortadan kaldıracağı savunulmaktadır.

Aynı bölümde yapay zekânın bağımsız denetimdeki rolü de ele alınmaktadır. Yapay zekâ teknolojisi hâlihazırda denetimde kullanılmakta ve önümüzdeki yıllarda da denetimin tamamen yapay zekâ tarafından yapılması mümkün görünmektedir. Tıpkı yönetim kurulu üyelerinin durumu gibi, yapay zekânın denetçi olabilmesi için kişilik açısından kimlerin bağımsız denetçi olabileceği hususunun düzenlenmesi gerekir. Taraflılık ve önyargı, sadece insan denetçiler için sorun olarak görülse de yapay zekâ için de bu sorunlar söz konusu olabilir. Bu nedenle, yapay zekâyı programlayan ekibin farklı arka planları olan kişilerden oluşması çözüm olarak gösterilebilir. Ayrıca gelecekte yapay zekânın etik ilkelerinin derinleşmesi ve insan hakları ve sürdürülebilirlik gibi konuları da içermesi beklenmektedir.

İkinci bölümde ise blok zinciri teknolojisi ve şirketler hukuku üzerine odaklanılmıştır. İlk kısımda genel olarak blok zinciri kavramı ele alınmakta ve akıllı sözleşmelerin blok zinciri üzerinden kullanılması incelenirken tüm bunların algoritmalardan oluşan merkeziyetsiz otonom organizasyonları mümkün kılacağı öngörüsünde bulunulmaktadır. Blok zinciri teknolojisinin merkezi otoriteleri önemsizleştirebileceği ihtimali üzerinde de durulmaktadır. Bölümün ikinci kısmında ise blok zincirinin şirketlerde konuşlandırılabileceği aşamalar incelenmektedir. Olası kullanım alanları; blok zinciri sistemi üzerinden şirket kurulması, sistem üzerinden şirketin ticari kayıtlarının tutulması, şirket esas sözleşmesinin blok zinciri üzerinden hazırlanması, blok zinciri sistemi üzerinden genel kurul yapılması, aynı sistem üzerinden yönetim kurulunun yapılması ve yine aynı sistem üzerinden şirketin tasfiyesi başlıkları altında sıralanmaktadır.

Blok zinciri sayesinde dijital kuruluşla birlikte kuruluştan tasfiyeye kadar dijital bir süreç yürütülebilmektedir. Böylece hiçbir evrak işine gerek olmadan bir-iki dakika içerisinde şirket kurmak mümkün olmaktadır. Gelecekte şirketler büyük olasılıkla blok zinciri sistemi içerisinde kurulacağından uluslararası bir sicilin gerekli olacağı gözler önüne serilmektedir. Ticari kayıtlarla ilgili olarak pay senedi kaydının blok zincirine entegre olacağı savunulabilir; böylece pay sahipliğinin tespiti daha kolay olacaktır. Esas Sözleşme, akıllı sözleşmeler ile birlikte blok zinciri sisteminde yer alabilir. Blok zinciri teknolojisi hem uzaktan katılım hem de uzaktan oylamayı sağlayacak; böylece genel kurullar ve yönetim kurulu toplantıları blok zinciri sistemi aracılığıyla yapılabilecek ve pay sahipleri yönetime daha etkin bir şekilde katılabilecektir. Blok zinciri sistemi üzerinden genel kurul yapılması salona alınmama ve söz alamama gibi sorunları bertaraf etmekte yararlı olacaktır. Blok zinciri ile birlikte merkezi bir otorite ortadan kalktığı için söz almalar engellenemeyecektir. Böylece herkes konuşabilecek ve pay sahiplerinin sesini duyurabilmesinin önü açılacaktır. Daha az seyahat, karbon ayak izini azaltacak ve paradan ve zamandan tasarruf sağlayacaktır. Son olarak, blok zinciri teknolojisi şirketin sona ermesinde de kolaylık

sağlayacaktır. Yani blok zinciri üzerinde kurulan şirket aynı şekilde blok zinciri üzerinden sona erecektir.

Blok zinciri teknolojisi ile bağlantılı olarak ele alınan akıllı sözleşmeler, merkeziyetsiz otonom organizasyonların oluşturulmasına izin veren otomatikleşmeyi mümkün kılmaktadır. Akıllı sözleşmeler, belirli parametreler oluştuktan sonra sözleşmeleri bağımsız olarak uygulayan dijital protokollerdir; yani akıllı sözleşme, kendisi bir sözleşme olmayıp var olan bir sözleşmeyi temsil etmektedir. Bütün bunlar şirketler hukukunda bir paradigma değişikliğine işaret etmektedir. Şirketler hukukunun dijitalleşmesiyle birlikte şirket ve kurumsal yönetim kavramlarının yeniden şekillenmesi muhtemeldir. Şirketler hukuku kavramlarının yeniden yorumlanması, yönetimde yapay zekaya ve dijitalleşen kurumsal varlıklara yol açacaktır. Blok zinciri, geleneksel mülkiyet kanıtlama yöntemlerinin yerini bile alabilir.

Merkeziyetsiz otonom organizasyonlar şirket kavramının tanımını genişletmektedir. Blok zinciri tabanlı olan işbu oluşumlar şeffaf ve kendi kendini yöneten şirket tanımının ortaya çıkmasına zemin hazırlamakta olup gelecekte şirket kavramının bile sorgulanmasına vesile olabilir. Programlanmış kurallar ve sözleşmeler ile şirketlerde devrim niteliğinde olması muhtemel otonom organizasyonlar üzerine yapılan araştırmalar şeffaflık, hesap verilebilirlik, güvenlik ve demokrasi gibi konulara odaklanmaktadır.

Tezin üçüncü bölümünde dijitalleşme ve kurumsal yönetim irdelenmektedir. Dijital kurumsal yönetim, şirkette dijital teknolojiler kullanılarak yürütülen süreçleri içermektedir. Bu bölüm, teknolojinin kurumsal yönetim üzerindeki etkisini kurumsal yönetim ilkeleri aracılığıyla analiz etmektedir. İlk olarak, bilgi asimetrisini ortadan kaldıran şeffaflık incelenmekte; ikinci ilke olarak çeşitlilik, ayrımcılık yapmama ve benzeri kavramları içeren hakkaniyetin altı çizilmektedir. Yapay zekâ, tarafsız bir şekilde programlanması koşuluyla haksız önyargıyı ortadan kaldırır ve blok

zinciri teknolojisi, özellikle eşitliği güvence altına alan e-oylama sürecine katkıda bulunur.

Üçüncü ilke olarak iç sorumluluk ilkesi de denilen hesap verebilirlik incelenmektedir. Yapay zekânın kişiliği ve yönetim kurulu üyesi olup olamayacağı hususları sorumluluğunu belirleyecektir. Bahsedildiği üzere hâlihazırda hukuken tanınmış bir kişiliği olmadığından yapay zekânın yönetim kurulu üyesi olamayacağı savunulabilir. Yönetim kurulu üyelerinin sorumluluğu teknolojiyle birlikte üzerinde araştırma yapılacak bir konu olacaktır. Yapay zekânın sorumluluk sahibi olmaması sorumluluk davası açılması halinde kimin sorumlu tutulacağının bilinmemesine yol açıyor. Normalde eşya kabul edilen yapay zekâda üreticiye sorumluluk getirilmekteydi. Şimdi ise kullananın da sorumluluğu söz konusu olacaktır. Yapay zekâ konusunda artık katı bir şekilde ürün sorumluluğu olmayacak ve yalnızca tasarımcı ve üretici değil, aynı zamanda kullanıcı da yapay zekânın eylemlerinden sorumlu tutulabilecektir. Ayrıca, merkeziyetsiz otonom organizasyonların kişiliği hakkında tartışmaların devam edeceği söylenebilir.

Ardından dış sorumluluk ilkesi çerçevesinde çevresel, sosyal ve kurumsal yönetim ve kurumsal sosyal sorumluluk incelenmektedir. Enerji tüketimi ve sürdürülebilirlik dâhilinde özellikle blok zincirinin çevreye etkisine ilişkin sorumluluk tartışılmaktadır. Son olarak gözetim ilkesi konusunda yapay zekâ, bilgi işleme kapasitesine sahip olduğu ve insanlardan daha hızlı olduğu için daha verimli olabilir. Ayrıca blok zincirinin sağladığı şeffaflık sayesinde bir izleme mekanizmasına ihtiyaç olmayacağı da söylenebilir. Bununla birlikte, öngörülebilir bir gelecekte teknolojinin yönetim kurulunun yerini alması pek olası değildir.

İşbu teknolojiler aynı zamanda pay sahiplerinin, özellikle de azınlık pay sahiplerinin haklarını etkilemektedir. Pay sahipliği haklarının kullanılması dijital hale gelmekte; böylece pay sahiplerinin yönetime daha aktif bir şekilde katılımları sağlanmaktadır. Bu gelişmelere örnek olarak pay sahiplerinin tespiti, sanal toplantılar ve e-oylama sayılabilir. Yapay zekâ ve

blok zinciri teknolojileri eşit muameleye katkıda bulunur. Örneğin, yapay zekâ tarafsızsa herkese eşit davranılacaktır; blok zinciri üzerinden yapılan toplantılar ve oylamalar da herkese eşit davranılmasını sağlayacaktır. Bir başka konu olan hukuka uygunluk açısından ise yapay zekâ, mevzuata uyup uyulmadığını tespit edebilir ve insan hatasını azaltabilir. Blok zinciri, şeffaflık ve gerçek zamanlı gözetim sayesinde yanlışları tespit edebilir.

Son başlık ise kurumsal yönetimde güncel bir konu olarak yönetim kurulu üyelerinde çeşitliliktir. Her ne kadar yapay zekânın yönetimde çeşitliliği, özellikle de cinsiyet çeşitliliğini artıracağı savunulabilirse de kota uygulamalarına, özellikle cinsiyete dayalı kota düzenlemelerine, hâlâ ihtiyaç olacaktır. Örneğin; üyeleri atayan yapay zekâ, farklı çevrelerden insanları seçebilirse de uygulamada yapay zekânın verilerden hareketle tarafsız davranmasının beklenemeyeceği ve ön yargılı olacağı savunulabilir. Bu yüzden, yapay zekânın yönetim kurulundaki çeşitlilik ihtiyacını azaltmayacağı sonucuna varılabilir. Ayrıca; yönetim kurulu üyesi olarak ya da karar alma süreçlerinde yer alan yapay zekâ, kararları etkileyeceği için farklı çevrelerden insan üyelerin de yönetim kurulunda bulunması gerekliliği savunulabilir. Böylece etkili bir şekilde fikir teatisi yapılabilecek ve yapay zekânın aldığı her kararın kayıtsız şartsız kabulü söz konusu olmayacaktır. Özellikle kadın üyelerin olması kapsayıcılığı sağlayacak ve farklı perspektifleri yönetim kuruluna kazandıracaktır. Ayrıca blok zinciri üzerinden yapılan toplantılar, farklı yerlerde yaşayan kişilerin üyeliğine imkân sağlayacak ve bu da çeşitliliğin önünü açacaktır.

Blok zinciri teknolojisinin sonuçları henüz tam olarak öngörülebilir değilse de doktrinde bu teknolojinin şirketler hukukunda bir devrimin habercisi olmayacağı da savunulmaktadır. Bunun sebebi ise çoğunluk ve azınlık arasındaki menfaat çatışmaları veya organların kontrolü gibi sorunların temel niteliği haiz olup teknolojiye bağlı olmamasıdır. Ancak iflas işlemleri ve önleyici yeniden yapılandırmalar gibi süreçler blok zinciri tabanlı olacak ve bu da likidite konularına ilişkin yeni çalışmalar ortaya çıkmasına yol

açabilir. Ayrıca, blok zinciri şirketlerin durumlarını tespit ederek iflasları önleme ve dolayısıyla şirketlerin kurtarılmasına katkı sağlayacaktır.

Tüm bu konularla bağlantılı olarak şirketlerin blok zinciri ile uyumlanmak zorunda olup olmadığı da incelenmelidir. Daha net bir ifade ile şirketlerde yeni teknolojilerin kullanılmamış olmasının yönetim kurulu üyeleri nezdinde özen yükümlülüğü çerçevesinde sorumluluk ortaya çıkarıp çıkarmayacağı incelenmelidir. Buna göre, istisnalar olması ihtimaline karşın şirketlerin yapay zekâ kullanmak zorunda olmadığı savunulabilir. Ancak blok zinciri uygulanması zorunlu hale gelebilir ve bu durumda şirketler tarafından kullanılmazsa hukuka uygun davranılmamış olacaktır. Öte yandan, zorunlu olmadığı ihtimalde de kullanılmamasının yönetim kurulu üyelerinin özen borcuna aykırılık teşkil edebileceği ileri sürülebilir. Yani blok zinciri mevcut bir teknoloji ve bu durumda özen yükümlülüğü çerçevesinde yönetim kurullarının şirketleri blok zincirine adapte etmekle yükümlü olup olmadığı büyük ihtimalle gündemde kalacak. Ayrıca, birleşme ve devralmalarda *due diligence* aşamasında yapay zekâya başvurulması, yönetim kurulu üyelerinin yükümlülüklerini etkileyebilir.

Yukarıda da belirtildiği gibi, yönetim kurulu üyelerinin şirkete karşı bir özen borcu vardır. Ancak yeni teknolojiler süreçleri hızlandırmakta ve şirket de gelir elde etmek amacıyla kurulmuş bir organizasyondur. Bu nedenle yönetim kurulu üyelerinin dünyadaki gelişmelerden haberdar olması gerekmektedir. Bu yüzden bu teknolojilerden yararlanmamanın sonuçları incelenmelidir. Özen yükümlülüğüne aykırı olup olmadığı bu çalışmada incelenen hususlardandır.

Son olarak merkeziyetsiz otonom organizasyonların kurumsal yönetim açısından pek çok avantajı olmakla birlikte, yasal niteliği konusunda fikir birliğine varılamaması ve kendilerine atfedilen sorumlulukların sınırlarının belirlenememesi gibi yasal riskleri de vardır. Ayrıca, işbu organizasyonların bazı özellikleri hâlâ belirsizdir. Örneğin, ademimerkeziyetçiliğin sadece altyapı düzeyinde yani blok zinciri sisteminde kalması ya da yönetim

düzeyini yani herhangi bir grup tarafından kontrol edilmemeyi de içermesi gerekliliği tartışılan bir konudur. Amacına ulaşması için yönetimi de içermesi gerektiği savunulabilir. Ancak, akıllı sözleşmelerden oluşan bir organizasyonun varlık olarak kabul edilmeme olasılığı da mevcuttur. İşte bu çalışma anılan bu noktalara ilişkin değerlendirmeleri sunarak literatüre katkı sağlamayı amaçlamaktadır. Böylece dijitalleşmenin şirketler hukukunu hangi yönlerde değiştirebileceği daha net bir şekilde anlaşılacak; hem avantajları yönünden hem de dezavantajları yönünden ele alınan gelişmelerin hukuki kurumları değiştirme potansiyelinin incelenmesi kapsayıcı bir tablo çizilmesine katkı sağlayacaktır.

Anahtar Kelimeler: Dijitalleşme, Şirketler Hukuku, Yapay Zekâ, Blok Zinciri, Akıllı Sözleşmeler, Merkeziyetsiz Otonom organizasyonlar, Kurumsal Yönetim

ABSTRACT

The Impact of Digitalisation on Company Law

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Digitalisation has affected company law as well as many areas in recent years. Artificial intelligence and blockchain technologies are leading in this regard. Whereas artificial intelligence manifests itself in issues such as management and auditing, blockchain technology is located in many processes from the formation of the company to its termination. This thesis examines artificial intelligence as a board member and an assistant in decision-making processes and emphasises its role in appointing board members. It also scrutinises the impact of artificial intelligence on external audits. In addition, it analyses blockchain technology regarding issues such as the formation of the company, keeping the documents, conducting meetings, and dissolution via blockchain. Blockchain technology, which is used with smart contracts, paves the way for forming decentralised autonomous organisations. This thesis also examines the effects of digitalisation on corporate governance, with reference to corporate governance principles. Moreover, it evaluates how shareholder rights, minority shareholder rights, and current issues such as board diversity will be ameliorated in the future. Although there will be no major change in the short term, it can be claimed that digitalisation will eventually mark an era in company law and corporate governance. More studies on these issues and their legalisation activities are expected to increase in the following periods.

Keywords: Digitalisation, Company Law, Artificial Intelligence, Blockchain, Smart Contracts, Decentralised Autonomous Organisations, Corporate Governance

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DEDICATION

Dedicated to the 100th anniversary of the Republic

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ABBREVIATIONS

1 to N	: One-to-many
AB	: *Avrupa Birliği* (The European Union)
AGM	: Annual General Meeting
AI	: Artificial Intelligence
Art.	: Article
B2C	: Business-to-consumer
BoD	: Board of Directors
CSR	: Corporate Social Responsibility
DAC	: Decentralised Autonomous Corporation
DAO	: Decentralised Autonomous Organisation
DLT	: Distributed Ledger Technology
D&O	: Directors and Officers
EBR	: The European Business Register Network
EBRA	: The European Business Registry Association
ESG	: Environmental, Social, and Governance
et al.	: *et alia* (and others)
EU	:European Union
ID	: Identity Document
i.e.	: *id est* (that is)
GmbH	: *Gesellschaft mit beschränkter Haftung* (Limited Company)
GRC	: Governance, Risk Management, and Compliance
HR	: Human Resources
ICLEC	: The Informal Company Law Expert Group
LLC	: Limited Liability Company

Ltd.	: Limited
MERSIS	: *Merkezi Sicil Kayıt Sistemi* (Central Registry Record System)
MKK	: *Merkezi Kayıt Kuruluşu* (Central Securities Depository of Türkiye)
OECD	: The Organisation for Economic Co-operation and Development
P2P	: Peer-to-peer
para.	: Paragraph
PLC	: Public Limited Company
Q&A	: Question and Answer
SEC	: The US Securities and Exchange Commission
SME	: Small and Medium-Sized Enterprises
SUP	: *Societas Unius Personae* (Single-Member Company)
TRY	: *Türk Lirası* (Turkish Lira)
UK	: United Kingdom
UPA	: The Uniform Partnership Act 1997
US	: United States
WWII	: World War II
VC	: Venture Capital
VR	: Virtual Reality
viz.	: *videlicet* (namely)

1. INTRODUCTION

Artificial intelligence (AI) and blockchain technology have been used in many areas, such as law, especially company law. The digitalisation of companies is enabled by these technologies. AI has many roles in companies, namely in the management, Board of Directors (BoD), and audit. Blockchain technology may be deployed throughout the life cycle of the company. Researchers suggest that digitalisation will transform corporate governance.[1] Hence, this study seeks to analyse legislation on AI and blockchain, especially in company law in different countries comparatively. It will scrutinise AI's role in the management and external audit. It also aims to find solutions to the challenges of AI in regulations and suggest legislation adaptations. Furthermore, it will scrutinise the impact of Blockchain systems on the company. Lastly, it will survey how digitalisation helps improve equality in corporate governance.

1.1. Literature Review

The digitalisation[2] of company law concentrates on providing a digital environment that facilitates a constructive interchange between corporate actors.[3] The literature on digitalisation of company law focuses on AI and blockchain technologies. AI's

[1] Irina Ivashkovskaya and Ilya Ivaninskiy, "What Impact Does Artificial Intelligence Have on Corporate Governance?", *Journal of Corporate Finance Research* 14, no. 4 (2020): 92, https://doi.org/10.17323/j.jcfr.2073-0438.14.4.2020.90-101.

[2] Digitisation is converting information into a digital format, whereas digitalisation is leveraging digitisation to enhance business processes. David Burkett, "Digitisation and Digitalisation: What Means What?", *Working Mouse- Innovation*, 19 December 2017, https://workingmouse.com.au/innovation/digitisation-digitalisation-digital-transformation/.

[3] Vasiliy Andreevich Laptev and Daria Rinatovna Feyzrakhmanova, "Digitalization of Institutions of Corporate Law: Current Trends and Future Prospects", *Laws* 10, no. 4 (2 December 2021): 1, https://doi.org/10.3390/laws10040093.

contribution to the management,[4] AI and external audit,[5] blockchain technologies,[6] smart contracts,[7] and decentralised autonomous organisations (DAOs)[8] are amongst the most discussed issues in digital company law.[9]

[4] Florian Möslein, "Robots in the Boardroom: Artificial Intelligence and Corporate Law", in *In: Barfield, W. & Pagallo, U. (Eds), Research Handbook on the Law of Artificial Intelligence, 649-670.* (Cheltenham, UK: Edward Elgar, 2018), 19; Iris H-Y Chiu and Ernest WK Lim, "Technology vs Ideology: How Far Will Artificial Intelligence and Distributed Ledger Technology Transform Corporate Governance and Business?", *SSRN Electronic Journal*, 2020, 1–52, https://doi.org/10.2139/ssrn.3695006; Sergio Alberto Gramitto Ricci, "Artificial Agents in Corporate Boardrooms", *Cornell Law Review* 105, no. 3 (20 August 2020): 40, https://ssrn.com/abstract=3677627; Meltem Karatepe Kaya, "Yapay Zekanın Şirket Yönetimine Olası Katkılarının Türk Şirketler Hukuku Kapsamında Değerlendirilmesi ve Yapay Zekanın Hukuki Statüsünün Belirlenmesinde Şirketler Hukukundan Çıkartılabilecek Dersler", *Ankara Hacı Bayram Veli Üniversitesi Hukuk Fakültesi Dergisi*, 10 August 2021, 69–106, https://doi.org/10.34246/ahbvuhfd.979208; Eleanore Hickman and Martin Petrin, "Trustworthy AI and Corporate Governance: The EU's Ethics Guidelines for Trustworthy Artificial Intelligence from a Company Law Perspective", *European Business Organization Law Review* 22, no. 4 (1 December 2021): 593–625, https://doi.org/10.1007/s40804-021-00224-0; Barış Gözübüyük, "Yapay Zeka Algoritmalarının Anonim Ortaklıklarının Kurumsal Yönetimine Sağlayabileceği Olası Katkılar (Possible Contributions of Artificial Intelligence Algorithms to the Corporate Management of Joint Stock Companies)", *Hacettepe Hukuk Fakültesi Dergisi*, 11 November 2021, https://doi.org/10.32957/hacettepehdf.1018788; Muzaffer Eroğlu and Meltem Karatepe Kaya, "Impact of Artificial Intelligence on Corporate Board Diversity Policies and Regulations", *European Business Organization Law Review*, 24 May 2022, https://doi.org/10.1007/s40804-022-00251-5; Sevda Bora Çınar, "Şirketler Hukukunun Geleceği Üzerine Bir İnceleme: Şirket Yönetiminde Yapay Zekâ" (PhD thesis, Antalya, Akdeniz Üniversitesi, 2022); Salih Karadeniz, "Yapay Zekânın Anonim Şirket Yönetim Kuruluna Üyeliği ve Üyelikten Doğan Sorumluluğunun Değerlendirilmesi", Türkiye Adalet Akademisi Dergisi, no. 54 (3 April 2023): 255–88, https://doi.org/10.54049/taad.1274437.

[5] Efstathios Kirkos, Charalambos Spathis, and Yannis Manolopoulos, "Audit-Firm Group Appointment: An Artificial Intelligence Approach", *Intelligent Systems in Accounting, Finance & Management* 17, no. 1 (17 December 2009): 1–17, https://doi.org/10.1002/isaf.310; Bill Brennan, Mike Flynn, and Mike Baccala, "Artificial Intelligence Comes to Financial Statement Audits", *CFO*, 2 February 2017, https://www.cfo.com/accounting-tax/2017/02/artificial-intelligence-audits/; Aneta Zemánková, "Artificial Intelligence and Blockchain in Audit and Accounting: Literature Review", *WSEAS TRANSACTIONS on BUSINESS and ECONOMICS* 16 (2019): 568–81.

[6] David Yermack, "Corporate Governance and Blockchains", *Review of Finance*, 10 January 2017, 7–31, https://doi.org/10.1093/rof/rfw074; Dirk A. Zetzsche, Ross P. Buckley, and Douglas W. Arner, "The Distributed Liability of Distributed Ledgers: Legal Risks of Blockchain", *SSRN Electronic Journal*, 2017, https://doi.org/10.2139/ssrn.3018214; Anne Lafarre and Christoph Van der Elst, "Blockchain Technology for Corporate Governance and Shareholder Activism", *SSRN Electronic Journal*, 2018, https://doi.org/10.2139/ssrn.3135209; Kevin Werbach, *The Blockchain and the New Architecture of Trust*, Information Policy Series (Cambridge, MA: MIT Press, 2018); Christoph Van der Elst and Anne Lafarre, "Blockchain and Smart Contracting for the Shareholder Community", *European Business Organization Law Review* 20, no. 1 (March 2019): 111–37, https://doi.org/10.1007/s40804-019-00136-0; Florian Möslein, "Blockchain Applications and Company Law", *Legal Technology Transformation in Practice*, 2020; Bilge Zeynep Yılmaz Orhan, "Merkeziyetsiz Otonom Organizasyonlar, Kurumsal Yönetim ve Blokzincir (Decentralized Autonomous Organizations, Corporate Governance and Blockchain)", *MHFD*, no. 2 (2022): 153–64.

[7] Belkıs Vural Çelenk, "Akıllı Sözleşmeler (Smart Contracts) Nedir?", 7 September 2017, https://startuphukuku.com/akilli-sozlesmeler-smart-contracts-nedir/; Kevin Werbach and Nicolas Cornell, "Contracts Ex Machina", *Duke Law Journal* 67, no. 313 (2017): 101–70, https://ssrn.com/abstract=2936294; Jeremy M Sklaroff, "Smart Contracts and the Cost of Inflexibility", *University of Pennsylvania Law Review- Prize Winning Papers* 166, no. 9 (2018): 263–304, https://scholarship.law.upenn.edu/prize_papers/9/; Robert Wilkens and Richard Falk, *Smart Contracts: Grundlagen, Anwendungsfelder und rechtliche Aspekte*, essentials (Wiesbaden: Springer Fachmedien

The doctrine examines AI as software that has the ability to learn[10] but cannot think like humans, instead learns from data,[11] whereas blockchain is considered distributed, decentralised, and public ledger, and its suitability for recording ownership of assets, such as, stocks, bonds, and real estates has been scrutinised.[12] In corporate governance, AI can be used in the process of audit,[13] providing reliable information to the corporation and the BoD analysing a great amount of data, and in the automation of the BoD, for example, as a board member or appointing the members.[14]

Wiesbaden, 2019), https://doi.org/10.1007/978-3-658-27963-9; "Introduction to Smart Contracts", *Ethereum*, 19 January 2023, https://ethereum.org/en/smart-contracts/.

[8] Nathan Schneider, "Are You Ready to Trust a Decentralized Autonomous Organization?", *Shareable*, 14 July 2014, https://www.shareable.net/are-you-ready-to-trust-a-decentralized-autonomous-organization/; Shawn Bayern, "The Implications of Modern Business–Entity Law for the Regulation of Autonomous Systems", *19 STAN. TECH. L. REV. 93* 7, no. 2 (2015): 93–112, https://doi.org/10.1017/S1867299X00005729; Usman W. Chohan, "The Decentralized Autonomous Organization and Governance Issues", *SSRN Electronic Journal*, 2017, https://doi.org/10.2139/ssrn.3082055; Ying-Ying Hsieh et al., "Bitcoin and the Rise of Decentralized Autonomous Organizations", *Journal of Organization Design* 7, no. 1 (December 2018): 14, https://doi.org/10.1186/s41469-018-0038-1; Laila Metjahic, "Deconstructing the Dao: The Need for Legal Recognition and the Application of Securities Laws to Decentralized Organizations", *Cardozo Law Review* 39, no. 4 (2018): 1533–67; Yılmaz Orhan, "Decentralized Autonomous Organizations".

[9] Boris P. Paal, "Die Digitalisierte GmbH", *Zeitschrift Für Unternehmens- Und Gesellschaftsrecht* 46, no. 5 (2017): 590–620, https://doi.org/10.1515/zgr-2017-0026; Yermack, "Corporate Governance and Blockchains"; Rokas Bakšys, "Digitalisation of Company Law: Trends and Future Opportunities" (Master's thesis, Vilnius, Mykolas Romeris University, Faculty of Law, 2018); Möslein, "Robots in the Boardroom"; Gerald Spindler, "Gesellschaftsrecht und Digitalisierung", *Zeitschrift für Unternehmens- und Gesellschaftsrecht* 47, no. 1 (14 February 2018): 17–55, https://doi.org/10.1515/zgr-2018-0002; Luca Enriques and Dirk Andreas Zetzsche, "Corporate Technologies and the Tech Nirvana Fallacy", *SSRN Electronic Journal*, 2019, https://doi.org/10.2139/ssrn.3392321; Nicolaus Emmanuel Schubert, "Digital Corporate Governance - Möglichkeiten für den Einsatz neuer Technologien im Gesellschaftsrecht", *Institut für Wirtschaftsrecht Forschungsstelle für Transnationales Wirtschaftsrecht Juristische und Wirtschaftswissenschaftliche Fakultät der Martin-Luther-Universität Halle-Wittenberg*, no. 166 (September 2019); Dirk Zetzsche, "Corporate Technologies – Zur Digitalisierung im Aktienrecht", *Die Aktiengesellschaft* 64, no. 1–2 (1 January 2019): 1–17, https://doi.org/10.9785/ag-2019-641-212; Chiu and Lim, "Technology vs Ideology"; Möslein, "Blockchain Applications and Company Law", 2020; Isil Erel et al., "Selecting Directors Using Machine Learning", ed. Itay Goldstein, *The Review of Financial Studies* 34, no. 7 (18 June 2021): 3226–64, https://doi.org/10.1093/rfs/hhab050; Samer Hassan and Primavera De Filippi, "Decentralized Autonomous Organization", Internet Policy Review 10, no. 2 (20 April 2021), https://doi.org/10.14763/2021.2.1556; Laptev and Feyzrakhmanova, "Current Trends- Future Prospects"; Möslein, "Blockchain Applications and Company Law", 23 February 2021; İrfan Akın, "Dijital Gelişmelerin Şirketler Hukuku Üzerindeki Etkisi", *Türk-Alman Üniversitesi Hukuk Fakültesi Dergisi* 4, no. 1 (2022): 3–26; Yılmaz Orhan, "Decentralized Autonomous Organizations"; Lafarre and Van der Elst, "Blockchain Technology"; Van der Elst and Lafarre, "Blockchain and Smart Contracting".

[10] Gözübüyük, "Yapay Zeka Algoritmaları", 1187.

[11] Gözübüyük, 1188.

[12] Yermack, "Corporate Governance and Blockchains", 8.

[13] Laptev and Feyzrakhmanova, "Current Trends- Future Prospects", 12.

[14] Isil Erel et al., "Research: Could Machine Learning Help Companies Select Better Board Directors?", 2018, https://hbr.org/2018/04/research-could-machine-learning-help-companies-select-better-board-directors; Möslein, "Robots in the Boardroom"; Chiu and Lim, "Technology vs Ideology", 12; Erel et al., "Selecting Directors Using Machine Learning", 18 June 2021; Karatepe Kaya, "Dersler", 92–95; Laptev and Feyzrakhmanova, "Current Trends- Future Prospects", 12; Eroğlu and Karatepe Kaya, "Board Diversity".

Furthermore, blockchain can be used for public records, namely birth certificates, driver's licenses, university degrees, and real estate titles.[15]

Regarding corporate governance, the literature focuses on the use of technology to enhance corporate practices, such as shareholder identification, e-voting, and virtual meetings,[16] which are expected to be realised via blockchain. In other words, digitalisation of corporate governance[17] is generally regarded as online Annual General Meetings (AGMs), e-voting, or deploying AI.[18] However, some scholars[19] argue that digitalisation of company law includes not only digitalisation of corporate governance but also other topics such as legal personality of the company and decentralised autonomous organisations (DAOs).[20] For instance, DAOs broaden the definition of companies. Blockchain technology will facilitate transparent, autonomous, and self-managing entities with DAOs. DAOs, Blockchain-based companies,[21] will reshape the definition of companies and cause questioning the need for companies.[22] DAOs constitute a revolution in organisations with their programmed rules and contracts.[23] Research on DAOs is based on issues such as transparency, accountability, security, and democracy.[24]

On the other hand, AI is discussed whether it can be involved in the company's management. For instance, the doctrine analyses to what degree AI can assist the BoD,

[15] Yermack, "Corporate Governance and Blockchains", 8.
[16] Enriques and Zetzsche, "Corporate Technologies", 59–60.
[17] Juan L. Gandía, "Corporate E-Governance Disclosure in the Digital Age: An Empirical Study of Spanish Listed Companies", *SSRN Electronic Journal*, 2005, https://doi.org/10.2139/ssrn.531182; Amita Charan, "E-Governance A New Dimension of Corporate Governance", 17 July 2011, https://ssrn.com/abstract=1641622; Erik P. M. Vermeulen, "Corporate Governance in a Networked Age", *Tilburg Law School Legal Studies Research Paper Series*, no. 16/2015 (9 August 2015), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2641441; Yermack, "Corporate Governance and Blockchains"; Svetlana Chekhovskaya, "A New Outline of Corporate Law", *SSRN Electronic Journal*, 2018, https://doi.org/10.2139/ssrn.3161341; Enriques and Zetzsche, "Corporate Technologies"; Chiu and Lim, "Technology vs Ideology".
[18] Charan, "E-Governance"; Vermeulen, "Corporate Governance"; Yermack, "Corporate Governance and Blockchains".
[19] Laptev and Feyzrakhmanova, "Current Trends- Future Prospects".
[20] Shawn J. Bayern, "Of Bitcoins, Independently Wealthy Software, and the Zero-Member LLC", *NW. U. L. REV.* 108, no. 4 (2014), https://doi.org/10.2139/ssrn.2366197; Bayern, "Autonomous Systems"; Lynn M LoPucki, "Algorithmic Entities", *Washington University Law Review* 95, no. 4 (2018): 68; John Armour and Horst Eidenmüller, "Self-Driving Corporations?", *Harvard Business Law Review* 10 (2020): 87–116.
[21] Bayern, "Bitcoins"; LoPucki, "Algorithmic Entities"; Armour and Eidenmüller, "Self-Driving Corporations?".
[22] Wulf A. Kaal, "Blockchain-Based Corporate Governance", *Stanford Journal of Blockchain Law & Policy* 4, no. 1 (2021): 27–28, https://doi.org/10.2139/ssrn.3441904.
[23] Chohan, "Autonomous Organization", 1.
[24] Chohan, 4.

be a board member, and assign board members. In addition, self-driving corporations, which consist of algorithms, that is, DAOs, are on the way. "Tech proponents" argue that technology will transform corporate governance paradigms and even eliminate long-standing issues such as majority-minority conflicts.[25]

In order to implement digitalisation, there have been attempts all over the world. For instance, the EU has been making an effort for at least the last two decades. Digitalisation of company law in the EU includes 2002 Winter Report, 2003 Action Plan,[26] 2010 Agenda for Europe, which enables the digital formation of enterprises, the 2011 Green Paper on Corporate Governance, the 2012 Action Plan, the 2015 Single Digital Market Strategy for the EU, ICLEC Report on digitalisation in company law, Directive (EU) 2017/1132, which includes business registers, websites, and proxy voting (revised version) and the Digitalisation Directive.[27][28]

The Digitalisation Directive has been transposed into domestic laws of the member countries. It enhances companies' digital practices by triggering numerous regulations and facilitating the formation and registration of a company in the EU.[29] Its requirements are built on the European Commission's package regarding company law and related to the online formation of companies.[30] The EU e-Government Action Plan seeks to form a Digital Single Gateway that actualise digital public services that operate across borders.[31] One of its aims is to connect all business and insolvency registers and to upload them to the eJustice portal.[32] The EU's Digital Single Market

[25] Enriques and Zetzsche, "Corporate Technologies".
[26] Both focused on Shareholders' Rights Directive.
[27] See also Alessio Bartolacelli, "A New(?) Framework(?) On Digitalisation in European (?) Company(?) Law?" (3rd International Conference on European Company Law and Corporate Governance, Zagreb, 6 December 2018), https://eclcg-conf.weebly.com/uploads/2/5/1/8/25181752/1-3_bartolacelli.pdf; Alessio Bartolacelli, "A New(?) Framework(?) On Digitalisation in European (?) Company(?) Law?", *INTEREULAWEA§T Journal for International and European Law, Economics and Market Integrations* 5, no. 2 (December 2018): 1–68, https://doi.org/10.22598/iele.2018.5.2.1.
[28] "Directive (EU) 2019/1151 of the European Parliament and of the Council of 20 June 2019 Amending Directive (EU) 2017/1132 as Regards the Use of Digital Tools and Processes in Company Law", accessed 6 January 2023, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32019L1151.
[29] Funda Özdin, "2019/1151 sayılı AB Dijitalleşme Yönergesi ve Alman Hukuku (DİRUG) Uyarınca Online Şirket Kuruluşu, Sicile Online İbraz ve Sicil Kayıtlarının Online İlanı", *İstanbul Hukuk Mecmuası / Istanbul Law Review* 80, no. 3 (15 September 2022): 722, https://doi.org/10.26650/mecmua.2022.80.3.0001.
[30] "Online Formation of Corporations: The Requirements of the Digitalization Directive at a Glance", *Deloitte*, accessed 6 January 2023, https://www2.deloitte.com/dl/en/pages/legal/articles/online-gruendung-digitalisierungsrichtlinie.html.
[31] "EGovernment Action Plan", *Shaping Europe's Digital Future*, 7 June 2022, https://digital-strategy.ec.europa.eu/en/policies/egovernment-action-plan.
[32] "EGovernment Action Plan".

Strategy aims for digital businesses, from their establishment to online operations across borders.[33] With this goal, the Digital Markets Act entered into force in 2022.

1.2. Aim and Scope

With technology improving, AI and Blockchain systems have been used in many areas, such as law, especially corporate law. They have many roles in companies: the management, the BoD, and auditing. The proposed study aims to analyse digitalisation from the perspective of company law. It will evaluate the effect of technology on corporate governance. It will examine AI and blockchain from the perspective of various legislations. The aim and scope of this research may be listed as follows:

1. To examine the legal framework of AI in general and in terms of companies, especially the BoD and auditing and to propose legislation for AI, and thus, its scope as a member, namely its liability, will be clear.

2. To analyse the impact of blockchain on the company from its establishment to its termination and to compare the legal framework of the BoD in various countries' legislations.

3. Lastly, to predict how digitalisation in company law, especially Turkish and EU, and corporate governance rules will be addressed. The proposed study seeks to find answers to how technology is used and will probably be used in the future by companies. Moreover, it aims to explore the consequences of such usage.

1.3. Problems and Key Research Questions

This thesis pursues to solve the following questions:

1. What is AI, and how does it function? What is its legal personhood and what does this mean in company law? Are there differences in different countries? Should it be considered a legal entity or is it possible to suggest a separate kind of personality?
2. What is the scope of AI in companies? What are the fields in which AI may be available in companies?
3. How can blockchain be deployed in companies? Is an autonomous organisation possible?

[33] "Directive (EU) 2019/1151 of the European Parliament and of the Council of 20 June 2019 Amending Directive (EU) 2017/1132 as Regards the Use of Digital Tools and Processes in Company Law".

4. How does digitalisation affect corporate governance?
5. What is the future of technology in companies? What is the trend, especially after Covid-19 Pandemic?

1.4. Overview and Contribution

Since AI and blockchain are new fields, few studies have been conducted. Their effects on corporate law have just begun to be written. The proposed study will compare the legal framework of AI and blockchain in different countries, particularly in EU law and Turkish law. Examining the usage of AI and blockchain regarding corporate governance will show how the legislation in different countries may be enacted. The fact that the proposed study is comparative research between various legislations contributes to its originality. Furthermore, it will examine the effect of AI on diversity. Hence, it will have a multidisciplinary approach.

1.5. The Importance of Study

As AI and blockchain are emerging fields, legal systems do not have suitable regulations yet. The EU wants to ensure standardisation by introducing new regulations. In company law, there is no legal regulation on AI or blockchain in other countries as in Türkiye. Corporate governance principles were adopted before AI and blockchain became prevalent. Therefore, the study scrutinises the effects of digitalisation on company law.

1.6. The Planned Structure of the Research

The planned structure of the proposed research is:

1. First, the proposed study will examine AI, and its uses in company law, particularly in the management and external audit.
2. Second, it will analyse blockchain from the formation of the company to its termination.
3. Third, the study will address AI and blockchain from the perspective of corporate governance.
4. Lastly, it will try to make recommendations about future regulations.

1.7. Research Methodology

First of all, this thesis does not have a certain criterion regarding particular legislation. It will evaluate global developments. The methods applied in this study are:

1. “Black letter” Doctrinal Analysis: Researching relevant legal rules of company law. Are they inclusive of the issues concerning AI and blockchain? How should company law and corporate governance rules be adapted to be able to use AI and blockchain? The study will analyse primary sources such as legislation of various countries.

2. Critical Doctrinal Analysis: Including an examination consisting of descriptive documents, namely books and research articles.

3. Gathering data and presenting knowledge through qualitative and quantitative research.

4. Exploration of a particular area through a specific theoretical point of view exploring AI and blockchain from technological developments and sociological perspectives.

5. Interdisciplinary research on subjects such as technology, engineering, economy, and sociology.

2. ARTIFICIAL INTELLIGENCE

2.1. In General

Throughout history, humans have attempted to understand how they think, and AI goes a step further, that is, to build intelligent beings.[34] Developed after the second world war (WWII), AI is a new field in engineering and science.[35] John McCarthy is one of the inventors of the term AI, which means "the science and engineering of making intelligent machines, especially intelligent computer programmes".[36] Although there are various descriptions of AI in the literature, most of them are related to the notion of developing computer programmes, or machines that would be considered smart if they behaved like humans.[37] However, the latter description may cause the argument that AI is a thinking machine, but it does not think like humans.[38]

2.2. Definitions and Functions of AI

While some definitions are related to the thought process and reasoning, others are oriented towards the behaviour.[39] The definitions are divided into four groups, namely "thinking rationally",[40] "thinking humanly",[41] "acting rationally",[42] and "acting humanly".[43] Thinking rationally is related to a logicist approach, which comprises AIs that can solve any solvable problem defined in logical notation.[44] Thinking humanly refers to the software's input-output behaviour matching with the corresponding human behaviour.[45] Acting rationally indicates that the machine acts according to getting the best result or the best-anticipated result,[46] whereas acting humanly is concerned with behaving like a human so that one cannot tell whether the AI is a

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[34] Stuart J. Russell and Peter Norvig, *Artificial Intelligence: A Modern Approach*, 3rd ed, Prentice Hall Series in Artificial Intelligence (Upper Saddle River: Prentice Hall, 2010), 1.
[35] Russell and Norvig, 1.
[36] John McCarthy et al., "A Proposal for the Dartmouth Summer Research Project on Artificial Intelligence, August 31, 1955." 27, no. 4 (2006): 12–14, https://doi.org/10.1609/aimag.v27i4.1904.
[37] Jerry Kaplan, *Artificial Intelligence: What Everyone Needs to Know*, What Everyone Needs to Know (New York, NY, United States of America: Oxford University Press, 2016), 1.
[38] Ademola Adeyoju, "Artificial Intelligence and the Future of Law Practice in Africa", *SSRN Electronic Journal*, 2018, 12, https://doi.org/10.2139/ssrn.3301937.
[39] Russell and Norvig, *Artificial Intelligence*, 1.
[40] See Patrick Henry Winston, *Artificial Intelligence*, 3rd ed. (Addison-Wesley, 1992).
[41] See John Haugeland, *Artificial Intelligence: The Very Idea* (Cambridge, Mass: MIT Press, 1985).
[42] David Poole, Alan Mackworth, and Randy Goebel, *Computational Intelligence: A Logical Approach* (Oxford University Press, 1998).
[43] R. Kurzweil, *The Age of Intelligent Machines* (Kurzweil Foundation, 1990), https://books.google.com.tr/books?id=SI1QAAAAMAAJ.
[44] Russell and Norvig, *Artificial Intelligence*, 4.
[45] Russell and Norvig, 3.
[46] Russell and Norvig, 4.

human or a programme.[47] AI is also defined as a technology that is used to accelerate tasks that are done by humans.[48] In fact, there is an analogous definition, that is, technologies that can perform tasks that normally require human intelligence,[49] including visual perception, speech recognition, and language translation.[50]

Regarding the European Commission's definition, AIs are "systems that display intelligent behaviour by analysing their environment and taking actions – with some degree of autonomy – to achieve specific goals".[51] However, it can be argued that AI surpasses human intelligence in terms of analysing the amount of data that humans cannot examine. Furthermore, it can be claimed that AI cannot be considered intelligent because it does not have the capacity to act; it only does what they are tasked with by humans;[52] that is to say, it performs duties according to the instructions given by humans.

AI comprises various functions such as learning and perception, playing chess, driving a car, proving theorems, and diagnosing diseases.[53] Thus, AI is commonly used for classification, creating algorithms, and data-driven decision-making and influencing subsequent cases.[54] It ensures automation in businesses and improves efficiency[55]. From contributing to consumer experience to enhancing data security, technology will probably have a central role in business.[56]

[47] The Turing Test, proposed by Alan Turing in 1950, deals with the machine's ability to exhibit human behaviours. In the test, there is a human interrogator that evaluates a written conversation between a human and a machine. If the interrogator cannot be sure whether the responses come from the human or the machine, that machine will be considered intelligent. See A. M. Turing, "Computing Machinery and Intelligence", *Mind, New Series* 59, no. 236 (1950): 433–60, http://www.jstor.org/stable/2251299.
[48] Harry Surden, "Artificial Intelligence and Law: An Overview", *GA. ST. U. L. REV.* 35 (2019): 1308, https://scholar.law.colorado.edu/articles/1234.
[49] "Artificial Intelligence, Eng. Oxford Dictionaries", accessed 10 August 2022, https://www.lexico.com/definition/artificial_intelligence; Surden, "Artificial Intelligence and Law", 1307; Russell and Norvig, *Artificial Intelligence*.
[50] "Industrial Strategy: Building a Britain Fit for the Future", 37, accessed 12 August 2022, https://www.gov.uk/government/publications/industrial-strategy-building-a-britain-fit-for-the-future.
[51] "A Definition of AI: Main Capabilities and Disciplines" 8 April 2019, 1.
[52] Karatepe Kaya, "Dersler", 73.
[53] Russell and Norvig, *Artificial Intelligence,* 1.
[54] Karatepe Kaya, "Dersler", 70.
[55] David Reinsel, John Gantz, and John Rydning, "The Digitization of the World from Edge to Core", 2018, 2, https://www.seagate.com/files/www-content/our-story/trends/files/idc-seagate-dataage-whitepaper.pdf.
[56] David Ndichu, "Ahead of the Curve: The Technology of Tomorrow", *Gulf Business*, 20 March 2021, https://gulfbusiness.com/ahead-of-the-curve-the-technology-of-tomorrow/.

2.3. Types of AI

In the literature, AI is divided into two categories, namely narrow/weak AI and general/strong AI.[57] Whereas the former denotes a narrow process of statistical analysis of data and computational power, the latter refers to a sentient human-conscious type of AI.[58]

Narrow AI indicates that it can perform a specific task, such as calculations and learning the rules of a game.[59] Narrow AI helps humans do repetitive tasks and provide support where a large amount of data is needed to be examined.[60] Machine learning, an improved form of narrow AI, provides the AI with the ability to devise the rules to achieve the result it was programmed for.[61] Supervised and unsupervised learning are common types of machine learning.[62] Whereas input and output data are certain in supervised learning,[63] in the unsupervised one, the algorithm has the input data but not the output data.[64] In this case, the machine identifies the data; viz., AI learns from the data.

Nowadays, "Narrow AI" has begun to be replaced by "General AI" that resembles humans in succeeding complex and composite tasks.[65] Self-driving cars can be given as an example of "General AI". On the other hand, it is predicted that "General AI" will evolve into "Super AI".[66] "Super AI" denotes an AI that is like a

[57] Alan J. Dignam, "Artificial Intelligence: The Very Human Dangers of Dysfunctional Design and Autocratic Corporate Governance", no. 314/2019 (3 May 2019): 4, https://ssrn.com/abstract=3382342.
[58] Dignam, 4.
[59] L. Thorne McCarty, "Finding the Right Balance in Artificial Intelligence and Law", in *Research Handbook on the Law of Artificial Intelligence*, by Woodrow Barfield and Ugo Pagallo (Edward Elgar Publishing, 2018), 4, https://doi.org/10.4337/9781786439055.00013.
[60] Chiu and Lim, "Technology vs Ideology", 6. For instance, IBM Watson processes data and provide possible outcomes on numerous business transactions. Bakšys, "Digitalisation of Company Law", 59–60. See also *IBM Watson*, accessed 8 November 2022, https://www.ibm.com/watson.
[61] Chiu and Lim, "Technology vs Ideology", 5.
[62] Daniel Martin Katz and John J. Nay, "Machine Learning and Law", in *Legal Informatics*, ed. Daniel Martin Katz, Ron Dolin, and Michael J. Bommarito, 1st ed. (Cambridge University Press, 2021), 94, https://doi.org/10.1017/9781316529683.010.
[63] Andreas Kaplan and Michael Haenlein, "Siri, Siri, in My Hand: Who's the Fairest in the Land? On the Interpretations, Illustrations, and Implications of Artificial Intelligence", *Business Horizons* 62, no. 1 (January 2019): 19, https://doi.org/10.1016/j.bushor.2018.08.004; Sonia K Katyal, "Private Accountability in the Age of Artificial Intelligence", 2019, 69, https://www.uclalawreview.org/private-accountability-age-algorithm/.
[64] Kaplan and Haenlein, "Siri", 19.
[65] Chiu and Lim, "Technology vs Ideology", 6–7.
[66] It is claimed that human capability will have profoundly and disruptively transformed by 2045. Ray Kurzweil, *The Singularity Is Near: When Humans Transcend Biology* (New York: Viking, 2005), 122.

human in sentience and capacity and can pass the Turing Test.[67] "Super AI" can change structures in various areas, including the economy and consequently companies. Nevertheless, it may be argued that there will unlikely be "Super AIs" everywhere soon.

2.4. Regulations on AI

All the improvements in technology have led to the growing need for regulations. Therefore, Communications on "Artificial Intelligence for Europe"[68] and "Coordinated Plan on Artificial Intelligence"[69] were regulated, and a White Paper on AI[70] and a report called "Report on the safety and liability implications of AI and other technologies" were published.[71] In addition, Digital Markets Act[72] will have implications for AI. Last but not least, the proposed AI Liability Directive[73] will affect the usage of AI in companies.

Data analysed by AI are exposed to the risk of the disclosure of the company's confidential business information.[74] In this case, blockchain may be deployed to

[67] Chiu and Lim, "Technology vs Ideology", 8. An AI, "Eugene Goostman", which imitates a 13-year-old Ukrainian boy, has already passed the Turing Test, which requires 30% of human interrogators to be beguiled by AI. It convinced 33% of the interrogators. "Computer Simulating 13-Year-Old Boy Becomes First to Pass Turing Test", *The Guardian*, 9 June 2014, https://www.theguardian.com/technology/2014/jun/08/super-computer-simulates-13-year-old-boy-passes-turing-test.

[68] "Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions, Artificial Intelligence for Europe COM/2018/237 Final", 25 April 2018, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2018%3A237%3AFIN.

[69] "Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions Coordinated Plan on Artificial Intelligence", 7 December 2018, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52018DC0795.

[70] "White Paper on Artifical Intelligence—a European Approach to Excellence and Trust. COM (2020) 65 Final", 19 February 2020, https://ec.europa.eu/info/publications/white-paper-artificial-intelligence-european-approach-excellence-and-trust_en.

[71] "Report on the Safety and Liability Implications of Artificial Intelligence, the Internet of Things and Robotics. COM (2020) 64 Final", 19 February 2020, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020DC0064.

[72] "Regulation (EU) 2022/1925 of the European Parliament and of the Council of 14 September 2022 on Contestable and Fair Markets in the Digital Sector and Amending Directives (EU) 2019/1937 and (EU) 2020/1828 (Digital Markets Act)", 1, accessed 30 November 2022, https://eur-lex.europa.eu/legal-content/EN/TXT/?toc=OJ%3AL%3A2022%3A265%3ATOC&uri=uriserv%3AOJ.L_.2022.265.01.0001.01.ENG.

[73] "Proposal for a Directive of the European Parliament and of the Council on Adapting Non-Contractual Civil Liability Rules to Artificial Intelligence (AI Liability Directive) COM(2022) 496 Final", 28 September 2022, https://ec.europa.eu/info/business-economy-euro/doing-business-eu/contract-rules/digital-contracts/liability-rules-artificial-intelligence_en.

[74] Laptev and Feyzrakhmanova, "Current Trends- Future Prospects", 14.

authenticate the information. Thus, transparency would be provided, and the confidential information itself would not be disclosed.[75]

The European Commission published "the Ethics Guidelines for Trustworthy AI" for possible ethical issues.[76] Based on the Guidelines, AI should adhere to the principles of legality, ethics, and resilience. It means that AI should comply with regulations, have ethical awareness, and be technically robust and safe. The Guidelines comprise a framework and a list of seven expected requirements.[77] The list consists of "(1) human agency and oversight, (2) technical robustness and safety, (3) privacy and data governance, (4) transparency, (5) diversity, non-discrimination and fairness, (6) environmental and societal well-being and (7) accountability". The Guidelines also mention concepts of "human-in-the-loop"[78], "human-on-the-loop"[79], or "human-in-command"[80] in achieving human oversight.[81] Thus, the Commission lays the foundations for the legal infrastructure of AI.

Furthermore, OECD has laid down "Principles for responsible stewardship of trustworthy AI", namely "inclusive growth, sustainable development and well-being", "human-centred values and fairness", "transparency and explainability", "robustness, security and safety", and "accountability".

[75] See *infra* Part 4.2.1.

[76] High-Level Expert Group on Artificial Intelligence, "Ethics Guidelines for Trustworthy AI" (European Commission, 2019). See also Thilo Hagendorff, "The Ethics of AI Ethics: An Evaluation of Guidelines", *Minds and Machines* 30, no. 1 (March 2020): 99–120, https://doi.org/10.1007/s11023-020-09517-8.

[77] Moreover, Germany published *Acht Leitlinien für künstliche Intelligenz* (Eight Guidelines for Artificial Intelligence). (22 January 2019), https://www.bvdw.org/fileadmin/bvdw/upload/publikationen/KI/RZ_BVDW_KI_8Prinzipien_ES_20190122.pdf.

[78] "Human-in-the-loop" indicates "the capability for human intervention in every decision cycle of the system". High-Level Expert Group on Artificial Intelligence, "Ethics Guidelines for Trustworthy AI", 16.

[79] "Human-on-the-loop" means "the capability for human intervention during the design cycle of the system and monitoring the system's operation". High-Level Expert Group on Artificial Intelligence, "Ethics Guidelines for Trustworthy AI", 16.

[80] "Human-in-command" refers to "the capability to oversee the overall activity of the AI system (including its broader economic, societal, legal and ethical impact) and the ability to decide when and how to use the system in any particular situation". High-Level Expert Group on Artificial Intelligence, "Ethics Guidelines for Trustworthy AI", 16.

[81] High-Level Expert Group on Artificial Intelligence, "Ethics Guidelines for Trustworthy AI".

2.5. Changes Brought by AI

2.5.1. In General

AI and distributed ledger technologies ("DLTs")[82] are defined as "Corporate Technologies (CorpTech)" as an umbrella term.[83] The doctrine addresses the framework as "incremental/facilitative", "radical/disruptive", and "fundamental/structural".[84] Firstly, "incremental/facilitative" change, which is the first level, refers to facilitating business purposes, namely growth, cost-saving, and other purposes, by technological improvements.[85] Although there is a change in the job roles, it has no effect on the ideology of economic structures.[86] Secondly, "radical/disruptive" transformation, which indicates "the creation of new markets and value networks", is considered a challenger and a substitute, whereas, thirdly, "fundamental/structural" change, which is the third level, means that completely new economic life supersedes traditional institutions and structures.[87]

"Radical/disruptive" change will most likely cause a paradigm shift.[88] For instance, AI software as the director, which is "radical/disruptive" change, may become a norm in the business. If AI as a director makes a mistake and causes corporate loss, there will be the personal liability of the BoD members[89] as per the AI Liability Directive, although it can be argued that AI may be liable itself if it is organised like a commercial company because it will have its own assets. Consequently, "radical/disruptive" change create policy shifts. The replacement of human boards by AI[90] may be given as an example of the "fundamental/structural" change that makes the organisation unrecognisable.[91]

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[82] A distributed ledger is conceptualised as the lack of a central administration and data storage. It is distributed in terms of the authorisation for the recording of data arising from the interaction between the participants. Enriques and Zetzsche, "Corporate Technologies", 62.
[83] Enriques and Zetzsche.
[84] Chiu and Lim, "Technology vs Ideology".
[85] Chiu and Lim, "Technology vs Ideology", 2.
[86] Andrew Keay, "Shareholder Primacy in Corporate Law: Can It Survive? Should It Survive?", *European Company and Financial Law Review* 7, no. 3 (2010): 369–413.
[87] Chiu and Lim, "Technology vs Ideology", 2–3.
[88] Chiu and Lim, 2.
[89] Some human managers may have to monitor AI. There may also be set a limit for the tasks that can be delegated to AI. See Martin Petrin, "Corporate Management in the Age of AI", *SSRN Electronic Journal* 2019, no. 3 (2019): 965–1030, https://doi.org/10.7916/cblr.v2019i3.5118.
[90] Petrin.
[91] Chiu and Lim, "Technology vs Ideology", 3.

2.5.2. Effects of AI on Company Law

All the abovementioned issues denote that AI has an enormous impact on law, especially, within the framework of this research, on company law. The field of AI and company law promptly emerges and becomes important.[92] Jobs automation, agency conflict, auditing processes, the selection of the BoD members, compliance functions, data analytics, and capital allocation can be listed as the areas where AI can be used in companies.[93] Hence, it has an impact on a company's decision-making,[94] and it is important to corporate law. AI is also used to recruit employees,[95] as well as for career counselling.[96] Therefore, AI will not only bring a professional perspective to the company; it will also quicken procedures.[97]

The present functions of AI within organisations involve supporting shareholders and investors through AI-enabled investment and voting decisions, aiding corporate control through AI-assisted auditing and supervision, and assisting directors in making management decisions with the help of AI.[98] Regarding AI in decision-making processes, the tipping point is regarded as the first AI on the BoD.[99] AI has permeated into almost every echelon of the corporation.

AI will have an important function especially on the BoD soon.[100] That is to say, companies and corporate governance are affected by the technological development in AI. As a matter of fact, especially after the Covid-19 Pandemic, AI should be expected to become irreplaceable to the BoDs, even though it may only help decision-making processes.

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[92] Hickman and Petrin, "Trustworthy AI and Corporate Governance", 595.
[93] Ivashkovskaya and Ivaninskiy, "Artificial Intelligence".
[94] Möslein, "Robots in the Boardroom", 2.
[95] Karatepe Kaya, "Dersler", 76.
[96] Karatepe Kaya, "Dersler", 76.
[97] Karatepe Kaya, 78.
[98] Möslein, "Robots in the Boardroom", 19. These are assisted, advisory or "augmented", and autonomous AI respectively. Vegard Kolbjørnsrud, Richard Amico, and Robert Thomas, *The Promise of Artificial Intelligence: Redefining Management in the Workforce of the Future*, 2016; Petrin, "Corporate Management", 980–83.
[99] World Economic Forum, "Deep Shift: Technology Tipping Points and Societal Impact", September 2015, 21, https://ec.europa.eu/futurium/en/system/files/ged/46-wef_gac15_technological_tipping_points_report_2015-toconnected.pdf. The World Economic Forum expects it to take place in 2026. Moreover, by 2025, 45% of respondents think that the tipping point will be reached.
[100] Karatepe Kaya, "Dersler", 71.

Three usages are suggested for AI in company boardrooms: AI as an assistant for the BoD,[101] AI as a director[102] in hybrid, partly human, and partly artificial boards, and AI in substituting[103] human boards.[104] That is to say, AI may be a board member, assist natural person members, or take part in the election of board members.[105] The decision-maker is a human in AI as an assistant, whereas in hybrid boards, the AI supports decision-making, and both the human and the AI learn from each other. Lastly, in an autonomous board, machines replace humans and substitute human intelligence. It is argued that AI is in the auxiliary role for now.[106] However, it is predicted that there will be AI directors, i.e. "robo-directors" in the future.

Moreover, the effect of technologies on corporate purposes is analysed.[107] Some scholars assert that even though technologies[108] have an impact on procedures and governance practices, core functions of the BoD will not become deprecated,[109] whereas others suggest that BoDs will comprise virtual networks of people, who are temporarily invited to the BoD because of their suitable competencies for the company's needs.[110]

Monitoring the management and setting the company strategy are the main functions of the BoD, and therefore, the BoD may consult an AI to perform monitoring tasks, to take decisions such as appointing BoD members or a CEO, to set up executive

[101] See Max Bankewitz, Carl Aberg, and Christine Teuchert, "Digitalization and Boards of Directors: A New Era of Corporate Governance?", *Business and Management Research* 5, no. 2 (12 June 2016): 58, https://doi.org/10.5430/bmr.v5n2p58.
[102] See Martin Petrin, "Corporate Management"; Gramitto Ricci, "Artificial Agents"; Karatepe Kaya, "Dersler"; Eroğlu and Karatepe Kaya, "Board Diversity".
[103] This may lead to self-driving corporations. See Bayern, "Autonomous Systems"; LoPucki, "Algorithmic Entities".
[104] Gramitto Ricci, "Artificial Agents", 895.
[105] Isil Erel et al., "Selecting Directors Using Machine Learning", 2018, 57, https://www.marshall.usc.edu/sites/default/files/2019-03/lea_stern_selecting_directors.pdf; Möslein, "Robots in the Boardroom"; Maria I. Nikishova, "Prospects of Digital Technologies Application in Corporate Governance", 2018, https://scieuro.com/wp-content/uploads/2018/05/86-95.pdf; Armour and Eidenmüller "Self-Driving Corporations?"; Gramitto Ricci, "Artificial Agents"; Gözübüyük, "Yapay Zeka Algoritmaları"; Karatepe Kaya, "Dersler"; Eroğlu and Karatepe Kaya, "Board Diversity".
[106] M.A. Tokmakov, "Corporate Governance Modernization: Legal Trends and Challenges", ed. V. Mantulenko, *SHS Web of Conferences* 71 (2019): 3, https://doi.org/10.1051/shsconf/20197104011.
[107] Bruner concludes that it has not changed. Christopher M. Bruner, "Distributed Ledgers, Artificial Intelligence and the Purpose of the Corporation", *The Cambridge Law Journal* 79, no. 3 (November 2020): 431–58, https://doi.org/10.1017/S0008197320000756.
[108] They are referred to as "CorpTech", which includes big data analytics, AI, machine learning, and DLTs such as blockchains and smart contracts. Enriques and Zetzsche, "Corporate Technologies", 59.
[109] See Enriques and Zetzsche. They argue that traditional corporate governance mechanisms will maintain their core function of restraining agency problems. Enriques and Zetzsche, 62.
[110] Bankewitz, Aberg, and Teuchert, "Digitalization", 58, 59.

pay arrangements, and to approve corporate actions.[111] Although the use of AI by top-level management may not yet have endangered ideologies and principles (including the duties and the accountability of the director and shareholder primacy), it may change human agency and work replacement.[112] In other words, it can be suggested that CorpTech will cause a paradigm shift in companies.

Some scholars, however, suggest that it is unlikely that CorpTech will drastically change the relationship between shareholders and directors.[113] They foresee that although AI with the "incremental/facilitative" characteristic will be willingly adopted by companies in decision-making processes, such as board decisions and general assembly decisions, the possibility of AI replacing the entire BoD is improbable.[114] Hence, self-driving companies[115] may be considered a far-fetched phenomenon.[116] This also means that in the near future, it is unlikely to have a "fundamental/structural" change in company law.

In conclusion, AI has advantages and disadvantages for companies. On the one hand, the positive impacts of AI on companies may be listed as "rational and data-driven decisions", "less bias", elimination of "irrational exuberance", the reconstruction of "old-fashioned bureaucracies", and "job gains and innovation".[117] On the other hand, "accountability, liability and governance", "job losses", "hacking/cybercrime", "increased inequality", and "falling foul of the algorithm" may be classified as the negative impacts of AI.[118]

[111] Assaf Hamdani et al., "Technological Progress and the Future of the Corporation", *Journal of the British Academy* 6, no. s1 (2018), 230, https://doi.org/10.5871/jba/006s1.215.
[112] Chiu and Lim, "Technology vs Ideology", 13.
[113] Chiu and Lim.
[114] Chiu and Lim, 3. They claim that the pace and the logic of AI will only exist in an institutional paradigm. It is also argued that corporate boards will not be superfluous because their functions will remain the same although CorpTech enhances their performances. This situation is defined as "tech nirvana fallacy". Enriques and Zetzsche, "Corporate Technologies", 71.
[115] See Armour and Eidenmüller, "Self-Driving Corporations?".
[116] Chiu and Lim, "Technology vs Ideology", 3.
[117] World Economic Forum, 21.
[118] World Economic Forum, 21.

2.6.The Use of AI in the Management of the Company

2.6.1. AI as a Director

One of the fields where companies can deploy AI is the management. Despite not being intelligent like humans,[119] AI is more successful than people in specialised tasks.[120]

As a matter of fact, there is already a "robo-director"[121] in a company based in Hong Kong. *Vital*[122], which is regarded as a member of the BoD by the company, aims to make recommendations on investment by analysing data.[123] It exercises due diligence in determining which projects are overrated by assessing potential investments and thus protects the company from popular but expensive investments.[124] However, *Vital* is not considered a board member legally, it only has observer status.[125][126] AI cannot be a member in many countries. For instance, although there are some exemptions, the UK does not allow corporate directors.[127] In the US, Delaware requires directors to be human, viz., natural persons.[128] Australia does not permit legal

[119] AI is generally designed for a specific skill. Surden, "Artificial Intelligence and Law", 1309. Human abilities like abstract thinking and comprehension are beyond AI's scope of work. See Jack Krupansky, "Untangling the Definitions of Artificial Intelligence, Machine Intelligence, and Machine Learning", 14 June 2017, https://jackkrupansky.medium.com/untangling-the-definitions-of-artificial-intelligence-machine-intelligence-and-machine-learning-7244882f04c7.

[120] Surden, "Artificial Intelligence and Law", 1308–9.

[121] See Möslein, "Robots in the Boardroom? Artificial Intelligence & Corporate Governance", 3.

[122] Monica Goyal, "Hong Kong VC Firm Appoints AI to Board of Directors", 16 May 2014, https://www.itbusiness.ca/blog/hong-kongvc-firm-appoints-ai-to-board-of-directors/48815.

[123] Rob Wile, "A Venture Capital Firm Just Named An Algorithm To Its Board Of Directors — Here's What It Actually Does" (Business Insider, 13 May 2014), https://www.businessinsider.com/vital-named-to-board-2014-5?IR=T.

[124] "Deep Knowledge Venture's Appoints Intelligent Investment Analysis Software VITAL as Board Member", *GlobeNewswire*, 13 May 2014, https://www.globenewswire.com/news-release/2014/05/13/635881/10081467/en/Deep-Knowledge-Venture-s-Appoints-Intelligent-Investment-Analysis-Software-VITAL-as-Board-Member.html.

[125] Möslein, "Robots in the Boardroom", 2.

[126] It can be claimed that if there is an observation board, AI may also be a part of it.

[127] Although the UK allowed corporate directors, namely companies as board members, for over a century; the Small Business, Enterprise and Employment Act 2015, Section 87 prohibits corporate directors from being members by amending the Companies Act 2006 (Section 156A: Each director to be a natural person). Furthermore, Corporate Transparency and Register Reform White Paper suggests that directors of corporate director entities must all be "natural persons" to have "greater transparency around director's control of companies". Corporate Transparency and Register Reform White Paper: Policy Overview and Response to Final Consultations (London: Dandy Booksellers Ltd, 2022), 72. See also Stephen M. Bainbridge, "Corporate Directors in the United Kingdom", *William&MaryLawReview Online* 59 (2017): 21, https://scholarship.law.wm.edu/wmlronline/vol59/iss1/3.

[128] Delaware General Corporation Law Section 141(b): "The board of directors of a corporation shall consist of 1 or more members, each of whom shall be a natural person…"

persons to become BoD members either.[129] As in the common law legislation, civil law countries such as Germany, Switzerland, and Italy only regulate real persons' membership. India also only allows real-person board members.[130] However, legal persons may be board members in France, Belgium, and the Czech Republic, but there must be a real person representative. In Türkiye, legal entities may become members on their own behalf in accordance with Turkish Commercial Code (TCC) No. 6102 Art. 359 para. 2.

Since many countries stipulate that board members must be real persons, AI cannot participate in management as a BoD member. However, allowing legal persons to be board members is not a solution to AI's membership. Although some of the abovementioned countries such as Türkiye allow a legal person to be a board member, there is no consensus in the literature on the personality of AI. Some scholars believe that AI should have rights, but its legal personality is controversial.[131] There is no AI legislation, and as AI does not have the capacity to act, it is not subject to rights and duties.[132] If AI is given a legal personality, it will be able to become a member of the BoD in the countries that allow members who are legal persons. If a special status is granted to the AI, it will most likely be added to the commercial laws.

Why would companies want to appoint AI as a member? That is to say, it may also be used only as an aid in decision-making. Pugh explains it with the topics of "time, loyalty, and access to information".[133] He regards AI as an independent tiebreaker in any disputes between human members.[134] If AI has the right to vote, human members will have to assert valid reasons to disagree with them; thus, it can bring solutions to groupthink[135] and biases.[136] Nevertheless, AI may be programmed or may "learn" to reflect biases.

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[129] The Corporations Act Section 9. See also Samar Ashour, "Artificial Intelligence in the Boardroom: An Outright Exposure to Directorial Liability?", 12 October 2020, https://www.law.ox.ac.uk/business-law-blog/blog/2020/10/artificial-intelligence-boardroom-outright-exposure-directorial.
[130] The Companies Act, 2013. Section 2(34), Dinesh Kumar, Rajinder Kaur, and Puneetish Kaur, "Legal Analysis of Artificial Intelligence in Corporate Board Rooms", *Turkish Journal of Computer and Mathematics Education* 12, no. 7 (2021): 1515.
[131] Karatepe Kaya, "Dersler", 80.
[132] Gramitto Ricci, "Artificial Agents", 872.
[133] Will Pugh, "Why Not Appoint an Algorithm to Your Corporate Board?", *Slate*, 24 March 2019, https://slate.com/technology/2019/03/artificial-intelligence-corporate-board-algorithm.html.
[134] Pugh.
[135] See *infra* Parts 4.5 and 4.6.
[136] Pugh, "Algorithm".

AI implementation in companies addresses numerous challenges related to managerial accountability. However, it is suggested that it may shift the responsibility to the ones who assign the AI as a manager.[137] The literature has been analysing AI's legal identity and capacity, as well as the issues surrounding liability for damages caused by AI. If AI becomes a board member, the question of who will be liable for the actions of AI should be examined.[138] As per TCC No. 6102 Art. 553, if the members of the BoD of joint-stock companies violate their duties arising from the law and the articles of association, they are liable to the company, shareholders, and company creditors, and their liability is due to the losses incurred. Those who are responsible will be determined by the status granted to the AI. It is worth noting that a distinct Expert Group has been established by the European Commission to assess the existing legal structure regarding liability.[139] In addition, the EU suggests that AI should be granted electronic personhood.[140] Electronic personhood comprises the idea AI has a legal person-like status.[141] It is seen as a solution to the problems of liability caused by AI.[142]

In other words, if an AI that is not legally responsible becomes a BoD member, and afterwards damage occurs, the problem of who will be sued arises.[143] In this case, other managers should not be held responsible.[144] It can also apply to the principle of differentiated solidarity.[145] According to this principle, the member of the BoD is responsible for their own fault. If natural persons establish a company and declare that

[137] Tokmakov, "Corporate Governance Modernization", 3.
[138] Karatepe Kaya, "Dersler", 80–81.
[139] See http://ec.europa.eu/transparency/regexpert/index.cfm?do=groupDetail.groupDetail&groupID=3592.
[140] See "Report with Recommendations to the Commission on Civil Law Rules on Robotics" (European Parliament, 2015).
[141] Gizem Özkan Şahin and Çağatay Şahin, "Yapay Zekalı Varlıklara Elektronik Kişilik Modeli Tanınmasına İlişkin Eurobotics Raporu ve Fikri Mülkiyet Sorunu Bağlamında Meseleye Yaklaşım", *İnönü Üniversitesi Hukuk Fakültesi Dergisi* 13, no. 1 (30 June 2022): 119, https://doi.org/10.21492/inuhfd.981080.
[142] Sergio M. C. Avila Negri, "Robot as Legal Person: Electronic Personhood in Robotics and Artificial Intelligence", Frontiers in Robotics and AI 8 (23 December 2021): 3, https://doi.org/10.3389/frobt.2021.789327.
[143] See *infra* Part 4.2.3.
[144] Karatepe Kaya, "Dersler", 82.
[145] See Himmet Koç, "Anonim Şirket Yönetim Kurulu Üyelerinin Farklılaştırılmış Teselsül İlkesi Uyarınca Sorumluluklarına Genel Bir Bakış", *NEÜHFD* 3, no. 1 (2020): 62–82.

every legal action is determined by an independent system, they can take advantage of the company for their own, whether good or bad, legal purposes.[146]

In conclusion, it can be claimed that AI cannot be a member of the BoD in the current situation because its legal status has not yet been determined. However, it can be argued that the bottom line is who is liable for AI's flaws. It is argued that board members should have no liability for a technical failure or error in the AI.[147] In this case, professional liability insurance may solve this problem.[148] Nonetheless, liability insurance should not be regarded as an institution that directly eliminates the liability of the members of the BoD.[149] The function of this insurance emerges in the compensation for damage; that is, even though liability arises as a result of the damage caused by the wrongful act of the member, the member's risk of paying compensation is eliminated.[150] In other words, in this case, if the AI member causes damage, it can be claimed that at least the damage will be covered. Although there is still no solution for who will be liable, the loss will be compensated thanks to the premiums paid by the company.

2.6.2. AI-Assisted Decision-Making

This section analyses the use of AI in supporting management decisions, as opposed to exploring the concept of "robo-directors". Almost all establishments benefit from AI in their decision-making processes.[151] AI is actually an essential element for all enterprises, not an option.[152] Since AI surpasses humans in performing tasks, it is observed in most of the decision-making processes.[153] It will help the management complete tasks in a shorter amount of time with efficiency. Since directors have generally limited time,[154] using AI in these processes helps directors save time. For

[146] Bayern, "Autonomous Systems", 99, 101. Thus, in the event that a natural person established and resigned from the company, an LLC with no human members would be established by taking advantage of the loophole in the US business entity law. See Bayern, "Bitcoins".
[147] Laptev and Feyzrakhmanova, "Current Trends- Future Prospects", 13.
[148] Karatepe Kaya, "Dersler", 83. In Türkiye, D&O liability insurance is regulated in TCC No. 6102 Art. 361.
[149] Murat Yusuf Akın and Muhammed Sulu, "Yönetim Kurulu Üyelerinin Menfaati ile Şirket Menfaatinin Çatışması Bağlamında Sorumluluk", *Marmara Üniversitesi Hukuk Fakültesi Hukuk Araştırmaları Dergisi* 25, no. 1 (28 June 2019): 181, https://doi.org/10.33433/maruhad.583680.
[150] Akın and Sulu, 181.
[151] Eric Colson, "What AI-Driven Decision Making Looks Like", *Harvard Business Review*, 8 July 2019, https://hbr.org/2019/07/what-ai-driven-decision-making-looks-like.
[152] Eroğlu and Karatepe Kaya, "Board Diversity", 3.
[153] Eroğlu and Karatepe Kaya, 3.
[154] Pugh, "Algorithm".

instance, Cloverleaf and PineStem, which behave like HR, can be given as examples of AI-based governance tools.[155]

IBM uses the terms "cognitive computing" and "augmented intelligence" instead of the term AI to demonstrate that programmes will not replace humans but make them efficient in performing tasks in line with data-driven decision-making.[156] Several applications of AI in corporations are highlighted, such as "information and communication management, investor profiling, product development, monitoring, profitability, risk, and compliance, and decision-making regarding corporate strategy, investment, personnel selection, procurement, manufacturing planning and control, pricing, sales, and marketing".[157]

Akın argues that the fact that AI cannot be a member of the BoD is not only due to legal regulations but also due to its structure. While BoD takes decisions according to the conditions of the situation, AI only takes them based on the data presented to it.[158] Consequently, in the first place, it should be regarded as an advisor to the board.[159] Presenting the collected data to the BoD, AI will contribute to healthier decision-making processes.[160] However, there should be no faulty AI algorithms. Otherwise, since the result will be wrong, the BoD's liability may arise because AI does not yet have full responsibility. Hence, the BoD has a fiduciary responsibility to the company in deciding to use AI, choosing an appropriate AI according to the nature of the job, and overcoming other issues.[161]

In some cases, AI makes discriminatory decisions because it uses data[162] and "learns" discrimination from humans.[163] Hence, it can be claimed that there is a risk

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[155] Laptev and Feyzrakhmanova, "Current Trends- Future Prospects", 13.
[156] Kaplan and Haenlein, "Siri", 23.
[157] Armour and Eidenmüller, "Self-Driving Corporations?", 96.
[158] Akın, "Dijital Gelişmeler", 19.
[159] Akın, 19–20.
[160] Akın, 20.
[161] See *infra* Part 4.2.3.
[162] Shlomit Yanisky-Ravid and Sean K Hallisey, "'Equality and Privacy by Design': A New Model of Artificial Intelligence Data Transparency via Auditing, Certification, and Safe Harbor Regimes", *Urban Law Journal* 46, no. 2 (n.d.): 444. The data are often flawed, allowing the algorithms to inherit the biases of the programmers or the decision-makers. Solon Barocas and Andrew D. Selbst, "Big Data's Disparate Impact", *SSRN Electronic Journal*, 2016, https://doi.org/10.2139/ssrn.2477899.
[163] Frederik Zuiderveen Borgesius, "Discrimination, Artificial Intelligence, and Algorithmic Decision-Making", 2018, 31, https://rm.coe.int/discrimination-artif%20icial-intelligence-and-algorithmic-decision-making/1680925d73. For example, Google Translate translates gender-neutral Turkish pronouns into English as follows: *"O bir doktor. O bir hemşire."* "He is a doctor. She is a nurse.",

of discrimination even if AI is consulted. In principle, AI is objective, impartial, and without prejudice.[164] However, this does not necessarily mean that every decision is unbiased and non-discriminatory.[165] The possible discriminatory outcomes are due to the composition of biased input data.[166] For instance, software programmed to foresee potential criminals is biased against blacks.[167] Furthermore, Microsoft's AI bot "Tay", which was chatting with people on several social media platforms, instantly became racist and genocidal.[168] This shows how easily AI may become a means of maintaining partiality in various areas, including the member selection of BoDs, which will be analysed in the next section.[169]

Regarding the possibility of discrimination by AI, there should also be diversity in the programmers of the AI. In fact, the Guidelines suggest that the AI designing teams should be diverse in terms of gender, age, culture, and background.[170] It can be claimed that if the team is diverse in terms of *habitus*[171], it will reduce discrimination. Nonetheless, algorithms may act independently of the instructions initially provided by programmers; hence, even though there is no flaw in design or execution, the AI may commit an error.[172]

Hybrid boardrooms may reduce the possibility of AI taking wrong or discriminatory decisions, as people will also participate in decision-making processes. Therefore, it needs to be analysed if human members overtrust AI's decisions. The fact

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Aylin Caliskan, Joanna J. Bryson, and Arvind Narayanan, "Semantics Derived Automatically from Language Corpora Contain Human-like Biases", *Science* 356, no. 6334 (2017): 4, https://doi.org/10.1126/science.aal4230.

[164] Michael Haenlein and Andreas Kaplan, "A Brief History of Artificial Intelligence: On the Past, Present, and Future of Artificial Intelligence", *California Management Review* 61, no. 4 (August 2019): 6, https://doi.org/10.1177/0008125619864925.

[165] An algorithm, which comprises instructions, is not an "impartial" tool and aids the programmers to solve a problem as per their preferences. Hence, conflicts of interest may arise. Enriques and Zetzsche, "Corporate Technologies", 80.

[166] Haenlein and Kaplan, "Artificial Intelligence", 6–7.

[167] Julia Angwin et al., "Machine Bias: There's Software Used across the Country to Predict Future Criminals. And It's Biased against Blacks.", *ProPublica*, 23 May 2016, https://www.propublica.org/article/machine-bias-risk-assessments-in-criminal-sentencing.

[168] Abby Ohlheiser, "Trolls Turned Tay, Microsoft's Fun Millennial AI Bot, into a Genocidal Maniac", *The Washington Post*, 25 March 2016, https://www.washingtonpost.com/news/the-intersect/wp/2016/03/24/the-internet-turned-tay-microsofts-fun-millennial-ai-bot-into-a-genocidal-maniac/.

[169] See *infra* Part 2.6.3.

[170] Guidelines, 23.

[171] As Bourdieu views it, it refers to the social, identitary, and cognitive disposition. See Pierre Bourdieu, *Language and Symbolic Power*, 1. publ. in paperb., repr (Cambridge: Polity Press, 1991).

[172] Emiliano Marchisio, "In Support of 'No-Fault' Civil Liability Rules for Artificial Intelligence", *SN Social Sciences* 1, no. 2 (February 2021): 5, https://doi.org/10.1007/s43545-020-00043-z.

that AI has analysed the data does not automatically imply that human members should directly obey its decision. Consequently, it can be suggested that AI should express its opinion after the other members so as not to influence them. However, it can also be suggested that AI can guide the board if it shares its opinion before discussing the decision.

2.6.3. AI in the Appointment of Board Members

Another area where AI can be deployed in management is assisting the selection of board members.[173] When the shareholders found a company, or foreign investors invest in a company, they have a shareholders' agreement. As per TCC No. 6102 Art. 360/1, shareholders may offer candidates to the board if it is regulated in the articles of association. In this case, AI may appoint members from the candidates.[174]

It can be argued that AI as an assistant in the appointment of members is a use more possible than AI as a member itself. It is also clear that it will contribute to current corporate governance discussions, particularly to board diversity.[175] The better performance directors display, the more developments in corporate governance are to be observed.[176] It is deduced that companies with weak corporate governance appoint non-suitable directors, who are generally male,[177] show dictatorial leadership qualities, and have larger networks that may benefit them in being appointed; hence, improving corporate governance using AI is possible.[178] This will benefit companies in producing sustainable policies.[179]

As a result of AI evaluation, equipped and professional people who meet the necessary criteria will be directors. When choosing a director, AI will process and learn from data about the characteristics of people who were previously appointed as directors. Thus, it will know the attributions that a good director should have. However, it can be argued that there will be a problem in terms of diversity caused by

[173] Chiu and Lim, "Technology vs Ideology", 12; Laptev and Feyzrakhmanova, "Current Trends- Future Prospects", 12. Erel et al. claim that AI can be used in managerial selection and thus may help companies improve their governance. See Erel et al., "Selecting Directors Using Machine Learning", 18 June 2021.
[174] TCC No. 6012 Art. 360 regulates the representation of certain classes on the BoD. In this way, specific classes are represented on the board. Furthermore, the represented shares will be deemed privileged ones.
[175] See *infra* Part 4.6.
[176] Erel et al., 18 June 2021.
[177] For the discussion of AI's contribution to gender diversity, see *infra* Part 4.6.
[178] Erel et al..
[179] Karatepe Kaya, "Dersler", 92.

the ongoing uniformity among directors; namely, AI may select people who fit the definition of white males.[180] For this reason, data to be included in it should also be diverse, so as not to be like biased AI[181] that chooses black people as potential criminals. Alternatively, the features that are close to the characteristics of the directors to be selected in a company can be loaded as data to be learned by AI. Thus, again, the director will be chosen following what people want, and the demand for AI to be useful by choosing objectively will not be achieved.

At this juncture, it is necessary to mention the human relations that are considered instead of objective criteria in recruitment.[182] Persons with similar backgrounds (*habitus*) and characteristics[183] are selected by the company. Although those who are well-respected and have political, business, and academic influences are generally appointed as directors at the largest corporations, they may not be experts in the business field of the corporation.[184] Regarding this issue, some scholars claim that algorithms surmount the detrimental impacts of cognitive biases,[185] whereas others argue that they may codify or aggravate existing biases.[186] Pursuant to the latter idea, the choices made by the AI are different from the usual choices; namely, the non-traditional candidates are chosen.[187] This indicates that in recruitment, human characteristics are taken into consideration, while AI may be focusing on choosing more appropriate and professional people.[188] On the other hand, looking at the directors selected by AI, it is clear that the number of women ones has increased.[189]

[180] See *infra* Part 4.6.
[181] Angwin et al., "Machine Bias".
[182] Rivera's research demonstrates homophily in hiring. It can be argued that employers seek candidates who have similar *habitus*. See Lauren A Rivera, "Hiring as Cultural Matching: The Case of Elite Professional Service Firms" (2012) 77 American Sociological Review 999 <http://journals.sagepub.com/doi/10.1177/0003122412463213> accessed 3 November 2022.
[183] The hiring practices of investment banks are examined by Rivera. She concludes that recruiters overestimate compatibleness, which is not necessarily a needed feature for employees to have. Rivera, "Hiring as Cultural Matching".
[184] Pugh, "Algorithm". Pugh gives Apple's and Tesla's BoDs as examples of BoDs that include non-expert members.
[185] Cass R Sunstein, "Algorithms, Correcting Biases", *Social Research: An International Quarterly* 86, no. 2 (2019): 499.
[186] See Bo Cowgill, "Bias and Productivity in Humans and Algorithms: Theory and Evidence from Résumé Screening", 21 March 2020, 35, https://conference.iza.org/conference_files/MacroEcon_2017/cowgill_b8981.pdf.
[187] Cowgill.
[188] Karatepe Kaya, "Dersler", 93.
[189] Erel et al., "Selecting Directors Using Machine Learning", 18 June 2021.

Hence, it should be perceived that AI is of great significance to board diversity, which will be analysed in the section on corporate governance.[190]

2.7. AI and External Audit

2.7.1. Audit

Another topic related to corporate law is auditing.[191][192] Auditing is the process designed to emphasise strengths and weaknesses of the way a company is operated. Examining performance and accountability ensure that the company has transparency and fairness in its organisation.[193] The concept of audit has a vital role in achieving them.

Auditing is regarded as a governance mechanism that guarantees the disclosure of accounting information and prevents conflicts between the shareholders and the management.[194] The primary objective of the audit is to ensure adequate disclosure of the financial status of the company.[195] Consequently, the information asymmetry between the management, shareholders, and creditors would diminish.[196] Furthermore, management frauds and scandals necessitate controlling mechanisms.[197] In a nutshell, auditing helps the company operate in line with the tenets of corporate governance.

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[190] See *infra* Part 4.6.

[191] For audit practice area, see Ali S. Naqvi, *Artificial Intelligence for Audit, Forensic Accounting, and Valuation: A Strategic Perspective*, 1. (Hoboken: Wiley, 2020).

[192] Auditing is divided into three categories, namely internal audit, external audit, and public audit, according to who performs it. Internal audit, which generally performs accounting and financial audits, is the type of audit established by the BoD, whereas external audit is the audit performed by persons and institutions authorised from outside the company. Finally, the public audit is broader in content and the audit is carried out by the people assigned by the public authority. The main difference between them is the identity of the people who conduct the examination, which is the determining factor whether the process is internal, external, or public audit. Whereas internal audit, as its name suggests, is conducted by individuals operating within the company in question, external audit is performed by people who are outside the company. Internal audit analyses the company's internal controls, especially its accounting and corporate governance. Its scope is specified by the management. Furthermore, the audit report is presented to the management. Internal audit aims to discover the faults and forgeries and protect the company. As it is internal, it can be argued that it personalises the process of audit. This will benefit the company in terms of improving its corporate governance because the audit body will know the company well. However, internal audit cannot be free from the company's influence. Therefore, it can be claimed that the reports of the audit cannot be completely objective. This will hinder the success of the company.

[193] Harlow Keith, "Role of an External Auditor in Corporate Governance", *Chron*, 2021, https://work.chron.com/role-external-auditor-corporate-governance-27754.html.

[194] Joseph V. Carcello, Dana R. Hermanson, and Zhongxia (Shelly) Ye, "Corporate Governance Research in Accounting and Auditing: Insights, Practice Implications, and Future Research Directions", *AUDITING: A Journal of Practice & Theory* 30, no. 3 (1 August 2011): 1–31, https://doi.org/10.2308/ajpt-10112.

[195] Kirkos, Spathis, and Manolopoulos, "Audit-Firm Group Appointment", 1.

[196] Kirkos, Spathis, and Manolopoulos, 1.

[197] Kirkos, Spathis, and Manolopoulos, 1.

Auditing includes evaluating partnership activities in a way that protects shareholders and creditors.[198] While in the narrow sense, it is examined whether the BoD transactions and company accounts comply with the relevant legislation, in the broad sense, limitations that restrict the will of the company, including individual rights and minority rights, are analysed.

2.7.2. External Audit

External audit is a procedure in which an independent body investigates the financial statements of a business. It seeks to ascertain the conditions and operations of a company within a specific period. The main aim is to demonstrate an honest and accurate view of the accounting statements. Thus, it ensures an audit that is free from the company's influence. Since it is independent, it provides the company with the primary protection of its corporate governance.[199] That is to say; external audit is valuable to ensure the separation of powers.

As mentioned before, auditing is essential in corporate governance. It can be argued that whether the company complies with corporate governance principles and the reflections of the results can be understood by auditing. The audit must also be carried out as per corporate governance principles.[200] That is, it should be performed in accordance with transparency, fairness, accountability, and responsibility.[201] The main roles of the external audit are as follows: Protecting shareholders' interests by representing them in the company is one of the principal roles of external audit.[202] External audit helps shareholders with ensuring that the BoD and the management consider their interests. External audit protects the interests of shareholders because it is independently conducted. It promotes accountability by offering policies and measures.[203] Moreover, it assists the company with conducting risk assessment and mitigation planning.[204] External auditing produces crisis management plans for the company to use in the events of corruption and fraud. External auditors assess the

[198] Cafer Eminoğlu, *Türk Ticaret Kanunu'nda Kurumsal Yönetim (Corporate Governance)*, 1. (Istanbul: On İki Levha Yayıncılık A.Ş., 2014), 314.
[199] Keith, "External Auditor".
[200] Eminoğlu, *Corporate Governance*, 314.
[201] See *infra* Chapter 4.
[202] Dilan Durmuş, "Kurumsal Yönetimde Bağımsız Denetimin Rolü ve Hukuki Esasları" (Master's thesis, Gaziantep University, 2019), 46.
[203] Durmuş, 46, 47–48. See also *infra* Part 4.2.3.
[204] Durmuş, 46.

organisation of the company and whether it complies with the regulations or not.[205] Last but not least, external auditing aids the company in finding areas in which the company should take measures. Thus, the processes may be tightened to prevent unproductiveness and decrease waste. Therefore, external auditors may advise the key decision-makers to develop internal control.

2.7.3. Effects of AI on External Audit

Although automation in auditing is an old idea and has been used for some time, it may be asserted that AI will affect the area of auditing more because of further technological developments.[206] AI is good at matching patterns and automating processes; hence, one may imagine circumstances where AI substitutes for humans in the future.[207] Above all, what needs to be highlighted is the position and the role of digitalisation in auditing, or possibly of a particular non-human auditor thereof, within the audit, which has been rapidly automatised. Nevertheless, it is argued that the need for human auditors will not disappear soon.[208] Instead, AI will affect the auditor profile,[209] that is, the requirements in the auditor's job descriptions.[210] This indicates that AI may contribute to new job opportunities rather than replacing humans.[211] Therefore, the effects of AI in auditing are as follows: Positive impacts of AI in auditing may be listed as "cost reductions", "unlocking innovation", and

[205] See *infra* Part 4.5.

[206] Julia Kokina and Thomas H. Davenport, "The Emergence of Artificial Intelligence: How Automation Is Changing Auditing", *Journal of Emerging Technologies in Accounting* 14, no. 1 (1 March 2017): 115, https://doi.org/10.2308/jeta-51730.

[207] World Economic Forum, "Deep Shift: Technology Tipping Points and Societal Impact", 22.

[208] Harriet Agnew, "Auditing: Pitch Battle", *Financial Times*, 9 May 2016, https://www.ft.com/content/268637f6-15c8-11e6-9d98-00386a18e39d. However, the World Economic Forum expects that by 2025, 30% of corporate audits will be performed by AI. World Economic Forum, "Deep Shift: Technology Tipping Points and Societal Impact", 22.

[209] The auditor should be able to analyse, process, and interpret the data provided by digital technologies. Riadh Manita et al., "The Digital Transformation of External Audit and Its Impact on Corporate Governance", *Technological Forecasting and Social Change* 150 (January 2020): 7, https://doi.org/10.1016/j.techfore.2019.119751.

[210] The audit firms most likely seek "soft" skills, namely nontechnical skills, rather than "hard", such as technical computer, software skills. See, Kelvin Law and Michael Shen, "How Does Artificial Intelligence Shape Audit Firms?", *Nanyang Business School Research Paper*, no. 20–31 (12 July 2020), https://ssrn.com/abstract=3718343 or http://dx.doi.org/10.2139/ssrn.3718343.

[211] It can be argued that AI creates new auditing jobs. See, Cindy Greenman, "Exploring the Impact of Artificial Intelligence on the Accounting Profession", *Journal of Research in Business, Economics and Management* 8, no. 3 (2017): 1453, http://scitecresearch.com/journals/index.php/jrbem/article/view/1063; Reem Solaimani et al., "The Impact of Artificial Intelligence on Corporate Control", *Corporate Ownership and Control* 17, no. 3 (2020): 171–78, https://doi.org/10.22495/cocv17i3art13. For the opposing view, see Bhumi Jariwala, "Exploring Artificial Intelligence & the Accountancy Profession: Opportunity, Threat, Both, Neither?", *International Federation of Accountants*, 1 June 2015. It can be claimed that AI will affect jobs based on automated tasks.

"opportunities for small businesses and start-ups", whereas negative impacts are perceived to be "job losses", "accountability and liability problems", and "the changes to legal and financial disclosure".[212]

2.7.4. Possible Uses of AI in External Audit

2.7.4.1. In General

The auditor is one of the most important elements of external auditing; hence, her/his required qualifications are essential to corporate governance.[213] For instance, the auditor's duty of confidentiality[214] may be fulfilled by an AI auditor, which, of course, protects the data in itself. Furthermore, analysing the entire set of data necessitates so much time that traditional audit relies only on sample-based testing.[215] Since, nowadays, there are more data to examine, traditional methods fall behind. Hence, the need for CorpTech, particularly AI, has increased. Thus, AI can be deployed in the process of audit and become the auditor itself. Thanks to AI, company ledgers will no longer need to be vouched for by high-priced auditors.[216] Moreover, with real-time accounting[217], there may not be a need for relying on auditing; instead, the certainty of data will prevail.[218]

Internally, AI provides various tasks to be performed better, faster, and cheaper. In contrast, externally, it affects the company's relationship with stakeholders, such as other firms, customers, and society in general.[219] Effective technologies also affect the external auditing process. CorpTech provides the external audit with a proactive and progressive approach.[220] It affects not only the way auditors work but also how audit firms operate.[221]

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[212] World Economic Forum, "Deep Shift: Technology Tipping Points and Societal Impact", 22.
[213] Eminoğlu, *Corporate Governance*, 321.
[214] TCC No. 6102 Articles 404 and 527 regulate the auditor's duty of confidentiality.
[215] Brennan, Flynn, and Baccala, "Audit"; Anusree Mohan, "Evolving Technologies in the External Audit Industry", *Beroe Inc*, 8 March 2020, https://www.beroeinc.com/blog/evolving-technologies-external-audit-industry/; Gultom Juan Barus et al., "Reciprocal Use of Artificial Intelligence in Audit Assignments", Journal of Accounting, Business and Finance Research 11, no. 1 (2021): 11 https://doi.org/10.20448/2002.111.9.20.
[216] Yermack, "Corporate Governance and Blockchains", 24.
[217] Instead of depending on the audit, Blockchain technology, which will be examined in the section on blockchain, may also be used. See Yermack, "Corporate Governance and Blockchains".
[218] Yermack, 24.
[219] Kaplan and Haenlein, "Siri", 22.
[220] Mohan, "External Audit".
[221] Mohan.

AI-assisted audit[222] and supervision may refer to assisting corporate control.[223] The external auditor restrains the management's fraudulent behaviour and its ability to conceal the financial situation of the company.[224] Therefore, AI may contribute to the audit process in case the human auditor has ulterior motives.

Tasks that were performed manually in the past have actually been carried out with the help of technology for a while.[225] That is, automation is an old concept[226] that has existed in auditing for many years.[227] Moreover, various auditing companies operate with the help of AI instead of manual methods that were previously used.[228] Garbelman Winslow CPAs, an accounting firm, adopts MindBridge Ai Auditor™, which is an audit analytics software.[229] AI examines and identifies risky transactions and groups them as high risk, medium risk, and low risk.[230] In addition, it is observed that AI is deployed[231] for appointments of auditors, as in the BoD members. AI as an appointer provides audit firms with finding the right auditor at a reasonable price.[232] Thus, appointment of auditors is considered important, especially regarding audit quality due to the AI's ability to find competent auditors.

[222] AI may also be used to predict bankruptcy. Amelia A. Baldwin, Carol E. Brown, and Brad S. Trinkle, "Opportunities for Artificial Intelligence Development in the Accounting Domain: The Case for Auditing", *Intelligent Systems in Accounting, Finance and Management* 14, no. 3 (July 2006): 81, https://doi.org/10.1002/isaf.277; Zemánková, "Audit and Accounting", 570. See also Nora Muñoz-Izquierdo et al., "Is the External Audit Report Useful for Bankruptcy Prediction? Evidence Using Artificial Intelligence", *International Journal of Financial Studies* 7, no. 2 (8 April 2019): 20, https://doi.org/10.3390/ijfs7020020.

[223] Möslein, "Robots in the Boardroom? Artificial Intelligence & Corporate Governance", 3.

[224] Stuart L. Gillan and John D. Martin, "Corporate Governance Post-Enron: Effective Reforms, or Closing the Stable Door?", *Journal of Corporate Finance* 13, no. 5 (December 2007): 929–58, https://doi.org/10.1016/j.jcorpfin.2007.03.008.

[225] Agnew, "Auditing: Pitch Battle"; Jon Raphael, "How Artificial Intelligence Can Boost Audit Quality", *CFO*, 15 June 2015, https://www.cfo.com/accounting-tax/2015/06/artificial-intelligence-can-boost-audit-quality/.

[226] C. L. Keenoy, "The Impact of Automation on the Field of Accounting", *The Accounting Review* 33, no. 2 (1958): 230–36, http://www.jstor.org/stable/241233.

[227] Likewise, AI has also been used in auditing for a while now. Researchers considered AI methodologies for decision-making problems in the audit. See Rayman D. Meservy, Eric L. Denna, and James V. Hansen, "Application of Artificial Intelligence to Accounting, Tax, and Audit Services: Research at Brigham Young University", *Expert Systems with Applications* 4, no. 2 (January 1992): 213–18, https://doi.org/10.1016/0957-4174(92)90112-6.

[228] Mohan, "External Audit".

[229] Kim Allen, "Garbelman Winslow CPAs Adopt MindBridge Ai Auditor™", *Allenvision Inc*, 21 November 2017, https://allenvisioninc.com/garbelman-winslow/.

[230] Mohan, "External Audit".

[231] For the AI methods used for auditor procurement, see Kirkos, Spathis, and Manolopoulos, "Audit-Firm Group Appointment".

[232] Kirkos, Spathis, and Manolopoulos, 2.

The doctrine on the audit usually emphasises the potential benefit and challenges of AI in auditing.[233] Furthermore, the literature generally examined AI as an assistant to auditing,[234] that is, few researchers analyse AI as an auditor. For instance, some scholars deem that AI will eventually replace humans in auditing,[235] while others claim that it will not displace human workforce.[236] Nevertheless, distinctions such as AI as an auditor and AI as an assistant may be made here.[237]

2.7.4.2. AI as a Decision Aid

Since auditors are not knowledgeable about everything, they generally consult experts.[238] Although firms have started to deploy AI for this purpose,[239] auditors still trust human experts more than AI experts.[240] It is suggested that auditors think of "Assisted AI" and "Augmented AI" as adaptable to auditing, whereas "Autonomous AI" systems are considered too complicated to use.[241] In addition, "Autonomous AI" is underestimated by auditors and recognised as not useful to the audit.[242] Nevertheless, the audit profession believes that AI will enhance the procedure[243] and accelerate various parts of the audit process.[244] If the audit is conventionally or traditionally conducted without using technologies, the auditor may be faced with impediments in objectively evaluating the data.[245] Hence, AI executes both structured and unstructured

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[233] Ravi Chandra Seethamraju and Angela Hecimovic, "Impact of Artificial Intelligence on Auditing - An Exploratory Study", *AMCIS 2020 Proceedings* 8 (2020): 2.
[234] "AI performs what the auditor demands; nothing more, nothing less." Brennan, Flynn, and Baccala, "Audit". Auditors may enhance their technical skills through the assistance of AI in the company. Nora Azima Noordin, Khaled Hussainey, and Ahmad Faisal Hayek, "The Use of Artificial Intelligence and Audit Quality: An Analysis from the Perspectives of External Auditors in the UAE", *Journal of Risk and Financial Management* 15, no. 8 (31 July 2022): 12, https://doi.org/10.3390/jrfm15080339.
[235] Anastassia Fedyk et al., "Is Artificial Intelligence Improving the Audit Process?", *Review of Accounting Studies* 27, no. 3 (September 2022): 938–85, https://doi.org/10.1007/s11142-022-09697-x.
[236] Mohan, "External Audit".
[237] See also *supra* Part 2.6.
[238] Benjamin P. Commerford et al., "Man Versus Machine: Complex Estimates and Auditor Reliance on Artificial Intelligence", *Journal of Accounting Research* 60, no. 1 (1 March 2022): 173, https://doi.org/10.1111/1475-679X.12407.
[239] In fact, auditors have been using technology, especially artificial intelligence, for many years. See William R. Kinney, "Audit Technology and Preferences for Auditing Standards", *Journal of Accounting and Economics* 8, no. 1 (March 1986): 73–89, https://doi.org/10.1016/0165-4101(86)90011-X; James V. Hansen, James B. McDonald, and James D. Stice, "Artificial Intelligence and Generalized Qualitative-Response Models: An Empirical Test on Two Audit Decision-Making Domains", *Decision Sciences* 23, no. 3 (May 1992): 708–23, https://doi.org/10.1111/j.1540-5915.1992.tb00413.x.
[240] Commerford et al., "Man Versus Machine".
[241] Ibrahim Albawwat and Yaser Al Frijat, "An Analysis of Auditors' Perceptions towards Artificial Intelligence and Its Contribution to Audit Quality", *Accounting*, 2021, 755–62, https://doi.org/10.5267/j.ac.2021.2.009.
[242] Albawwat and Al Frijat.
[243] Commerford et al., "Man Versus Machine".
[244] Raphael, "Audit Quality".
[245] Juan Barus et al., "Artificial Intelligence in Audit", 9.

data analysis and advanced analysis to comprehend possible risks and projected assets.[246] Auditors may also benefit from AI in designing audit work. Nevertheless, it can be argued that existing AI technology is unlikely to reconstruct auditing roles in the near future.[247]

The fact that the data are in volumes complicates them for the auditor's examination, and auditing involves various time-consuming repetitive tasks, such as data acquisition;[248] hence, AI and data analytics are suitable for the audit.[249] If AI performs repetitive tasks such as process-driven assignments and bookkeeping, auditors may concentrate on higher-value tasks,[250] because audit tasks necessitate sample selection, evaluation, decision-making,[251] and other activities.[252] In the case that AI obtains and processes data and identifies anomalies[253] in them,[254] it would facilitate auditing of all the data and ease the workload.[255] Consequently, the auditor may concentrate on improving quality by assessing advanced analytics, having more time to exercise professional judgement, and being more insightful.[256]

[246] Juan Barus et al., 10.
[247] Solaimani et al., "Artificial Intelligence".
[248] Brennan, Flynn, and Baccala, "Audit".
[249] Kokina and Davenport, "Artificial Intelligence", 116.
[250] "Digital Darwinism: Thriving in the Face of Technology Change" (The Association of Chartered Certified Accountants, 2013), 56–57, https://www.accaglobal.com/us/en/technical-activities/technical-resources-search/2013/october/digital-darwinism.html; Jeanne Boillet, "Why Success with AI in the Audit Starts with Asking the Right Questions", *EY*, 17 June 2019, https://www.ey.com/en_gl/assurance/why-success-ai-audit-starts-with-asking-right-questions; Zemánková, "Audit and Accounting"; Solaimani et al. "Artificial Intelligence".
[251] Mohan, "External Audit".
[252] Zemánková, "Audit and Accounting", 569.
[253] AI benefits auditing in comprehending the entirety of the ledgers and detecting anomalies based on risk, not rules. Mohan, "External Audit".
[254] Machine learning may be deployed to recognise, extract, and process values from the various documents usually attached to a confirmation, automatically verifying the transaction without the intervention of the auditor. Moreover, natural language processing technology may assist the system with independently handling anomalies and exceptions by reading and understanding textual responses from the other parties and recommending suitable action. Raphael, "Audit Quality".
[255] Brennan, Flynn, and Baccala, "Audit".
[256] Raphael, "Audit Quality". In addition, since AI has a problem-solving feature, it may set an example to the auditors in their education, that is to say, AI may be a good asset in auditor education. See Nitaya Wongpinunwatana, Colin Ferguson, and Paul Bowen, "An Experimental Investigation of the Effects of Artificial Intelligence Systems on the Training of Novice Auditors", *Managerial Auditing Journal* 15, no. 6 (1 August 2000): 306–18, https://doi.org/10.1108/02686900010344511.

AI as a decision aid not only enhances efficiency and effectiveness but also has other potential results:[257][258] Reducing audit fees,[259] optimising the audit process,[260] better performing audit tasks, that is, improving audit quality,[261] and increasing the productivity of the company[262] may be given as examples of the benefits of AI.[263] With AI in auditing, clients' and other stakeholders' trust would grow because AI will ensure the credibility of the audit.[264] However, algorithms used in auditing should reflect the outputs that dispense an accurate and honest view of reality because decisions taken by biased algorithms may cause reputational and financial damage to the shareholders and the investors.[265]

AI also improves financial reporting accountability and aids auditors in making reliable decisions.[266] That is to say, AI may help decision-makers take better decisions and evade legal liability.[267] However, it may also cause auditor difficulties because of overreliance.[268] Furthermore, AI-aided techniques[269] may confuse the auditor because they are too complex and involve various criteria.[270] Accordingly, it can be asserted that AI as an auditor eliminates these problems.

[257] Baldwin, Brown, and Trinkle, "Auditing", 79.
[258] There may be negative results, that is, audit companies may confront the challenges such as the conservative approach to the external regulatory body and the perceived legal and reputational risk of the audit that restricts the use of AI. Seethamraju and Hecimovic "Auditing".
[259] Fedyk et al., "Audit Process". However, Eulerich et al. find that CorpTech is related to higher audit costs. Marc Eulerich et al., "The Impact of Audit Technology on Audit Task Outcomes: Evidence for Technology-Based Audit Techniques", *SSRN Electronic Journal*, 13 October 2022, https://ssrn.com/abstract=3444119 or http://dx.doi.org/10.2139/ssrn.3444119.
[260] Manita et al., "External Audit".
[261] Raphael, "Audit Quality"; Kuang-Hua Hu et al., "Identifying Key Factors for Adopting Artificial Intelligence-Enabled Auditing Techniques by Joint Utilization of Fuzzy-Rough Set Theory and MRDM Technique", *Technological and Economic Development of Economy* 27, no. 2 (7 September 2020): 459–92, https://doi.org/10.3846/tede.2020.13181; Manita et al., "External Audit"; Seethamraju and Hecimovic, "Auditing"; Fedyk et al., "Audit Process".
[262] Solaimani et al., "Artificial Intelligence".
[263] Eulerich et al., "Audit Technology", 1.
[264] Juan Barus et al., "Artificial Intelligence in Audit".
[265] Zemánková, "Audit and Accounting", 577.
[266] Hu et al., "Artificial Intelligence-Enabled Auditing".
[267] Baldwin, Brown, and Trinkle, "Auditing", 79.
[268] Baldwin, Brown, and Trinkle, 79.
[269] For a bibliometric analysis of the level of digital technologies used by the auditors, see Rita Lamboglia et al., "Exploring the Relationship between Audit and Technology. A Bibliometric Analysis", *Meditari Accountancy Research* 29, no. 5 (21 September 2021): 1233–60, https://doi.org/10.1108/MEDAR-03-2020-0836.
[270] Hu et al., "Artificial Intelligence-Enabled Auditing", 466.

2.7.4.3. AI as an Auditor

Regarding the audit in Türkiye, there is a compulsory independent audit.[271] Although the appointment of the auditor is, in principle, at the general assembly's discretion;[272][273] the independent auditor must have certain characteristics.[274]

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[271] The regulation in Türkiye creates a gap in the audit system because there is no compulsory internal audit. The companies that are not subject to independent audit become completely unsupervised. Only large-scale companies are within the scope of the audit. Small-scale companies would be unaudited. As per the repealed TCC No. 6762, every joint-stock company had to have an auditing body, viz., the supervisory board. However, TCC No. 6102 abolished the internal audit and established a mandatory independent external audit for unity in the audit system. In accordance with TCC No. 6102 Art. 397 (4), the scope of independent audit is regulated by the Presidential with the amendment made in 2018.

Presidential No. 6434 on the Determination of the Companies Subject to Independent Audit determines which corporations are within the scope of independent audit. These companies are as follows:

1. If a company is mentioned in Annex (I), it will be subject to independent audit.
2. If a company whose capital market instruments are not traded in a stock market or other organized markets but are considered publicly traded under the Capital Market Law No. 6362 exceeds the threshold values of at least two of the following three criteria in two consecutive accounting periods, it will be subject to independent audit:
   - Company's assets must be at least TRY 30 million,
   - Company's net annual sales revenue must be at least TRY 40 million,
   - At least 50 people must work in the company.
3. If a company that is in the scope of Annex (II) exceeds at least two of the following three criteria in two consecutive accounting periods, it will be subject to independent audit:
   - Company's assets must be at least TRY 60 million,
   - Company's net annual sales revenue must be at least TRY 80 million,
   - At least 100 people must work in the company.
4. If a company that is not in the scope of the Annexes (I) and (II) exceeds at least two of the following three criteria in two consecutive accounting periods, it will be subject to independent audit:
   - Company's assets must be at least TRY 75 million,
   - Company's net annual sales revenue must be at least TRY 150 million,
   - At least 150 people must work in the company.

[272] Pursuant to the repealed TCC No. 6762, there was no professional requirement to be an auditor, and auditors could be chosen from amongst shareholders or appointed from outside.

[273] Şaban Kayıhan, *6102 Sayılı Yeni Türk Ticaret Kanunu'na Göre Anonim Şirketlerde Üst Gözetim*, 1. (Ankara: Seçkin Yayıncılık, 2011); Fatih Bilgili and Ertan Demirkapı, *Şirketler Hukuku*, 9. (Bursa: Dora, 2013), 262, 423, 424–26; Vefa Toroslu, *Türk Ticaret Kanunu Kapsamında Anonim Şirketlerde Denetim* (Istanbul: Adalet Yayınevi, 2015); Mehmet Bahtiyar, *Ortaklıklar Hukuku*, 13. (Istanbul: Beta, 2019), 262; Reha Poroy, Ünal Tekinalp, and Ersin Çamoğlu, *Ortaklıklar Hukuku I*, Güncellenmiş, Yeniden Yazılmış 14. Bası (Istanbul: Vedat Kitapçılık, 2019), 514, 531; Oruç Hami Şener, *Teorik ve Uygulamalı Ortaklıklar Hukuku Ders Kitabı*, 4. (Ankara: Seçkin Yayıncılık, 2019), 438; Hakan Çebi, *Şirketler Hukuku*, 1. (Ankara: Seçkin Yayıncılık, 2020), 280; Fatih Bilgili and Ertan Demirkapı, *Ticaret Hukuku Bilgisi*, 19. (Bursa: Dora, 2021), 277; Selma Çetiner and Armağan Ebru Bozkurt Yüksel, *Ticari İşletme ve Şirketler Hukuku*, 5. (Ankara: Seçkin Yayıncılık, 2021), 337; Mevci Ergün, *Anonim Şirketler Hukuku*, 1. (Ankara: Yetkin Yayınları, 2021), 485; Şaban Kayıhan, *Şirketler Hukuku*, 5. (Ankara: Seçkin Yayıncılık, 2021), 236; Tamer Bozkurt, *Ticaret Hukuku*, 5. (Ankara: Seçkin Yayıncılık, 2022), 234; Aytekin Çelik, *Ticaret Hukuku*, 12th ed. (Ankara: Seçkin Yayıncılık, 2022), 248; Mustafa İsmail Kaya and Burçak Tatlı, *Ticaret Hukuku - I Ticari İşletme ve Ortaklıklar Hukuku*, 4. (Ankara: Seçkin Yayıncılık, 2022), 292; Hasan Pulaşlı, *Şirketler Hukuku Genel Esaslar*, 8. (Ankara: Adalet Yayınevi, 2022), 460; Hasan Pulaşlı, *Şirketler Hukuku Şerhi*, 4., vol. 1 (Adalet Yayınevi, 2022), 832; Aydın Alber Yüce, *Şirketler Hukuku Ders Notları*, 1. (Ankara: Adalet Yayınevi, 2022), 195, 244; Soner Altaş, *Türk Ticaret Kanunu'na Göre Anonim Şirketler Açıklamalı, İçtihatlı, Örnekli*, 12. (Ankara: Seçkin Yayıncılık, 2023), 377; Rıza Ayhan, Hayrettin Çağlar, and Mehmet Özdamar, *Şirketler Hukuku Genel Esaslar*, 5. (Ankara: Yetkin Yayınları, 2023), 285; Tamer Bozkurt, *Şirketler Hukuku*, 15. (Ankara:

If there were internal audit, that is, the supervisory board, the majority would be effective in the selection of auditors. Since people tend to choose the ones who suit their benefits, it can be posited that the majority would elect the person who is in their best interest.[275]

Only natural persons could be auditors.[276][277] According to this system, even if we put everything aside, AI would not be an auditor because it still has no personality. An electronic personality is not enough either because AI would not be regarded as a natural person in this case. Even if it is given a personality recognised by law or the auditor's requirement to be a real person is abolished, AI may not be appointed because, as mentioned above, auditors are selected by the general assembly, and it would probably not be in the majority's interests.

Auditors are hired from outside the company, but they may not be impartial due to being chosen by the majority,[278] which demonstrates that minority shareholders are ignored. This means that the auditor may not take into account corporate governance principles. Besides, the majority in the general assembly elects board members, which indicates that the management may not comply with the corporate governance approach. Hence, there should be an objective view at least during the audit phase. On the other hand, it can be posited that AI will be important in bringing

Yetkin Yayınları, 2023), 314; Tamer Bozkurt, *Ticaret Hukuku Konu Kitabı*, 6th ed. (Ankara: Seçkin Yayıncılık, 2023), 233; Koray Demir, *Şirketler Hukuku Temel Bilgileri*, 1. (Ankara: LYKEION Yayıncılık, 2023), 335; Ömer Korkut et al., *Şematik Şirketler Hukuku*, 3. (Ankara: Seçkin Yayıncılık, 2023), 131; Mustafa Yasan, *Ortaklıklar Hukuku*, 2. (Ankara: Seçkin Yayıncılık, 2023), 159; Aydın Alber Yüce, *Şirketler Hukuku*, 2. (Ankara: Adalet Yayınevi, 2023), 274.

[274] TCC No. 6102 Art. 400; Regulation on Independent Audit Art. 14 "Bağımsız Denetim Yönetmeliği", Official Gazette No: 28509 § (2012).

[275] In that case, minority shareholders remain in the background.

[276] Kayıhan, *Anonim Şirketlerde Üst Gözetim*; Bilgili and Demirkapı, *Şirketler Hukuku*, 419–20; Toroslu, *Anonim Şirketlerde Denetim*; Bahtiyar, *Ortaklıklar Hukuku*, 257; Poroy, Tekinalp, and Çamoğlu, *Ortaklıklar Hukuku I*, 509–12; Şener, *Ortaklıklar Hukuku*, 437, 440; Çebi, *Şirketler Hukuku*, 280; Bilgili and Demirkapı, *Ticaret Hukuku Bilgisi*, 276; Çetiner and Bozkurt Yüksel, *Ticari İşletme ve Şirketler Hukuku*, 337; Ergün, *Anonim Şirketler Hukuku*, 490; Kayıhan, *Şirketler Hukuku*, 237; Bozkurt, *Ticaret Hukuku*, 234; Çelik, *Ticaret Hukuku*, 247; Kaya and Tatlı, *Ticaret Hukuku - I Ticari İşletme ve Ortaklıklar Hukuku*, 292; Pulaşlı, *Şirketler Hukuku*, 460; Pulaşlı, *Şerh*, 1:832; Yüce, *Ders Notları*, 241; Altaş, *Anonim Şirketler*, 377; Ayhan, Çağlar, and Özdamar, *Şirketler Hukuku*, 285; Bozkurt, *Şirketler Hukuku*, 312; Bozkurt, *Ticaret Hukuku Konu Kitabı*, 233; Demir, *Şirketler Hukuku*, 335; Korkut et al., *Şirketler Hukuku*, 131; Yasan, *Ortaklıklar Hukuku*, 160; Yüce, *Şirketler Hukuku*, 272.

[277] Although commercial companies can be auditors as per TCC No. 6102 Art. 400/1, the company should consist of real persons.

[278] Even though auditors are selected by the general assembly, there are standards on who may become an auditor. For instance, the auditor must not have organic ties to the company. For example, an auditor who held office for a certain amount of time cannot be re-elected for a period as per TCC No. 6102 Art. 400/2. Hence, the majority cannot choose the auditor freely.

an impartial and objective point of view not only for the audit process but also for the BoD.

Pursuant to the General Preamble of TCC No. 6102, regulations concerning corporate governance state the following regarding auditing[279]:

> On auditing: Independence, impartiality, auditing in international standards, the auditor's incapacity to provide services other than auditing to the client, the inability to provide consultancy; not providing the same client with auditing services with the same team of auditors…

These are amongst the standards that can be fulfilled by AI. For external auditing, there should be impartial-independent expert auditors who have no organic ties to the company. It can be suggested that this will be achieved with AI. Since unless it is biased and programmed in a way that favours the management, which denotes a neutral-independent AI, it will be able to make objective decisions.

The auditor should be impartial and independent so that the audit process can be objective. The fact that the auditor is independent and protects the creditors and investors causes a contradiction because the appointment of the auditor may jeopardise the impartiality of the auditor.[280] Hence, an AI auditor may eliminate this problem. However, for ethical AI-based decision-making, governance and auditing processes should be made suitable to the skills of AI.[281]

Moreover, a higher quality audit, which companies prefer, provides the company with an increased stock price because of the advantage of integrity and reduced information risks.[282] Additionally, companies consult high-priced audit firms to appear more independent. Whereas auditing by or with the help of AI significantly shortens the duration of the audit, there seem to be new problems such as the costs of technology application, platform construction, and personnel training.[283] Nonetheless,

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[279] "Turkish Commercial Code No. 6102 General Preamble" (n.d.), para. 163.
[280] Kirkos, Spathis, and Manolopoulos, "Audit-Firm Group Appointment", 2.
[281] Othmar Manfred Lehner et al., "Artificial Intelligence Based Decision-Making in Accounting and Auditing: Ethical Challenges and Normative Thinking", *Accounting, Auditing & Accountability Journal* 35, no. 9 (21 June 2022): 109–35, https://doi.org/10.1108/AAAJ-09-2020-4934.
[282] Keith A. Houghton and Christine A. Jubb, "Auditor Selection: What Influences Decisions by Listed Companies?", *Australian Accounting Review* 13, no. 31 (2003): 67, https://doi.org/10.1111/j.1835-2561.2001.tb00173.x.
[283] Zhang Xing, Li Zhu, and Zhang Lijun, "A Study on the Application of the Technology of Big Data and Artificial Intelligence to Audit", in *2020 International Conference on Computer Engineering and*

although developing AI software may initially be costly, it will eventually be beneficial. On the contrary, AI may bring risks to the audit,[284] such as data security risks or systemic risks of the intelligent audit.[285] In addition, hardware and software defects and human interference may also affect the auditing process.[286]

2.7.5. Thoughts on the Future of External Audit

Audit is a procedural and standards-driven process.[287] Since each audit may be unique, and there has been a change in the business world, auditing started to benefit from CorpTech.[288] Audit technology, which has generally examined audit management automation rather than intelligent audit automation, has changed and started to affect the business model of audit firms.[289] Audit, which is currently carried out through programs by human auditors, may become a process that will be conducted entirely by AI. This means that AI will provide intelligent automation rather than management software that only automates the human auditor's tasks. Automation and intelligence have become the competitive advantage.[290] However, it can be argued that no clear strategic approach to automated audit has been implemented.[291] Nonetheless,

Application (ICCEA) (2020 International Conference on Computer Engineering and Application (ICCEA), Guangzhou, China: IEEE, 2020), 800, https://doi.org/10.1109/ICCEA50009.2020.00174.

[284] Xing, Zhu, and Lijun, 800.

[285] Xing, Zhu, and Lijun, 798.

[286] Xing, Zhu, and Lijun, 798.

[287] Naqvi, *Artificial Intelligence*, 7.

[288] Naqvi, 7. There are programmes used in bankruptcy prediction. See Bahaaeddin Alareeni, "A Review of Auditors" GCOs, Statistical Prediction Models and Artificial Intelligence Technology', *International Journal of Business Ethics and Governance* 2, no. 1 (31 January 2019): 19–31, https://doi.org/10.51325/ijbeg.v2i1.30. Janvrin, Bierstaker, and Lowe assert that most auditors consult applications such as "analytical procedures, audit report writing, electronic work papers, Internet search tools, and sampling", but others, namely "digital analysis, expert systems, test of online transactions, database modelling, and continuous transaction monitoring" are not used much. Diane Janvrin, James Bierstaker, and D. Jordan Lowe, "An Examination of Audit Information Technology Use and Perceived Importance", *Accounting Horizons* 22, no. 1 (1 March 2008): 16, https://doi.org/10.2308/acch.2008.22.1.1.

[289] Naqvi, *Artificial Intelligence*, 7; Albawwat and Al Frijat, "An Analysis".

[290] Naqvi, 7.

[291] For the reasons, see Naqvi, 13–14.

the largest audit companies[292][293] invest in AI to enhance the efficiency[294] and effectiveness[295] of the audit process.[296] They develop "narrow AI" algorithms to accomplish tasks.[297] External audit firms benefit from AI to perform the audit accurately and comprehensively.[298] Accordingly, AI-enhanced audit eliminates human error[299] and is time-saving.[300] Furthermore, AI may be the solution to the gap in the external audit in Türkiye.

However, AI programmed for external auditing must also be unbiased and independent of the company. It is highlighted that human biases in AIs and the "black-box" problem hinder AI adoption in auditing.[301] Hence, a highly interesting paradox manifests itself here: AI, by which objectivity and impartiality can be introduced into auditing, may become a means to preserve the interests of the management because it may create a partnership of interests between the creators or programmers of the AI and the BoD and lead to management weakness. In conclusion, it may be suggested that the position and the role of AI require the literature to scrutinise the ethical implications, namely ethical concerns with technology.[302]

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[292] The Big Four firms, namely Deloitte, Ernst & Young, KPMG, and PricewaterhouseCoopers, regard AI as a useful tool in auditing. KPMG deploys IBM's Watson AI, and PwC invented Halo, whereas Deloitte created Argus and Optix for AI and data analytics respectively. Agnew, "Auditing: Pitch Battle"; Carlos Melendez, "Artificial Intelligence Gets into Auditing, What's Next?", *InfoWorld*, 16 March 2016, https://www.infoworld.com/article/3044468/artificial-intelligence-gets-into-auditing-whats-next.html; "PwC Wins 'Audit Innovation of the Year' at 2016 International Accounting Bulletin Awards", *PwC*, accessed 22 November 2022, https://www.pwc.com/lv/en/news/pwc-wins-audit-innovation-of-the-year.html; Kokina and Davenport, "Artificial Intelligence"; Seethamraju and Hecimovic, "Auditing", 1. Abou-El-Sood, Kotb, and Allam claim that for the ones with less experience in auditing and more expertise in technology in the the Big Four firms, the perceived use and importance of CorpTech is higher than the others. Heba Abou-El-Sood, Amr Kotb, and Amir Allam, "Exploring Auditors' Perceptions of the Usage and Importance of Audit Information Technology", *International Journal of Auditing* 19, no. 3 (November 2015): 252–66, https://doi.org/10.1111/ijau.12039.

[293] According to Noordin, Hussainey, and Hayek's research, the distinction between the perceived contribution of AI regarding audit quality in local firms, namely firms in the United Arab Emirates, and that of international firms is very little. Noordin, Hussainey, and Hayek, "Artificial Intelligence and Audit".

[294] Brennan, Flynn, and Baccala, "Audit"; Zemánková, "Audit and Accounting", 569; Hu et al., "Artificial Intelligence-Enabled Auditing"; Juan Barus et al., "Artificial Intelligence in Audit", 11.

[295] Eulerich et al., "Audit Technology".

[296] Commerford et al., "Man Versus Machine".

[297] Commerford et al., 172.

[298] Hu et al., "Artificial Intelligence-Enabled Auditing".

[299] Zemánková, "Audit and Accounting", 569.

[300] Brennan, Flynn, and Baccala, "Audit".

[301] Seethamraju and Hecimovic, "Auditing".

[302] See Ivy Munoko, Helen L. Brown-Liburd, and Miklos Vasarhelyi, "The Ethical Implications of Using Artificial Intelligence in Auditing", *Journal of Business Ethics* 167, no. 2 (November 2020): 209–34, https://doi.org/10.1007/s10551-019-04407-1.

In conclusion, auditing will undergo a change with new technologies and its cost will decrease.[303] However, the literature has no anticipation for considerable savings, as auditing is already executed using electronic programs, and the workload is significantly reduced; nonetheless, the process would be performed on systematically recorded and encrypted data, and thus, not only the accuracy and compatibility of the data will be evaluated, but also transactions would be analysed.[304] In addition, it is deemed that the complete replacement of the auditor by blockchain, which will be examined in the next chapter,[305] unrealistic because it does not carry out a proper accounting check for itself.[306] It can be asserted that AI herein get involved in the process and evaluate the reports. Thus, blockchain may collaborate with AI, and the need for a human auditor would be diminished.

[303] Schubert, "Digital Corporate Governance", 14–15.
[304] Schubert, 15.
[305] See *infra* Chapter 3.
[306] Schubert, "Digital Corporate Governance", 15.

3. BLOCKCHAIN

3.1. In General

In 2008, a paper on the concept of "peer-to-peer e-cash", which introduced the term chain of blocks, was published.[307] The term, which has evolved into the "blockchain",[308] aimed to solve the double-spend problem[309] in the Bitcoin payment system.[310] It was initially designed to assure the one-off payment with the same token; thus, after the validation of the transaction, blockchain ensured non-repudiation.[311]

In fact, the foundations of blockchain date back to the Internet on the grounds that it is linked to the Internet technology.[312] A Blockchain, commonly known by the term "trust engine" or "machine",[313] is a type of database which comprises linked ("chained") blocks that include records.[314] That is to say, rather than being just a new type of database,[315] blockchain is an important means of storing records of transactions and values that operates without requiring reliance on a trusted third party like banks. It is composed of one-to-many (1 to N) transactions in a chain that encompasses fixed-

[307] See Satoshi Nakamoto, "Bitcoin: A Peer-to-Peer Electronic Cash System".

[308] The idea of blockchain was originally suggested by Haber and Stornetta in 1990 at International Cryptology Conference Crypto 90 when they proposed procedures for the digital timestamping of documents so that the backdating or forward dating of a document would be unfeasible. Stuart Haber and W Scott Stornetta, "How to Time-Stamp a Digital Document", in *Advances in Cryptology - CRYPT0 '90, LNCS*, ed. Alfred J. Menezes and Scott A. Vanstone, vol. 537 (Berlin Heidelberg: Springer-Verlag, 1991), 437–55.

[309] The double-spend problem occurs when the same token is being spent more than once. CFI Team, "Double-Spending: A Problem Caused by Transacting Digital Currency That Involves the Same Tender Being Spent Multiple Times", *Corporate Finance Institute*, accessed 23 December 2022, https://corporatefinanceinstitute.com/resources/cryptocurrency/double-spending/. See also Daniel Drescher, *Blockchain Basics: A Non-Technical Introduction in 25 Steps* (Berkeley, CA: Apress, 2017), 49–54, https://doi.org/10.1007/978-1-4842-2604-9.

[310] Nils Braun-Dubler et al., *Blockchain: Capabilities, Economic Viability, and the Socio-Technical Environment*, ed. TA-SWISS, 1st ed. (vdf Hochschulverlag AG an der ETH Zürich, 2020), 63, https://doi.org/10.3218/4017-3.

[311] Braun-Dubler et al., 63.

[312] Kariappa Bheemaiah, *The Blockchain Alternative* (Berkeley, CA: Apress, 2017), 54, https://doi.org/10.1007/978-1-4842-2674-2. For the origins of blockchain technology, see William Magnuson, *Blockchain Democracy: Technology, Law and the Rule of the Crowd*, 1st ed. (Cambridge University Press, 2020), 9–40, https://doi.org/10.1017/9781108687294.

[313] Inasmuch as the business is conducted by blockchain without needing a trusted intermediary, hence transactions between parties that are unknown to each other, the terms "trust engine" and "trust machine" are used to describe blockchain. Braun-Dubler et al., *Blockchain*, 61.

[314] Mark Walport, "Distributed Ledger Technology: Beyond Block Chain- A Report by the UK Government Chief Scientific Adviser" (Government Office for Science, December 2015), 17, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/492972/gs-16-1-distributed-ledger-technology.pdf.

[315] It is an original method of the distributed database, which is regarded as the fifth evolution of computing. Tiana Laurence, *Blockchain*, --For Dummies (Hoboken, NJ: John Wiley & Sons, 2017), 7, 9.

length blocks.[316] Each new transaction to be attached is validated and then embedded in the block, and after the completion of these procedures, it is appended to the existing Blockchain.[317]

When combining blocks, it benefits from a cryptographic signature that enables blockchain to be deployed like a ledger that can be shared and corroborated.[318] The reason why it is named "Blockchain" is that whenever a new transaction is verified, it is uploaded to a block including older ones, which is appended to the ledger that comprises other blocks when that block reaches a particular size.[319] That is to say, each new block containing new data is attached to the other blocks, hence the name "Blockchain".

3.2. Definitions of Blockchain

Two different Blockchain definitions are suggested: One of them is for laypersons, the other one is a technical definition.[320] Whereas the former elucidates blockchain as a shared and secure record-keeping system in which users have the records that only be updated by the parties of the transaction[321], the latter explains it as a peer-to-peer (P2P)[322] DLT that is "cryptographically secure", "immutable",[323] "append-only", and updateable only by peers[324] with consensus[325] or agreement. "Cryptographically

[316] Joseph J. Bambara and Paul R. Allen, *Blockchain A Practical Guide to Developing Business, Law, and Technology Solutions* (McGrawHill Education, 2018), 1.
[317] Bambara and Allen, 1. For instance, in a public transaction, the transaction between two parties, which is broadcasted and verified after cryptographic keys are assigned, creates a new block that is added to the end of blockchain. See, Bambara and Allen, 2.
[318] Walport, "Distributed Ledger Technology", 17.
[319] Bheemaiah, *The Blockchain Alternative*, 56.
[320] Imran Bashir, *Mastering Blockchain: A Deep Dive into Distributed Ledgers, Consensus Protocols, Smart Contracts, DApps, Cryptocurrencies, Ethereum, and More*, Third edition, Expert Insight (Birmingham Mumbai: Packt, 2020), 12.
[321] Bashir, 12; Imran Bashir, *Blockchain Consensus: An Introduction to Classical, Blockchain, and Quantum Consensus Protocols* (Berkeley, CA: Apress, 2022), 167, https://doi.org/10.1007/978-1-4842-8179-6.
[322] The term P2P indicates that there is no third-party intermediary. In terms of computing, P2P means "involving sharing files or other resources between computers connected through a network, rather than using a central server", while in the business context, it is "used to describe computers that work together to form one system". "Peer-to-Peer", in *Peer-to-Peer* (Cambridge Dictionary), accessed 13 December 2022, https://dictionary.cambridge.org/tr/s%C3%B6zl%C3%BCk/ingilizce/peer-to-peer. P2P systems comprise individual computers, namely distributed software systems, whose resources are available to one another. When someone downloads a file from the system, it will randomly come from someone else's computer on account of the files being kept in users' computers. Drescher, *Blockchain Basics*, 23.
[323] It is exceedingly difficult to change.
[324] Namely "miners". Bheemaiah, *The Blockchain Alternative*, 57.
[325] Akın, 'Dijital Gelişmeler', 10.

secure" refers to cryptographic protection against tampering and misuse.[326] "Append-only" means that data can only be uploaded to the system in chronological order,[327] which render the system nearly immutable.[328]

3.3. Types of Blockchain

In the literature, there are mainly three categories of blockchain, namely "public blockchains", including Bitcoin; "permissioned blockchains", e.g. Ripple, and "private blockchains", such as the ones that are usually deployed by consortia, which have trusted members and confidential information.[329] Whereas "public blockchains" are open to everyone, "permissioned blockchains", whose core codes may or may not be open source, control the roles of individuals, and "private blockchains", which are generally smaller, control their membership.[330] Moreover, a "consortium (federated) blockchain" is a "hybrid blockchain", which merges "public" and "private" blockchains.[331] What they have in common is not having a central authority, which is one of the characteristic features of blockchain.[332]

3.4. Characteristics of Blockchain

The fact that blockchain has a cryptographical linkage means that it hinders the possibility of an altered transaction without re-chaining the new blocks added after the very block, including that transaction.[333] That is to say, it is impossible to alter anything without alerting all the participants in blockchain.[334] Replications of the data in numerous computers, namely nodes,[335] enable various businesses or individuals to participate in blockchain.[336] In addition, the software contains a consensus protocol that provides data recording for all the participants,[337] namely synchronisation of data

[326] Bashir, *Mastering Blockchain*, 12–13; Bashir, *Blockchain Consensus*, 168.
[327] See Bheemaiah, *The Blockchain Alternative*, 57.
[328] Bashir, *Mastering Blockchain*, 12–13; Bashir, *Blockchain Consensus*, 168.
[329] Laurence, *Blockchain*, 7–8.
[330] Laurence, 8.
[331] Corina Georgiana Costea, "Blockchain-Based Solutions for Financially Distressed or Insolvent Companies", *Challenges of the Knowledge Society*, 2019, 277.
[332] However, some scholars argue that private blockchains provide insufficient decentralisation. Costea, 277.
[333] Braun-Dubler et al., *Blockchain*, 61, 62.
[334] "Blockchain Company Formation", *GBO International Financial Services*, 12 January 2022, https://gbo-licensing.com/blockchain-company-formation/.
[335] Nodes refer to individual computers. Drescher, *Blockchain Basics*, 23. Computers that comprise the network are in different locations. Laurence, *Blockchain*, 8.
[336] Braun-Dubler et al., *Blockchain*, 61.
[337] Zetzsche, "Corporate Technologies ", 4.

between nodes.[338] Subsequently, it can be claimed that tampering with the data becomes arduous owing to more nodes.[339]

Blockchain averts the most common types of hacking, theft, and ransomware attacks, it will continue to work so long as a single node is connected.[340] Blockchain technologies ensure safe recording of information, i.e. tamper-proof data storage, and communication amongst participants in such organisations with a large number of participants.[341] Before DLTs, one had to trust the data stored centrally were not manipulated.[342]

Accordingly, blockchain is considered a DLT.[343] The consensus amongst peers brings decentralisation by virtue of the lack of authority to update and control the system. Therefore, blockchain may be used as a means of ensuring and perpetuating the system's integrity.[344] In addition, blockchain ensures flawless record-keeping that can be consulted to have an immaculate timeline of the actions and actors, over which various industries and regulatory bodies usually dally because of the enormous problem of assessing the chronology.[345] Thus, the interpretation of the past[346] may become easier.

Blockchain is regarded not only as a "ledger", "data repository", "value transfer mechanism" and a decentralised network but also as the instrument of a modern concept of capitalism.[347] The facts that it is nearly impossible for an individual or a group to alter a transaction and the software is governed with better checks and balances ensure the trust[348] in a Blockchain.[349] However, a disadvantage is that checks and balances, and correcting errors may need more time; nevertheless, it is a result of the democratic decision-making process,[350] where equality and fairness prevail.

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[338] Braun-Dubler et al., *Blockchain,* 61; Akın, "Dijital Gelişmeler", 10.
[339] Each node verifies blocks that satisfy relevant consensus rules, and blocks that do not pass the verification are repudiated. Kedar Iyer and Chris Dannen, *Building Games with Ethereum Smart Contracts* (Berkeley, CA: Apress, 2018), 1, https://doi.org/10.1007/978-1-4842-3492-1.
[340] "Blockchain Company Formation".
[341] Zetzsche, "Corporate Technologies", 3.
[342] Schubert, "Digital Corporate Governance", 7.
[343] Braun-Dubler et al., *Blockchain,* 61.
[344] Drescher, *Blockchain Basics*, 24.
[345] Laurence, *Blockchain*, 11.
[346] Laurence, 11.
[347] Bheemaiah, *The Blockchain Alternative*, 54.
[348] Laurence, *Blockchain*, 9.
[349] Braun-Dubler et al., *Blockchain,* 62.
[350] Braun-Dubler et al., 62.

In a nutshell, blockchain, which is a type of DLT, may be described as a decentralised database that groups entries chronologically into linked blocks that become immutable.[351] It refers to database sequences that are secured by forms of cryptographic proof,[352] such as the zero-knowledge protocol. Cryptography is utilised by blockchain for identification, authentication, and authorisation.[353] The wallet app *Cuber* of LHV Group in Estonia can be given as an example of means that enable various activities, such as ID authentication and voting.[354] Therefore, blockchain have a growing importance, especially in the business world, and may replace the classical financial ledgers.[355]

3.5. Smart Contracts

3.5.1. In General

Another concept related to blockchain is smart contracts. Smart contracts, suggested by Nick Szabo in the 90s,[356] were initially separate from blockchain.[357] A smart contract is a digital protocol that independently implements agreements after certain parameters have occurred, that is, it itself is not a contract but represents a contract.[358] Smart contracts participate in facilitating, verifying, monitoring, and enforcing the negotiation and performance of the contract.[359] They are basically executors of transactions who check whether the conditions are met or not. If they are met, following the invocation of the contract, the smart contract will execute the related transfer.[360]

Smart contracts allow the conclusion of numerous contracts without having to monitor the process of enforcement; thus, a central authority to check the transactions

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[351] Möslein, "Blockchain Applications and Company Law", 23 February 2021.
[352] Yermack, "Corporate Governance and Blockchains", 7.
[353] For the proof of ownership, see Drescher, *Blockchain Basics*, 39–47.
[354] Leon Pick, "Estonia's LHV Bank Testing Colored Coins-Based 'Cuber'", *Finance Magnates*, 9 June 2015, https://www.financemagnates.com/cryptocurrency/news/estonias-lhv-bank-testing-colored-coins-based-cuber/; Stan Higgins, "LHV Bank Develops Wallet App Built on Bitcoin's Blockchain", *CoinDesk*, 21 September 2021, https://www.coindesk.com/business/2015/06/08/lhv-bank-develops-wallet-app-built-on-bitcoins-blockchain/.
[355] Yermack, "Corporate Governance and Blockchains", 7.
[356] Nick Szabo, "Smart Contracts", 1994, https://www.fon.hum.uva.nl/rob/Courses/InformationInSpeech/CDROM/Literature/LOTwinterschool2006/szabo.best.vwh.net/smart.contracts.html.
[357] David Gerard, *Attack of the 50 Foot Blockchain: Bitcoin, Blockchain, Ethereum & Smart Contracts*, 2017, 101.
[358] Schubert, "Digital Corporate Governance", 18.
[359] Kaal, "Blockchain-Based Corporate Governance", 6.
[360] Braun-Dubler et al., *Blockchain*, 102.

is needless, and this would lower the transaction costs.[361] Therefore, smart contracts can be standardised like standardised forms of legal contracts.[362][363] Moreover, since it has suitable qualifications to be a contract as per contract law, smart contracts may be considered classical contracts in the legal sense.[364]

A legal contract in the form of a computer programme that cannot be interfered with after it was drawn up aims to enhance immunity to human intervention and avert the uncertainty and hierarchy of human-mediated agreements, but it is an unsuitable idea in that the immutability smart contracts bring indicates that developers need to create bug-free programmes in the first place.[365]

The conditions the smart contract must monitor should be recorded in blockchain[366] so that they can be scrutinised, and the smart contract performs the task it is programmed to fulfil. Consequently, smart contracts may be identified concisely as conditional payment and transfer instructions.[367] However, a smart contract does not rule the accounts of the other party. For instance, the payment rendered by the smart contract to the other party to the interaction is sent to an escrow account, and if the conditions are not met, it will be sent back to the first party.[368]

3.5.2. Smart Contracts on Blockchain

Smart contracts, which are native to blockchain, execute operations in accordance with the inputs coming from blockchain.[369] One may assume that the term contract indicates that smart contracts are like legal contracts although they can be regarded as classical contracts as mentioned above.[370] However, whereas legal contracts define the rights and obligations of the parties, smart contracts execute the actual act that is stipulated by the contract. Smart contracts administer the rules by controlling the transaction

[361] Schubert, "Digital Corporate Governance", 19.
[362] Smart contracts may use templates to standardise the transaction. The operations that are desired to automate may be "real estate exchanges", "automobile purchases", "making insurance payments", or similar tasks. Bheemaiah, *The Blockchain Alternative*, 58.
[363] If a smart contract was considered a legal contract, it would be under the scrutiny of standardised terms of contracts and if the transaction was B2C, it would be subject to unfair terms' regulations. Of course, the name "contract" does not necessarily mean that the smart contract is a legal contract.
[364] Vural Çelenk, "Smart Contracts".
[365] Gerard, *Blockchain,* 101.
[366] Braun-Dubler et al., *Blockchain,* 102.
[367] Braun-Dubler et al., 102.
[368] Braun-Dubler et al., 102.
[369] Bheemaiah, *The Blockchain Alternative,* 58. Smart contracts are largely deployed by platforms like Ethereum. See Bheemaiah, 58.
[370] See *supra* Part 3.5.1.

under their conditions.[371] By connecting blockchain and smart contracts, the company's administrative work could considerably be automated.[372]

Smart contracts automatically check whether the conditions are met and whether the contractual obligations can be fulfilled; hence, vague legal terms may prevent smart contracts to interpret them, and therefore, smart contracts are generally connected to the DLTs,[373] to prevent counterfeiting. They are not flexible enough to react to changes in the law; consequently, they are usually used together with a conventional contract.[374] However, a smart contract may cause the contract to lag behind the amendments in the law and change in circumstances, and if the contract follows real-life data, there will be a need for human interpretation.[375] In the same vein, it may be suggested that AI can be consulted because it most likely has the ability to help in this interpretation. AI can also assist in evaluating whether the conditions are met or not in the first place.[376]

While smart contracts still have room for improvement, the concept has been gaining attention. It is argued that a computer program in charge of the entire contractual relationship, such as conducting pre-contractual negotiations, concluding and performing the contract, resolving potential disputes, and determining the law to be applied to the legal relationship, must have a highly developed AI capability, and that there will be a move away from the flexible principles in contract law in the area of smart contracts.[377]

Executions performed by smart contracts are securely uploaded to blockchain; thus, there will be no need for others to complete them.[378] Smart contracts act as an objective authority and fulfil the terms and conditions outlined in a contract. That is to say, a positive aspect of using smart contracts in blockchain is that an "end-to-end

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[371] Bheemaiah, *The Blockchain Alternative*, 58. Employee stock options or investor warrants are examples of such cases. Smart contracts have the potential to extend their application to other domains, such as facilitating predetermined solutions for financial difficulties. Yermack, "Corporate Governance and Blockchains", 8.
[372] Schubert, "Digital Corporate Governance", 19.
[373] Schubert, 18.
[374] Schubert, 19.
[375] Gerard, *Blockchain*, 101.
[376] Since smart contracts currently take decisions on the basis of the inputs and rules, AI may both generate and execute them and enhance their efficiency by predicting whether the contract will be performed.
[377] See also Sklaroff, "Smart Contracts".
[378] Bheemaiah, *The Blockchain Alternative*, 59.

process" is performed by the computer considering the parties' interests and providing unbiased information.[379]

3.6. Benefits and Challenges of Blockchain

Almost everything that required offline transactions in the past can be realised online today. For instance, property rights and identity, which were analogues, can be formed and sustained online.[380] Moreover, some slow processes of banking and business, such as fund settlements and money wires, can be performed quickly.[381] Blockchain technology is deployed by major stock exchanges to trade issued shares.[382] Blockchain, which was deployed only by the financial world,[383] is now being debated by related fields such as investing, banking, VC, and public administration.[384]

Some of the potential advantages of blockchain may be listed as identity management and operations' transparency, such as in trading corporate equities and tracking their ownership, and auditing.[385] Moreover, financial derivatives and fixed-income securities can be accommodated by blockchain and executed as smart contracts.[386] These examples are amongst the important concepts for companies, in terms of management or corporate governance. For instance, identity management is a major issue in companies. Generally, identities of minority shareholders, e.g. institutional investors, are unknown to the company. For example, during the AGM, blockchain would facilitate processes. Moreover, transparency is amongst the core tenets of corporate governance, and the audit is essential to have good corporate governance. Therefore, it can be claimed that Blockchain systems have gained importance in terms of corporate law.

It is suggested that an emerging market would be one of the first to greatly integrate blockchain into its capital markets and stock exchanges, and this would be due to deficiencies in record keeping, doubts about regulators, who are corrupt, dishonest, and ineffective, and the high technology penetration rate.[387] Blockchain-

[379] Bheemaiah, *The Blockchain Alternative,* 59.
[380] Laurence, *Blockchain*, 9; Yermack, "Corporate Governance and Blockchains", 8.
[381] Laurence, *Blockchain,* 9–10.
[382] Yermack, "Corporate Governance and Blockchains", 7–8.
[383] Secure digital records will contribute to the global economy. Laurence, *Blockchain,* 10.
[384] Bheemaiah, *The Blockchain Alternative,* xvii.
[385] Yermack, "Corporate Governance and Blockchains".
[386] Yermack, 8.
[387] Yermack, 9.

based payment system *BitPesa*[388] operating across Africa and in some countries in other continents, such as Honduras[389] and Georgia[390], transferring land registries on blockchain[391] may be given as examples of technology penetration.

Blockchain may be the solution to the problems of record-keeping.[392] Speed, lower costs, and data integrity are amongst the positive aspects of blockchain.[393] The advantage of blockchain to the stock market in areas such as execution and settlement in terms of cost and speed is important. Since blockchain facilitates an electronic register for records, transactions, and events, there is no need for authorisation by a central office,[394] that is, all participants in the network are informed of the changes. It provides a new method of generating, interchanging, and pursuance of the ownership of financial assets on a P2P basis.[395] It ensures an environment that is independent of central authority,[396] and thus common trust.[397]

Blockchain enables transparency in such a way that provides investors with ownership positions of debt and equity investors, and prevents corrupt behaviours of regulators, exchanges, and listed companies.[398] Moreover, it may improve the relationship between investors and company representatives.[399] Independence from intermediaries not only avoids cost-intensive middlemen but also enables completely

[388] Landry Yoder, "BitPesa and GBG: The Evolution of Payments in Africa", *GBG*, accessed 5 January 2023, https://www.gbgplc.com/en/blog/bitpesa-evolution-of-payments-in-africa/.
[389] John Andrikos, "Blockchain-Based Land Registry in Honduras", *The Borgen Project*, 7 January 2021, https://borgenproject.org/blockchain-based-land-registry/.
[390] "Georgia Develops Blockchain Land Registry Platform", *Agenda.Ge*, 27 April 2016, https://agenda.ge/en/news/2016/1002. See also Per Aarvik, "Anti-Corruption Reforms Have Been Successful in Georgia, but Blockchain Is Stealing the Limelight", *U4 Anti-Corruption Resource Centre Blog*, 25 October 2022, https://www.u4.no/blog/anti-corruption-reforms-successful-in-georgia-blockchain-stealing-limelight.
[391] See Georg Eder, "Digital Transformation: Blockchain and Land Titles", in *The 2019 OECD Global Anti-Corruption & Integrity Forum*, 2019.
[392] Yermack, "Corporate Governance and Blockchains".
[393] Yermack, 8.
[394] Möslein, "Blockchain Applications and Company Law", 23 February 2021.
[395] Yermack, "Corporate Governance and Blockchains", 7.
[396] Laurence, *Blockchain*, 8.
[397] Möslein, "Blockchain Applications and Company Law", 2020, 2; Möslein, "Blockchain Applications and Company Law", 23 February 2021.
[398] Yermack, "Corporate Governance and Blockchains", 8.
[399] Richard DeMarinis and Fredrik Voss, "Is Blockchain the Answer to E-Voting? Nasdaq Believes So", Nasdaq, 23 January 2017, https://www.nasdaq.com/articles/blockchain-answer-e-voting-nasdaq-believes-so-2017-01-23.

new decentralised transaction models, and the direct execution of transactions between two parties can create leaner and therefore more efficient processes.[400]

The biggest challenge blockchain will face is gaining users' trust in this new technology.[401] Having a small number of nodes, which may be due to costs, reduces system security.[402] This feature should be considered, particularly in establishing a new public Blockchain that has few participants.[403] Trust in smart contracts system is depending on the security of its cryptographic mechanisms, which can be altered, but a consensus amongst participants is needed because there is no authority to regulate technical changes.[404]

To be able to ascertain the effect of blockchain on company law, this chapter will analyse the formation of a company on blockchain system, keeping commercial records of the company through blockchain, preparation of the articles of association on blockchain, AGMs via blockchain, board meetings via blockchain, and lastly, the termination of the company via blockchain.

3.7. From Traditional Ways to Blockchain in Companies

Financial institutions, government institutions, companies, and other similarly large organisations store, record, and process information in a centralised structure that is considered unmanipulated and thus provides correct information.[405] This section will examine how digitalisation will affect traditional methods.

The digitalisation of company law is an issue that has occupied the European Commission for many years.[406] As mentioned before,[407] the Digitalisation Directive, which was entered into force in 2019 and has been transposed into domestic laws of the member countries, enhances companies' digital practices by triggering numerous

[400] Christian Welzel et al., *Mythos Blockchain: Herausforderung für den öffentlichen Sektor*, 1. Auflage (Berlin: Kompetenzzentrum Öffentliche IT, Fraunhofer-Institut für Offene Kommunikationssysteme FOKUS, 2017), 25.
[401] Akın, "Dijital Gelişmeler", 14.
[402] Akın, 14.
[403] Welzel et al., *Mythos Blockchain*, 26.
[404] Welzel et al., 26. The choice of Blockchain version 0.7 amongst the 0.7 and 0.8 versions was by consensus. Although some companies suffered losses, they accepted that version considering their long-term profits. This shows that there is a democratic order in blockchain.
[405] Akın, "Dijital Gelişmeler", 7.
[406] Özdin, "DİRUG", 724.
[407] See *supra* Part 1.1.

regulations, facilitating the formation and registration of a company in the EU.[408] The main aims of the Digitalisation Directive are competitiveness and trustworthiness by presenting digital solutions, thus providing faster and more efficient company establishment, information access, and preventing abuses and frauds.[409]

One of the functions of the Directive is that it adopts a digital foundation, that is, the online foundation of companies in the EU. Thus, it would reduce start-up costs, time, and administrative burdens, particularly for SMEs.[410] Thus, the digital formation of a company is now possible in the EU; namely, digital processes from the establishment to the termination are feasible. Pursuant to the Directive, member states shall enable companies, particularly SMEs, to be formed through an online procedure that requires physical presence only when necessary, that is, this requirement would not be systematic.[411] The requirement comprises suspecting identity falsification or non-compliance in terms of legal capacity and applicants' power of representation.[412]

Moreover, Art. 13g/7 stipulates that this procedure must be concluded within five business days in the event of an application by a natural person and the usage of template documents; in other cases, it must be completed in ten days.[413] This means a timeframe of five business days for individuals and ten working days for companies. Thus, anyone can establish a company without being physically present before an authority. It can be argued that blockchain would accelerate the procedure because it would facilitate instant registration, and smart contracts would also execute it

[408] Özdin, "DİRUG", 722. The EU members shall harmonise their national rules with the Digitisation Directive until 01.08.2021 (Art. 2 (1)). However, member states that need more time to make the necessary arrangements have been given the opportunity to request an extension of time for a maximum of one year and thus to complete the relevant national regulations by 01.08.2022 at the latest (Art. m 2 (3)).

[409] "Directive (EU) 2019/1151 of the European Parliament and of the Council of 20 June 2019 Amending Directive (EU) 2017/1132 as Regards the Use of Digital Tools and Processes in Company Law", para. 3; "Online Formation of Corporations: The Requirements of the Digitalization Directive at a Glance".

[410] "Directive (EU) 2019/1151 of the European Parliament and of the Council of 20 June 2019 Amending Directive (EU) 2017/1132 as Regards the Use of Digital Tools and Processes in Company Law", para. 8.

[411] "Directive (EU) 2019/1151 of the European Parliament and of the Council of 20 June 2019 Amending Directive (EU) 2017/1132 as Regards the Use of Digital Tools and Processes in Company Law", para. 21.

[412] "Directive (EU) 2019/1151 of the European Parliament and of the Council of 20 June 2019 Amending Directive (EU) 2017/1132 as Regards the Use of Digital Tools and Processes in Company Law", para. 21.

[413] "Directive (EU) 2019/1151 of the European Parliament and of the Council of 20 June 2019 Amending Directive (EU) 2017/1132 as Regards the Use of Digital Tools and Processes in Company Law".

immediately. Hence, this means that a company would be established, for example, in the UK, or any of the European countries, within 1-2 minutes, without the need for any paperwork digitally.

In accordance with the Directive, GmbHs, namely limited companies in Germany, can be online registered. Although Germany abandoned manual applications and switched to digital applications in company law, it considered the unique dangers of the digital world and took measures to prevent possible abuses as much as possible.[414] While allowing online applications, maintaining the functionality and reliability of the trade registry is considered important; hence, the notary public, a control and audit mechanism, actively engages in online transactions and manual transactions.[415] Therefore, the legal structure for the performance of virtual notarial certifications and certifications in company law enables to complete the processing of the online formation of the GmbH with an online video communication system.[416]

The Directive particularly takes micro (start-ups) and SMEs into consideration, and aims to make the formation of a company easier and more attractive for these businesses within the borders of the EU.[417] However, there are some risks presented by the Directive, such as identity theft, serial corporate abuse, and veiled ownership structures.[418] The Directive abolishes the physical presence, which may cause one to assume an identity,[419] namely identity fraud and identity theft. Regarding serial corporate abuse, the ones who were disqualified in their countries may establish a firm in another member country.[420] As for veiled ownership structures, due to the inadequate examination of the ultimate beneficial owner of the company, the

[414] Özdin, "DİRUG", 726.
[415] "Entwurf Eines Gesetzes Zur Umsetzung Der Digitalisierungsrichtlinie (DiRUG)", 31 March 2021, 62, https://dserver.bundestag.de/btd/19/281/1928177.pdf. "In particular, the functionality and reliability of the commercial register should be preserved, and at the same time, their role and importance for legal and business transactions should be taken into account. The notaries and registry courts continue to be of crucial importance." (Translated by the author unless otherwise stated.)
[416] "Entwurf Eines Gesetzes Zur Umsetzung Der Digitalisierungsrichtlinie (DiRUG)", 62–63.
[417] Özdin, "DİRUG", 726–27.
[418] "ETUC Guidelines on the Transposition of the Directive on Digital Tools and Processes in Company Law" (The European Trade Union Confederation, 2021), 5, https://www.etuc.org/sites/default/files/2021-06/Guidelines_digital%20tools%20Directive%20EN.pdf.
[419] "ETUC Guidelines on the Transposition of the Directive on Digital Tools and Processes in Company Law", 5.
[420] "ETUC Guidelines on the Transposition of the Directive on Digital Tools and Processes in Company Law", 5.

concealment of owners from authorities is possible.[421] Therefore, in order to prevent corporate abuse, the Directive stipulates some safeguards such as regulating the categories of companies that are eligible for online registration, the fact that electronic ID with video identification systems can be used, and publication in the national gazette.[422]

Blockchain technology, conversely, will minimise the risk of identity theft with the transactions' pseudonymity[423] because in this case, the party to the interaction will have no need for privacy owing to the near-anonymous state provided. It will enable an effective and functional expansion of the internet that makes it possible to use a wide variety of network structures, and greatly facilitates the transfer of information.[424] The clear verifiability and extremely high security with decentralisation blockchain provides make it the perfect method for the legally secure documentation and tracking of transactions.[425] Hence, various countries, such as Great Britain, France, Switzerland, Malta, Liechtenstein, Japan, Hong Kong, and several US states have amended their legislation in accordance with blockchain requirements.[426]

3.8. Decentralised Autonomous Organisations

Coding legal and social regulations on a blockchain system surpasses smart contracts and expedites the creation of DAOs.[427] Blockchain's decentralised organisation makes a digital firm that only exists on the internet possible.[428] A DAO, which runs on a Blockchain platform,[429] is operated by a defined protocol that corresponds to a code on blockchain and is managed using smart contracts implemented.[430] The DAO receives capital in the form of cryptocurrency that is stored in blockchain after being transferred by the investor to the DAO's smart contract address, and the investor receives tokens that convey ownership and voting rights.[431] DAOs have decentralised

[421] "ETUC Guidelines on the Transposition of the Directive on Digital Tools and Processes in Company Law", 5.
[422] "ETUC Guidelines on the Transposition of the Directive on Digital Tools and Processes in Company Law", 5.
[423] Welzel et al., *Mythos Blockchain*, 25.
[424] Schubert, "Digital Corporate Governance", 9.
[425] Spindler, "Gesellschaftsrecht und Digitalisierung", 49.
[426] Josias Dewey, *Blockchain & Cryptocurrency Regulation*, First edition (London, United Kingdom: Global Legal Group Ltd., 2019).
[427] Georgios Dimitropoulos, "The Law of Blockchain", *SSRN Electronic Journal*, 2020, 1136, https://doi.org/10.2139/ssrn.3559970.
[428] Schubert, "Digital Corporate Governance", 20.
[429] Hassan and De Filippi, "Decentralized Autonomous Organization", 2.
[430] Schubert, "Digital Corporate Governance", 20.
[431] Schubert, 20–21; Dimitropoulos, "The Law of Blockchain", 1136.

governance, which means that they have no management body,[432] and thus are autonomous[433] and independent of central control. Entities such as Dash governance, The DAO, and Digix.io adopt this business model.[434] DAOs govern themselves and facilitate the communication between participants.[435] DAOs can also be structured as decentralised autonomous corporations (DAC).[436]

Although decentralised organisations have been mentioned in the literature for some time,[437] the actual DAO was first discussed in the 1990s.[438] Furthermore, whereas some scholars claim that Bitcoin is the first real DAO,[439] others argue that the term refers to organisations utilised as smart contracts within blockchain network, not to the network itself.[440] Consequently, a DAO may be defined as an organisation that operates through rules encoded as smart contracts into blockchain.[441] It is a virtual organisation consisting of members and shareholders who have the authority to use the resources of the organisation and make changes in its codes within the framework of certain conditions.[442] The first DAO,[443] which was established on the public

[432] It enables participants to coordinate and govern themselves. Hassan and De Filippi, "Decentralized Autonomous Organization", 2.
[433] It operates by itself through linked smart contracts. Dimitropoulos, "The Law of Blockchain", 1136.
[434] Chohan, "Autonomous Organization", 1.
[435] Hassan and De Filippi, "Decentralized Autonomous Organization", 2.
[436] Depending on the specific structure, DAC can be classified as different types of companies, which enables flexibility under company law. Schubert, "Digital Corporate Governance", 21.
[437] Martin Shubik, "Incentives, Decentralized Control, the Assignment of Joint Costs and Internal Pricing", *Management Science* 8, no. 3 (April 1962): 325–43, https://doi.org/10.1287/mnsc.8.3.325; Richard Beckhard, "An Organization Improvement Program in a Decentralized Organization", *The Journal of Applied Behavioral Science* 2, no. 1 (1966): 3–25, https://doi.org/10.1177/002188636600200102.
[438] See W. Dilger, "Decentralized Autonomous Organization of the Intelligent Home According to the Principle of the Immune System", in *1997 IEEE International Conference on Systems, Man, and Cybernetics. Computational Cybernetics and Simulation*, vol. 1 (1997 IEEE International Conference on Systems, Man, and Cybernetics. Computational Cybernetics and Simulation, Orlando, FL, USA: IEEE, 1997), 351–56, https://doi.org/10.1109/ICSMC.1997.625775.
[439] Vitalik Buterin, "DAOs, DACs, DAs and More: An Incomplete Terminology Guide", *Ethereum Foundation Blog*, 6 May 2014, https://blog.ethereum.org/2014/05/06/daos-dacs-das-and-more-an-incomplete-terminology-guide; Hsieh et al., "Bitcoin".
[440] Hassan and De Filippi, "Decentralized Autonomous Organization", 3.
[441] Chohan, "Autonomous Organization", 1; Dimitropoulos, "The Law of Blockchain", 1136.
[442] Vitalik Buterin, "Ethereum Whitepaper", *Ethereum*, 19 January 2023, https://ethereum.org/en/whitepaper/.
[443] The first DAO was launched by blockchain company Slock.it in May 2016. See also Christoph Jentzsch, "The History of the DAO and Lessons Learned", *Slock.It Blog*, 24 August 2016, https://blog.slock.it/the-history-of-the-dao-and-lessons-learned-d06740f8cfa5.

blockchain Ethereum, has a structure that comprise software, code, and smart contracts.[444]

In conclusion, a decentralised organisation is a program without a controller,[445] operating on a "peer-to-peer network" that comprises users engaging in interaction with one another as per the protocol designed using code and enforced on blockchain.[446] A DAO may be identified as a blockchain framework under which people with common goals join and shared rules are imposed.[447] Although there is no exact legal definition regarding a DAO, it has some basic features that differentiate it from traditional organisations,[448] such as the automation of the management and operation processes in an integrated manner.[449] Hence, these properties cause problems with legal categorisations.[450]

The next section will scrutinise the possible applications of blockchain in the lifespan of the company. It will begin with the formation and end with the termination of the company. Furthermore, it will demonstrate how the use of blockchain may lead to DAOs and DACs in the future.

3.9. Blockchain from the Formation to the Termination of the Company

3.9.1. Forming a Company on Blockchain

3.9.1.1. Company Formation

Countries have different commercial registers that maintain information on companies. For instance, Austria keeps the records through authorised district courts, whereas Germany maintains them through both Ministry of Justice and aforementioned courts.[451] Furthermore, "the Federal Public Service Economy" in Belgium, authorised commercial courts in France, and "Unified State Register of Legal Entities", managed by the tax authority, in Russia keep the records.[452] "The European

[444] Jentzsch; Christoph Jentzsch, "Decentralized Autonomous Organization to Automate Governance", accessed 18 January 2023, https://lawofthelevel.lexblogplatformthree.com/wp-content/uploads/sites/187/2017/07/WhitePaper-1.pdf.
[445] Buterin, "DAOs".
[446] Metjahic, "Dao", 541–42.
[447] Youssef El Faqir, Javier Arroyo, and Samer Hassan, "An Overview of Decentralized Autonomous Organizations on the Blockchain", in *Proceedings of the 16th International Symposium on Open Collaboration* (OpenSym 2020: 16th International Symposium on Open Collaboration, Virtual conference Spain: ACM, 2020), 2, https://doi.org/10.1145/3412569.3412579.
[448] Dimitropoulos, "The Law of Blockchain", 1136.
[449] Yılmaz Orhan, "Decentralized Autonomous Organizations", 159.
[450] Dimitropoulos, "The Law of Blockchain", 1136.
[451] Laptev and Feyzrakhmanova, "Current Trends- Future Prospects", 4.
[452] Laptev and Feyzrakhmanova, 4.

Business Register Network (EBR)",[453] a network of registers in most of the European countries, is managed by "the European Business Registry Association (EBRA)". That is to say, business registers have been interconnected and are searchable. Türkiye uses "Central Registry Record System (MERSIS)", an electronic registry system that performs commercial registry processes and storing commercial registry data, to fulfil trade registration transactions.[454]

3.9.1.2. Company Formation via Blockchain

Owing to its probative force[455] and effective and secure information transfer,[456] maintaining national records on a Blockchain has gained more acceptance.[457] It can be argued that the absence of a trusted authority[458] will reduce costs and save time[459] as well as improve data security.[460] For example, an international trade registry may be installed in blockchain, in which the formation, shareholder participation, capital and share transfers, and other legal relationships between companies all over the world are documented according to the applicable law, and thus, everyone will be informed.[461] Considering the fact that blockchain is subject to the same rules on an international scale, records on such a platform would gain international features, such as transparency.[462] These practices will most likely affect companies and corporate law in the near future. It is highlighted that processes and transactions would become legally compliant.[463]

A serious drawback of Blockchain systems is that each recording requires more processing, slowing down the system.[464] Furthermore, since some registries require a preliminary examination,[465] it is highlighted that abandoning the central control mechanism is unlikely in the short term.[466] AI may replace the relevant authority in

[453] "European Business Register", accessed 19 February 2023, https://ebr.lv/en/.
[454] "Establishing a Business", *Presidency of the Republic of Türkiye Investment Office*, accessed 29 May 2023, https://www.invest.gov.tr/en/investmentguide/pages/establishing-a-business.aspx.
[455] Akın, "Dijital Gelişmeler", 11.
[456] Schubert, "Digital Corporate Governance", 10.
[457] Akın, "Dijital Gelişmeler", 11.
[458] Welzel et al., *Mythos Blockchain,* 7.
[459] Paal, "Die Digitalisierte GmbH", 610.
[460] Schubert, "Digital Corporate Governance", 10.
[461] Paal, "Die Digitalisierte GmbH", 610.
[462] Akın, "Dijital Gelişmeler", 11. See also *infra* Part 4.2.1.
[463] Paal, "Die Digitalisierte GmbH", 610.
[464] Welzel et al., *Mythos Blockchain*; Schubert, "Digital Corporate Governance", 11.
[465] For instance, Turkish legislation stipulates that a registry manager inspects whether the requirements are met for the registration (TCC No. 6102 Art. 32/1).
[466] Akın, "Dijital Gelişmeler", 12.

the examination process, but some scholars argue that what role AI will play currently remains uncertain.[467] Nonetheless, regardless of blockchain technology, a reduction in the number of examinations would currently be possible,[468] as is the case with the Digitalisation Directive.[469] Hence, in the short run, one should not expect large gains in efficiency from Blockchain registers in areas such as trade registries.

Emerging technologies may ease numerous procedures and contribute to the rights to be protected. In particular, the EU legislation may set a good example to other countries in terms of adapting company law as per new technologies.[470] For example, company formation is one of the areas regulated by the EU, which urges all countries to meet the expectations of some standards, such as setting up a company no more than three working days, costing less than EUR 100, all the registration procedures being online, and being able to register a company online in another EU country.[471]

The main problems may be identified as the lack of unity amongst countries in implementing the digitalisation process, identifying people online, providing stakeholders' rights in cross-border relations, protecting personal data, and preventing fraud.[472] Hence, the EU seeks to enable cross-border activities of the companies with harmonised rules, which would reduce formation costs and operational expenses, in parallel with its digital single market goals, by suggesting countries adjusting their legislations for the *Societas Unius Personae*[473] (SUP).[474] The goal is to lower the costs

[467] Schubert, "Digital Corporate Governance", 11; Akın, "Dijital Gelişmeler", 12.
[468] Schubert, "Digital Corporate Governance", 11.
[469] Digital reporting and digital registries can be given as examples. "ETUC Guidelines on the Transposition of the Directive on Digital Tools and Processes in Company Law", 5.
[470] Bakšys, "Digitalisation of Company Law", 10.
[471] "Starting a Business", *Your Europe*, 17 August 2022, https://europa.eu/youreurope/business/running-business/start-ups/starting-business/index_en.htm. See also "Points of Single Contact", *Internal Market, Industry, Entrepreneurship and SMEs*, accessed 25 January 2023, https://single-market-economy.ec.europa.eu/single-market/services/directive/points-single-contact_en.
[472] Bakšys, "Digitalisation of Company Law", 24.
[473] Single-member company, a type of LLC. See also Fatih Aydoğan, *Tek kişi Ortaklığı* (Istanbul: Vedat Kitapçılık, 2012); Fatih Aydoğan, "Tek Kişi Ortaklığı", in *Türk Hukukunun Avrupa Birliği Hukukuna Uyumu Özel Hukuk*, ed. Arslan Kaya et al., 270-280. İstanbul: istanbul Üniversitesi Yayınevi (Istanbul: Istanbul Üniversitesi Yayınevi, 2020), 270–80, https://cdn.istanbul.edu.tr/file/JTA6CLJ8T5/EAF037142E1148C5AB3D0981BBFF644D.
[474] "Directive 2009/102/EC of the European Parliament and of the Council of 16 September 2009 in the Area of Company Law on Single-Member Private Limited Liability Companies", accessed 1 June 2023, https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A32009L0102; "Proposal for a Directive of the European Parliament and of the Council on Single-Member Private Limited Liability Companies", (2014), https://eur-lex.europa.eu/resource.html?uri=cellar:100dbdec-c08b-11e3-86f9-01aa75ed71a1.0002.01/DOC_1&format=PDF.

and the capital requirement[475] for the formation process and to facilitate online registration.[476] Furthermore, to reach its full potential, there would be no such requirement for the designated physical locations of the SUP's registered office and central administration to be in the same country.[477] That is to say, the Directive aims for a fully electronic registration procedure; thus, the physical appearance of the founder in front of the authority would not be required.[478]

3.9.1.3. A Case Study from Estonia

Estonia is at the forefront of using new technologies in various areas. Hence, it may be regarded as a unique case in terms of digitalisation in almost every field, including company law. For instance, establishing a company online in Estonia is possible. In fact, in 2009, the world's fastest-founded company was formed on the internet in 18 minutes.[479] Moreover, the new record is 15 minutes thanks to its e-Residency programme.[480]

Estonia's e-Residency programme is a digital framework providing a digital identity allowing remote access.[481] It gives opportunities to shareholders and people who are related to the company to communicate with the company from any place in the world and to attend shareholders' meetings from any place.[482] Another example of digitalisation may be the software X-Road, which provides secure and unified data exchange between public and private sectors.[483] It is already deployed not only by Estonia but also by various countries, such as Finland, Azerbaijan, Namibia, and the

[475] EUR 1.
[476] "Proposal for a Directive of the European Parliament and of the Council on single-member private limited liability companies", 3.
[477] "Proposal for a Directive of the European Parliament and of the Council on single-member private limited liability companies", 3.
[478] "Proposal for a Directive of the European Parliament and of the Council on single-member private limited liability companies", 7.
[479] Juhan Tere, "New World Record in Estonia: Creation of a Company in Internet with 18 Minutes", *The Baltic Course*, 13 November 2009, http://www.baltic-course.com/eng/energy/?doc=20451.
[480] "An Estonian Startup Was Created from Scratch in World Record Breaking 15 Minutes at London Tech Week", *Invest in Estonia*, June 2022, https://investinestonia.com/an-estonian-startup-created-from-scratch-in-world-record-breaking-15-minutes-at-london-tech-week/.
[481] "What Is E-Residency?", *Republic of Estonia E-Residency*, accessed 31 May 2023, https://www.e-resident.gov.ee/.
[482] Bakšys, "Digitalisation of Company Law", 22.
[483] "X-Road", *E-Estonia*, accessed 28 January 2023, https://e-estonia.com/solutions/interoperability-services/x-road.

Faroe Islands.[484] Estonia's uniqueness stems from the elimination of most of the legal barriers to digitalise company law.[485]

Estonian government also deploys blockchain to realise the integrity of systems and data.[486] According to them, blockchain is to be trusted[487] because instead of storing data, it detects violations of law, operating like a speed camera, and on the grounds that changes leave traces behind, it determines whether there is a change in the data, which are preserved by the system.[488] Regarding personal data protection, "hash values", which are digital fingerprints of the data, are preserved,[489] not the data themselves. It can be claimed that this fact is analogous to the aim of these systems to verify the data without revealing them.

When Türkiye is examined, it is observed that companies can be established online via MERSIS.[490] Türkiye is also integrating its e-government system into blockchain. A Blockchain-based login system, "digital identity" was introduced to the public. It will enable users to log in to e-Government with digital identities created in blockchain network.[491] Thus, it will also affect company law, and the formation process will most likely be shortened by deploying blockchain. It will accelerate procedures with both its technology and the absence of an administrative body. Establishing a sole proprietorship via an e-Government system without the need for a financial consultant or accountant would be possible.

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[484] Bakšys, "Digitalisation of Company Law", 22.
[485] Bakšys, 21.
[486] "Estonian Blockchain Technology", *E-Estonia*, accessed 3 January 2023, https://e-estonia.com/wp-content/uploads/2020mar-nochanges-faq-a4-v03-blockchain-1-1.pdf.
[487] In 2017, Kaja Kallas, current prime minister of Estonia, expressed the potential of blockchain applications, along with ideas such as open and secure digital identity, cybersecurity and secure data exchange, and data storage in the cloud. Kaja Kallas, "Digital Company Law and Corporate Governance", 2017.
[488] "Estonian Blockchain Technology", 1. The government has been testing blockchain systems since 2008, in fact, before Bitcoin was launched. "Estonian Blockchain Technology", 2.
[489] "Estonian Blockchain Technology", 2.
[490] "Establishing a Business".
[491] Ümit Kılınç, "E-Devlet'e Büyük Kolaylıklar Getirecek 'Dijital Kimlik' Duyuruldu: Peki Ne İşe Yarayacak?", *Webtekno*, 2 January 2023, https://www.webtekno.com/dijital-kimlik-duyuruldu-h131091.html; Cem Arslan Kurt, "Cumhurbaşkanı Yardımcısı Duyurdu: E-Devlet'te Blockchain Tabanlı Dijital Cüzdan", *Cointelegraph Türkiye*, 2 January 2023, https://tr.cointelegraph.com/news/digital-wallet-announcement-from-the-vice-president; Tuğçe İçözü, "E-Devlet'e Girişte Blockchain Tabanlı Dijital Kimlik Kullanımı Için Çalışmalar Başladı", *Webrazzi*, 3 January 2023, https://webrazzi.com/2023/01/03/e-devlet-e-giriste-blockzincir-tabanli-dijital-kimlik-kullanimi-icin-calismalar-basladi/.

Lastly, companies established on blockchain may not even need to follow different countries' regulations. Since blockchain is a decentralised system, the company can be set up no matter where in the world it is. Companies formed on blockchain also contribute to the development of DAOs. However, it can be asserted that all these discussions will not matter, since there will be no corporate actors within DAOs.

3.9.2. Preparation of the Articles of Association on Blockchain

Online registration processes generally include a standardised format for the articles of association.[492] The standard template consists of the topics of "formation, shares, share capital, organisation, accounts, and the dissolution" of an SUP.[493] In the UK, if an LLC is registered online, a memorandum of association[494] is not needed to be written; instead, it will be automatically created in the registration process.[495] Regarding the articles of association,[496] model articles, namely standard articles, can be used, or the founders can write and upload the document to the system in online registration.[497] In Türkiye, the "memorandum of association" and "articles of association" must be submitted online to MERSIS.[498]

In France, in spite of the fact that an electronic means, i.e. online registration, is regulated in 2010 to ease the registration, it has disadvantages in terms of the absence of both professional liability insurance and the registration of the articles of association in the tax registries, and regarding the complicated forms that may necessitate legal advice.[499]

The obligation to record shares in the stock register normally begins with the registration of the articles of association.[500] Hence, in order for digitalisation to be realised, it can be claimed that it is a prerequisite for the articles of association to be in

[492] "Proposal for a Directive of the European Parliament and of the Council on single-member private limited liability companies", 5, 7. Art. 11 and Art. 12 regulate the articles of association.
[493] Art. 11/2.
[494] A legal statement signed by the initial shareholders and guarantors to establish the company. "Memorandum and Articles of Association", *Set up a Limited Company: Step by Step*, accessed 11 January 2023, https://www.gov.uk/limited-company-formation/memorandum-and-articles-of-association#:~:text=a%20'memorandum%20of%20association'%20%2D,directors%20and%20the%20company%20secretary.
[495] "Memorandum and Articles of Association".
[496] Comprises rules on running the company. "Memorandum and Articles of Association".
[497] "Memorandum and Articles of Association".
[498] "Establishing a Business".
[499] Bakšys, "Digitalisation of Company Law", 12.
[500] Akın, "Dijital Gelişmeler", 13.

a digital environment. In addition, any amendments will be made public in a decentralised and transparent environment. Thus, no procedural requirements such as registration and announcement will be necessary.

Smart contracts may enable all pertinent information in the articles of association, such as majority rules and access rights, to be contained in blockchain.[501] Smart contracts may also be integrated or employed in standardised processes such as a capital increase.[502] Standardised templates for general meeting resolutions or predefined content for contracts may be automatically and electronically controlled by smart contracts.[503] After the decision of the general assembly[504] or the BoD[505] regarding the capital increase,[506] the smart contract automatically fulfils the process. The smart contract transforms the decision into computer code and operates on blockchain. The code monitors the decision and automates its execution. Thus, the number of legal steps, such as ministry approval, registration, announcement, and publication, will be reduced because direct publicity will be ensured by the visibility of the decision on blockchain.

It should be noted that there was no consensus amongst the EU member states except for online registration.[507] Hence, it can be asserted that there is much more to do to achieve harmony[508] in company law. Moreover, if even the EU could not harmonise it, one should not expect a unified practice from the whole world. Fortunately, blockchain enables a worldwide application, but there is still significant progress to be made in order to accomplish a decentralised system because company law is still subject to national legislation in many respects.

[501] Lafarre and Van der Elst, "Blockchain Technology", 16.
[502] Spindler, "Gesellschaftsrecht und Digitalisierung", 49-50.
[503] Spindler, 50.
[504] TCC No. 6102 Art. 459.
[505] TCC No. 6102 Art. 460.
[506] See Özlem Arabacı, "Anonim Şirketlerde Sermaye, Sermaye Artırımı Sistemleri Ile Yöntemleri Hakkında Genel Bilgi ve 6102 Sayılı Türk Ticaret Kanunuyla Konuya İlişkin Getirilen Temel Yenilikler", *Gümrük ve Ticaret Dergisi*, no. 1 (2013): 28–33, https://dergipark.org.tr/tr/download/article-file/1020972.
[507] Bakšys, "Digitalisation of Company Law", 35.
[508] Bakšys, 36.

3.9.3. Keeping Commercial Books and Records of the Company via Blockchain

The share ledger, which is under the duty of the BoD[509] to keep,[510] shows who the shareholders of the company in question are.[511] It becomes clear by whom the shareholding rights will be exercised by means of these records,[512] and the ledger ensures that third parties outside the company can access this information in a secure and low-cost way.[513] However, the trust in the share ledger is not preserved.[514] Moreover, the principle of publicity, which is found in the trade registry, may not be in question[515] in terms of the stock register.[516] Therefore, a record in the stock register would have no effect on the ownership; namely, it would be considered a rebuttable presumption.[517] That is to say, since the principle of trust in the register is not in question in terms of the stock register, security measures regarding the accuracy and precision of the information in the records do not need to be very stringent.[518] Hence, the register can be easily integrated into blockchain system. Keeping company registers on blockchain would enable companies to cut related costs as a result of the elimination of intermediaries such as registrars and thus improve trust between shareholders and issuers.[519]

In fact, whereas in Russia, data regarding the register of securities holders and digital financial assets representing shares in private joint-stock companies are kept;[520] in Delaware, records of a company can be kept using DLTs.[521] These examples

[509] In limited companies, the share ledger is kept by the manager. Akın, "Dijital Gelişmeler", 13.
[510] Jason Gordon, "Shareholder Register - Explained: What Is the Shareholder Register?", 25 September 2021, https://thebusinessprofessor.com/en_US/business-governance/shareholder-register-definition.
[511] Akın, "Dijital Gelişmeler", 12.
[512] Akın, "Dijital Gelişmeler", 12. Some rights shareholders exercise do not necessitate registration. For example, the dividend right certificate gives limited rights to its owner. Gordon, "Shareholder Register".
[513] Akın, "Dijital Gelişmeler", 12.
[514] Akın, 12. Shares can be transferred without being recorded in the share ledger.
[515] It can be argued that there is a need for global shareholder ID. See Hüsrev Bilgin and Nick Arbuthnott, "Shareholder Identification & Targeting" (IPREO, 2015), https://www.tuyid.org/files/seminerler/Ek_3_IPREO_%20ShareID_and_Targeting.pdf.
[516] For example, pursuant to Swedish Companies Act, the stock register can be accessed by the public. Gordon, "Shareholder Register". However, publicity of the stock register is absent in Turkish law. Akın, "Dijital Gelişmeler", 12.
[517] Akın, 13.
[518] Akın, 13.
[519] Laptev and Feyzrakhmanova, "Current Trends- Future Prospects", 7.
[520] "Federal Law No. 259-FZ 'On Digital Financial Assets, Digital Currency and on Amendments to Certain Legislative Acts of the Russian Federation'", accessed 12 February 2023, https://cis-legislation.com/document.fwx?rgn=126432; Laptev and Feyzrakhmanova, "Current Trends- Future Prospects", 6.
[521] Laptev and Feyzrakhmanova, "Current Trends- Future Prospects", 7.

demonstrate that companies' commercial records have become eligible to be integrated into blockchain. Furthermore, some scholars suggest that deploying AI to function on blockchain, which autonomously records transactions while providing their confidentiality, would be beneficial to the upkeep of the register of shareholders; thus, shareholders' interests would be protected, and information would not be used in third persons' own interests.[522]

The transparency blockchain technology provides may expedite the integration process. All these factors demonstrate how achievable the relationship between the stock registry and blockchain technology is,[523] that is, the stock register being integrated into blockchain. Moreover, the non-success in retaining timely and accurate records of the owners of the shares may be solved by deploying blockchain to keep the data of stock ownership.[524] Companies using a public blockchain for their commercial or financial records cause the management of accrual earnings and strategies of financial reporting to decrease considerably and improve the transparency of related-party transactions.[525] For instance, the stock transfer company Computershare Limited has collaborated with SETL, which renders a blockchain-based central securities depositary service, to create the first register of securities ownership based on blockchain technology.[526]

Shareholder identification is essential not only for facilitating communication between the shareholders and the company but also for ensuring the security of countries.[527] In addition, transparency is a necessity for well-functioning markets in terms of creditors and investors.[528] These scattered records may be kept under certain standards by virtue of blockchain; thus, market participants and government institutions would have access to stock registers,[529] because in a public blockchain, all transactions can be viewed by every participant.[530] Moreover, the increase in the

[522] In Russia, the Titan Blockchain automates the transfer of documents amongst registrars rather than relying on manual handling. Laptev and Feyzrakhmanova, 7.
[523] Akın, "Dijital Gelişmeler", 12.
[524] Marcel Kahan and Edward B Rock, "The Hanging Chads of Corporate Voting", *Faculty Scholarship at Penn Law* 164: 1227–81.
[525] Yermack, "Corporate Governance and Blockchains", 8–9.
[526] Anthony Culligan, "Computershare and SETL Demonstrate Australia's First Working Blockchain Solution", *SETL- Insights/Press Releases*, 28 April 2016, https://setl.io/computershare-and-setl-demonstrate-australias-first-working-blockchain-solution/.
[527] Akın, "Dijital Gelişmeler", 13.
[528] Akın, 13–14.
[529] Akın, 14.
[530] Welzel et al., *Mythos Blockchain*, 26.

shareholder transparency contributes to anti-money laundering and combating terrorist financing.[531]

Regarding deploying blockchain to create financial records, using cryptocurrencies and tokens may enable transparency in records.[532] Since contracting across entire life cycle is inadequately digitised,[533] using blockchain will make transactions transparent and available to every participant. It can be claimed that this transparency would enhance records management and accounting owing to the accessibility to the record and its history, namely, the date and time being precisely viewable. This up-to-date and always retrievable accounting would provide appropriate information about the company's financial situation.[534] Hence, blockchain has been argued to facilitate real-time auditing and testing transactions.[535] Blockchain may even replace the auditor to some degree, as it authenticates transactions and balances.[536] It would also facilitate detecting irregularities and misstatements in financial records.[537] Thus, tax authorities may utilise these records concerning inspection.[538] A system based on blockchain will automate tax collection without needing intermediaries, alleviate transaction costs and cash flow problems of the employers, and reduce smuggling activities.[539]

A positive aspect of the transparency of financial records on quoted companies is that they can avert the hustle before and after issuing quarterly reports, and accessing these records with blockchain technology will avert manipulations in the market.[540] However, unquoted companies may not be willing to share financial records, which

[531] Laptev and Feyzrakhmanova, "Current Trends- Future Prospects", 7.
[532] Schubert, "Digital Corporate Governance", 14; Akın, "Dijital Gelişmeler", 14.
[533] This obstructs asset servicing, capital formation, and secondary market liquidity. Rather than tokens solving the liquidity problem, contracts should be automated. "Commercial Record-Keeping on the Blockchain", 2023, https://www.youtube.com/watch?v=YCHJL_xM4QI.
[534] Schubert, "Digital Corporate Governance", 14.
[535] It is also suggested that these advantages are not unique to blockchain technology. Graham Gal and Matthew Sherwood, "The External Financial Statement Audit Process and Blockchain Technology", *TIDE AcademIA Research* 3, no. 1 (2021): 103–40.
[536] Mohini Singh, "Blockchain Technology for Corporate Reporting: An Investor Perspective" (CFA Institute, September 2020), 6.
[537] Akın, "Dijital Gelişmeler", 14.
[538] Schubert, "Digital Corporate Governance", 14.
[539] Tuğçe Akdemir Altunbaşak, "Blok Zincir (Blockchain) Teknolojisi ile Vergilendirme", Maliye Dergisi, no. 174 (June 2018): 360–71.
[540] Akın, "Dijital Gelişmeler", 14–15.

could harm the company if opened to third parties.[541] However, knowing the company's financial situation would benefit shareholders and stakeholders.[542]

Moreover, blockchain will prevent duplicate financing fraud, which indicates that the same transaction is repeatedly financed. Therefore, Singapore launched blockchain-based Trade Finance Registry that digitises cross-border trade execution.[543] In addition, smart contracts will facilitate the recording of trade registry and subsequent transactions, by allowing to sign numerous contracts without needing to follow a separate process for their implementation; thus, the need for a separate central structure to monitor the signed contracts and provide savings will be eliminated.[544] Furthermore, since the wider the network of blockchain is, the less possible it may be manipulated,[545] trust in blockchain will grow.

Blockchain demonstrates data on the transfer of ownership, that is, the sequence of transfer of rights will be transparent.[546] Hence, blockchain can be utilised to verify the ownership.[547] Thus, transactions do not necessitate extra protection because blockchain technology presents the highest safeguard for data.

3.9.4. Having Annual General Meetings via Blockchain

3.9.4.1. Virtual AGMs

Communication, information, and decision-making processes within the company take place at the general assembly.[548] Key decisions, such as replacing a director, approving finances, and filing for bankruptcy necessitate shareholders meetings.[549] Shareholders

[541] Akın, "Dijital Gelişmeler", 14.
[542] Schubert, "Digital Corporate Governance", 14.
[543] Eleanor Wragg, "MonetaGo Picked to Deliver Singapore's Trade Finance Registry", *Global Trade Review*, 15 June 2022, https://www.gtreview.com/news/fintech/monetago-picked-to-deliver-singapores-trade-finance-registry/; "Singapore Banks Pick MonetaGo to Build Trade Finance Registry", 15 June 2022, https://www.finextra.com/newsarticle/40454/singapore-banks-pick-monetago-to-build-trade-finance-registry; Deepesh Patel, "Trade Finance Registry: Singapore Launches the World's First Blockchain-Based Solution Aimed at Preventing Double Financing Fraud", 12 December 2022, https://www.tradefinanceglobal.com/posts/singapore-launches-the-worlds-first-blockchain-based-solution-aimed-at-preventing-double-financing-fraud/; "Trade Finance Registry", *Blockdata*, accessed 31 May 2023, https://www.blockdata.tech/profiles/trade-finance-registry.
[544] Akın, "Dijital Gelişmeler", 17.
[545] Welzel et al., *Mythos Blockchain*, 26.
[546] Laptev and Feyzrakhmanova, "Current Trends- Future Prospects", 16.
[547] Singh, "Blockchain Technology for Corporate Reporting", 9.
[548] Zetzsche, "Corporate Technologies", 15; Akın, "Dijital Gelişmeler", 15. See also Ferna İpekel Kayalı, "Turkish Company Law", in *Turkish Private Law*, ed. Korkusuz M. Refik and Ferna İpekel Kayalı, 2. (Ankara: Seçkin Yayıncılık, 2020), 242–47, 254–56.
[549] Eknath, Londero, and Simonyan, "Are Virtual Meetings for Companies' Shareholders and Board Members the New Normal?"

exercise their basic shareholder rights at the company's AGM.[550] However, AGMs are costly events, and shareholders do not usually attend the meetings.[551]

With the increase in cross-border investments, there is a prominent desire for more investor participation, necessitating a safe, economical, and flexible means of shareholder engagement and remote voting.[552] Although there are a few web-based voting systems, shareholders still choose to participate in the AGM and vote in person because especially when there is a proxy, they generally have no authority over their votes and no access to their voting record histories.[553] Nevertheless, it can be claimed that there has been a shift from face-to-face AGMs to virtual AGMs,[554] and therefore, blockchain will most likely gain importance, especially in voting processes of the AGM. Thanks to blockchain technology, shareholders can vote and express their opinions, regardless of whether the meeting is held physically or online.[555]

Today, virtual and hybrid meeting practices have become widespread, particularly with the Covid-19 Pandemic.[556] During the Covid-19 Pandemic, requirements such as including e-meetings in the articles of association[557] were bent so as not to cause business disruptions. Pursuant to TCC No. 6102 Art. 1527, Türkiye regulated online general meetings well before the pandemic. Listed companies are now required to adhere to obligations to implement systems that enable participation and

[550] Kürşat Göktürk, "Anonim Şirket Pay Sahipliği Haklarının Kullanılmasında Muhalefet Şartı", *İnönü Üniversitesi Hukuk Fakültesi Dergisi*, 31 December 2017, 53–78, https://doi.org/10.21492/inuhfd.338779.
[551] DeMarinis and Voss, "E-Voting".
[552] DeMarinis and Voss, "E-Voting"; Lafarre and Van der Elst, "Blockchain Technology"; Van der Elst and Lafarre, "Blockchain and Smart Contracting", 128.
[553] DeMarinis and Voss, "E-Voting".
[554] The first fully virtual AGM was held by Starbucks Corporation during the Covid-19 Pandemic in 2020. "Starbucks to Webcast 2020 Annual Meeting of Shareholders", *Starbucks Investor Relations*, 13 March 2020, https://investor.starbucks.com/press-releases/financial-releases/press-release-details/2020/Starbucks-to-Webcast-2020-Annual-Meeting-of-Shareholders/default.aspx.
[555] Akın, "Dijital Gelişmeler", 16.
[556] For different practices on a global scale, see Louise Coen, "Virtual Annual General Meetings – A Global Update: We Take a Look at the Benefits of Virtual AGM and the Legal Situation in Different Countries.", *EQS Group*, 22 March 2022, https://www.eqs.com/ir-blog/virtual-annual-general-meetings-update/. See also "Holding an Online Annual General Meeting (AGM)", *Co-Operatives UK*, accessed 11 January 2023, https://www.uk.coop/coronavirus/covid-19-governance-advice/holding-online-annual-general-meeting-agm; "Holding a Hybrid Annual General Meeting (AGM)", *Co-Operatives UK*, accessed 11 January 2023, https://www.uk.coop/coronavirus/covid-19-governance-advice/holding-hybrid-annual-general-meeting-agm.
[557] TCC No. 6102 Art. 1527.

voting in the general assembly electronically.[558] All transactions can be made using electronic signatures before, during, and after the general assembly via "Electronic General Meeting System".[559] It can be claimed that more virtual meetings will be held in the future.

Thanks to digitalisation, communication with shareholders will become electronic; thus, shareholders can digitally exercise their rights.[560] For instance, shareholders can hold the BoD to account owing to Q&A and messaging current technology presents.[561] Thus, shareholder engagement will be on the rise.

Companies will overcome the challenges of physical meetings.[562] In terms of shareholder legitimacy, this will reflect a change in the identification of the shareholders in practice.[563] Virtual AGMs may encourage shareholders to actively participate in the meeting.[564] Hence, shareholders would possess greater control over the management, thereby lessening the necessity for extensive board monitoring.[565]

However, data protection should also be given consideration. Identification should be for communicating directly with shareholders so that they can exercise their shareholder rights. Moreover, full transparency must be accomplished to be informed on how the votes are exercised in order not to miscount them.[566] Blockchain technology will contribute to the prevention of counting errors.[567] As can be understood, current voting systems are may have problems with transparency, verification, non-repudiation, and identification;[568] and since these issues are related

[558] Art. 1527/5. Participation in the AGMs in joint stock companies, making suggestions, expressing opinions and voting have all the legal consequences of physical participation and voting. Participation and voting in the general assembly electronically are left to the discretion of the companies for unlisted joint stock companies and unlisted public companies.
[559] "E-GENEL KURUL (Electronic General Meeting System)", *MKK*, accessed 29 May 2023, https://www.mkk.com.tr/en/corporate-governance-services/e-gem-electronic-general-meeting-system; "E-Genel Kurul", accessed 29 May 2023, https://egk.mkk.com.tr/egkweb/en/.
[560] Zetzsche, "Corporate Technologies", 14.
[561] Coen, "Virtual AGMs".
[562] Chiu and Lim, "Technology vs Ideology", 15.
[563] Zetzsche, "Corporate Technologies", 14.
[564] Enriques and Zetzsche, "Corporate Technologies", 70.
[565] Bankewitz, Aberg, and Teuchert, "Digitalization", 63.
[566] The 2017 AGM of Procter & Gamble and the 2008 board elections of Yahoo can be given as examples of miscounting. See "Yahoo Recount Shows Large Protest: Yang's Approval At 66, Not 85 Percent", *The Huffington Post*, 25 May 2011, https://www.huffpost.com/entry/yahoo-recount-shows-large_n_117195.
[567] Spindler, "Gesellschaftsrecht und Digitalisierung", 50.
[568] They have over-authority and manipulation risks in terms of notions such as fairness, privacy, anonymity, integrity, and transparency. Uzma Jafar, Mohd Juzaiddin Ab Aziz, and Zarina Shukur,

to the positive aspects of blockchain technology, blockchain can be deployed to overcome them.[569]

The benefits of blockchain voting may be listed as follows: Fight against voter fraud and altered votes, increasing voter turnout, privacy, integrity, transparency, fast and accurate counting, and immutable data can be advantages of blockchain-based e-voting.[570] Decentralisation and end-to-end verification enabled by blockchain[571] facilitate distributed and secure electronic voting, preventing non-repudiation.[572] Thus, security steps are guaranteed by blockchain, promising simpler, cheaper, and more protected e-voting.[573] Moreover, voter anonymity and vote confidentiality will be ensured by storing voter data as hashes, fixed-sized strings,[574] on the system.[575]

3.9.4.2. Virtual AGMs via Blockchain

Since Blockchain systems will provide both remote participation and voting[576] in the general meeting, and voting transparency,[577] it can be asserted that blockchain will play an important role in voting at a general meeting. It can be claimed that this will reduce the need for a proxy because shareholders will be able to perform what the proxy has done before. Nonetheless, there have been attempts to execute proxy voting with the help of blockchain, particularly as a back-up system of the voting software.[578]

"Blockchain for Electronic Voting System—Review and Open Research Challenges", *Sensors* 21, no. 17 (31 August 2021): 2, https://doi.org/10.3390/s21175874.

[569] Lafarre and Van der Elst, "Blockchain Technology", 15.

[570] Sam Daley, "Blockchain Voting: The Future of Elections?", *Built In*, 21 September 2022, https://builtin.com/blockchain/blockchain-voting-future-elections.

[571] Cryptography has been transformed into a decentralised means that allows secure e-voting processes. Mukta Goyal and Adarsh Kumar, "Sustainable E-Infrastructure for Blockchain-Based Voting System", in Digital Cities Roadmap, ed. Arun Solanki, Adarsh Kumar, and Anand Nayyar, 1st ed. (Wiley, 2021), 221–51, https://doi.org/10.1002/9781119792079.ch7.

[572] Kashif Mehboob Khan, Junaid Arshad, and Muhammad Khan, "Secure Digital Voting System Based on Blockchain Technology", *International Journal of Electronic Government Research* 14 (1 January 2018): 53–62, https://doi.org/10.4018/IJEGR.2018010103. Nevertheless, privacy and speed are still mostly debated blockchain issues. In order to ensure sustainability in blockchain-based voting, transaction speed and secure remote participation must be enhanced.

[573] Goyal and Kumar, "Blockchain-Based Voting System", 224, 226.

[574] "Explained: What Is Hashing in Blockchain?", *Bybit Learn*, 17 December 2020.

[575] Mehboob Khan, Arshad, and Khan, "Digital Voting System".

[576] For Blockchain-based voting, see Ahmed Ben Ayed, "A Conceptual Secure Blockchain Based Electronic Voting System", *International Journal of Network Security & Its Applications* 9, no. 3 (30 May 2017): 01–09, https://doi.org/10.5121/ijnsa.2017.9301; Friorik P. Hjalmarsson et al., "Blockchain-Based E-Voting System", in *2018 IEEE 11th International Conference on Cloud Computing (CLOUD)* (2018 IEEE 11th International Conference on Cloud Computing (CLOUD), San Francisco, CA, USA: IEEE, 2018), 983–86, https://doi.org/10.1109/CLOUD.2018.00151.

[577] DeMarinis and Voss, "E-Voting".

[578] For example, blockchain was deployed at Santander Investments in an AGM. Pete Rizzo, "Broadridge Completes Blockchain Proxy Voting Trial", *CoinDesk*, 11 September 2021, https://www.coindesk.com/markets/2017/04/13/broadridge-completes-blockchain-proxy-voting-trial/.

Thus, it not only has good results for those who cannot physically participate but also provides transparency, that is, the transparency of proxy voting can be enhanced because the results would be immediately visible.[579]

One of the attempts to use blockchain was Nasdaq's project on proxy voting with Estonia's e-Residency platform.[580] Moreover, in order to meet market demand and expectations, Nasdaq has been negotiating with various stakeholders, such as the custody department of *SEB Pank*[581] about voting processes and the distribution of voting rights to beneficial owners.[582] Furthermore, custodians possess the power to cast votes on behalf of their clients and swiftly and effortlessly allocate voting rights to beneficial owners via a file upload, and information on ownership, votes and voting rights transfers will be recorded in blockchain.[583]

e-Residency platform in Estonia includes not only Estonia residents but also those who have business interests in the country; thus, shareholder verification would be enhanced, and with e-voting platform,[584] voting in the listed companies' AGMs would be easy and secure.[585] This would enhance shareholder participation, consequently corporate governance. Moreover, as per Nasdaq, it will contribute to proxy voting in that votes can be recorded expeditiously and safely, unlike former processes being fragmented and labour-intensive.[586] In fact, in Türkiye, there is an electronic AGM practice.[587] In addition, it is currently possible to conduct AGMs

[579] Coen, "Virtual AGMs".
[580] "E-Residency to Support Nasdaq in Transforming Shareholder Participation", *E-Estonia*, 12 February 2016, https://e-estonia.com/e-residency-to-support-nasdaq-in-transforming-shareholder-participation/; Rizzo, "Blockchain Proxy Voting".
[581] *SEB Pank* is an Estonian bank, owned by the Swedish bank SEB.
[582] DeMarinis and Voss, "E-Voting".
[583] DeMarinis and Voss.
[584] "NASDAQ'S Blockchain Technology to Transform the Republic of Estonia's E-Residency Shareholder Participation", accessed 3 January 2023, https://ir.nasdaq.com/news-releases/news-release-details/nasdaqs-blockchain-technology-transform-republic-estonias-e?releaseid=954654.
[585] Stephanie Palmer, "Nasdaq and Estonia in Blockchain Project", *Asset Servicing Times*, 15 February 2016, https://www.assetservicingtimes.com/assetservicesnews/technologyarticle.php?article_id=6446.
[586] Palmer.
[587] TCC No. 6102 Art. 1527; "Anonim Şirketlerde Elektronik Ortamda Yapılacak Genel Kurullara İlişkin Yönetmelik", Official Gazette No: 28395 § (2012), https://www.mevzuat.gov.tr/File/GeneratePdf?mevzuatNo=16548&mevzuatTur=KurumVeKurulusYonetmeligi&mevzuatTertip=5; "Anonim Şirketlerin Genel Kurul Toplantılarının Usul ve Esasları Ile Bu Toplantılarda Bulunacak Bakanlık Temsilcileri Hakkında Yönetmelik", Official Gazette No: 28481 § (2012), https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=16800&MevzuatTur=7&MevzuatTertip=5. See also Ümit Yayla, *Yeni Türk Ticaret Kanunu ve Yeni Sermaye Piyasası Kanunu Uyarınca Anonim Ortaklık Genel Kurulları Elektronik Genel Kurullar*, 1. (Istanbul: On İki Levha Yayıncılık A.Ş., 2013); Mete Özgür Falcıoğlu, *6102 Sayılı Türk Ticaret Kanunu ve İlgili Mevzuat Kapsamında Anonim*

through blockchain. Thus, this will pave the way for shareholders to make their voices heard because it will provide more participation of shareholders. There are problems such as not being admitted to the hall in face-to-face AGMs. As there will be no central authority with blockchain, it will not be possible to prevent shareholders from taking the floor.

Companies from various other countries started to adopt Blockchain-based voting systems. For instance, whereas Strate Ltd., a South African central securities depository, collaborates with Nasdaq to solve the voting problem with blockchain,[588] AST Financial is in a partnership with blockchain specialist firm NuArca for proxy voting.[589] In addition, Fidelity Investments created "SOCOACT", a "blockchain-based voting system" that authenticates voters and facilitates voting processes.[590]

E-voting[591] allows blockchain's immutable ledger technology to be used in an activity other than transaction settlements.[592] It can be claimed that this will dramatically change AGMs. Although online meetings have emerged in the last decade, meetings via blockchain will drastically affect the organisation. Smart contracts, which were not within blockchain system at the beginning, have been deployed to execute the functionality of voting.[593] For example, AGM resolution templates or contract content could be controlled with smart contracts without needing to actually make any formulations.[594] It can also be suggested that by using blockchain, investors may get information about meetings beforehand, appoint a proxy to vote,

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Şirketlerde Elektronik Genel Kurul (Ankara: Yetkin, 2016); Salih Karadeniz, "Anonim Şirketlerde Elektronik Genel Kurul", İstanbul Medeniyet Üniversitesi Hukuk Fakültesi Dergisi 7, no. 13 (2022): 491–520.

[588] "Nasdaq to Deliver Blockchain E-Voting Solution to Strate", *Press Releases*, 22 November 2017, https://ir.nasdaq.com/news-releases/news-release-details/nasdaq-deliver-blockchain-e-voting-solution-strate; "Nasdaq Tech Spotlight: Strate", *Technology*, 7 May 2020, https://www.nasdaq.com/articles/nasdaq-tech-spotlight%3A-strate.

[589] "AST Completes Successful Pilot of Blockchain-Based Solution for Proxy Voting, Processing at Volumes Simulating the Largest Proxy Campaigns", *Businesswire*, 13 December 2017, https://www.businesswire.com/news/home/20171213005230/en/AST-Completes-Successful-Pilot-of-Blockchain-based-Solution-for-Proxy-Voting-Processing-at-Volumes-Simulating-the-Largest-Proxy-Campaigns.

[590] Timothy Lohe et al., The Crypto Voting and Social Aggregating, Fractionally Efficient Transfer Guidance, Conditional Triggered Transaction, Datastructures, Apparatuses, Methods and Systems ("SOCOACT"), US 2017/0046689 A1, filed 14 July 2016, and issued 16 February 2017, https://patentimages.storage.googleapis.com/49/f4/22/74c201ca2c8dca/US20170046689A1.pdf.

[591] E-voting comprises stationary e-voting enabling voters to use technical means in the voting places, and remote e-voting, which facilitates technical means to be deployed in different locations. Laptev and Feyzrakhmanova, "Current Trends- Future Prospects", 9.

[592] DeMarinis and Voss, "E-Voting".

[593] DeMarinis and Voss.

[594] Spindler, "Gesellschaftsrecht und Digitalisierung", 50.

monitor the proxy, recall them when necessary, and owing to the secure data blockchain provides, review and analyse previous meetings.[595]

3.9.4.3. Drawbacks of Blockchain-based AGMs

There are some drawbacks of blockchain-based meetings, which will also be mentioned in the next section, namely board meetings via blockchain system.[596] Regarding potential problems about data protection, since transactions are mapped in blockchain, which can potentially reveal the identities of associated legal entities under certain circumstances, a public Blockchain can basically be viewed by anyone because they are part of blockchain.[597] Even if there is anonymisation because the transactions are encrypted, they can be identified because their keys are available, but even then, implementation in a blockchain should often meet the criteria of General Data Protection Regulation Art. 6,[598] since the data are required for the implementation of the contract and there is a legitimate rationale provided to support the processing of the data as a result.[599] Private blockchains may be used to overcome data protection problems.[600]

Given the protection against counterfeiting, blockchain is being discussed not only for the identification of shareholders but also for the examination of manipulation of the market or insider trading.[601] Nevertheless, blockchain is not a panacea, since it allows a clear allocation of transactions that can hardly be changed afterwards; but it gives no information on who actually initiated the transaction, that is, the actual control over a transaction is invisible to the outside even in a Blockchain.[602] Conversely, reporting obligations can be significantly minimised by utilising blockchain technology, as it provides the opportunity for the visibility of transactions and the identities of the participants involved.[603]

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[595] DeMarinis and Voss.
[596] See *infra* Part 3.9.5.3.
[597] Spindler, "Gesellschaftsrecht und Digitalisierung", 48–49.
[598] "Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the Protection of Natural Persons with Regard to the Processing of Personal Data and on the Free Movement of Such Data, and Repealing Directive 95/46/EC (General Data Protection Regulation)", https://doi.org/10.5040/9781782258674.
[599] Spindler, "Gesellschaftsrecht und Digitalisierung", 48–49.
[600] Spindler, 50.
[601] Spindler, 49.
[602] Spindler, 49.
[603] Spindler, 49.

Regardless of the possible disadvantages of blockchain, remote voting via blockchain will be more transparent and reliable and reduce AGM costs.[604] Blockchain, especially a private one, may accelerate voting for proposals. For instance, shareholders would be informed as soon as a proposal is uploaded to blockchain and can instantaneously cast their votes.[605] This would mean that AGMs are decentralised; namely, shareholders will be involved in a decentralised environment and yearly and centralised AGMs may be abrogated.[606] Consequently, it can be asserted that AGMs would be deprived of their purpose and seem unnecessary if information, communication, and decision-making occurred in secure ways beyond the AGM.[607] Nonetheless, it can be argued that this is unlikely for the foreseeable future, particularly for the shareholders to vote.

Shareholders will be able to vote safely by holding a decentralised AGM without the need for an official at the meeting; thus, there would be no need to prepare the necessary physical environment to organise the meeting.[608] Moreover, problems encountered in a family company or cooperative AGM can be eliminated as a consequence of blockchain technology.[609]

A smart contract may send the minutes of the AGM and other documents to a repository.[610] This will enable the attendance to be instantly registered in a fixed and searchable format.[611] For example, to back up records of meetings, Northern Trust, a financial services company, deploys a Blockchain system, which adopts a sequence of smart contracts to catch data concerning the meeting, such as the attendance and the time and the place of the meeting.[612] This demonstrates that after the data are transformed into minutes in the format of standardised smart contracts, minutes can be stored in blockchain.

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[604] Lafarre and Van der Elst, "Blockchain Technology", 18.
[605] Lafarre and Van der Elst, 16, 18.
[606] Lafarre and Van der Elst, "Blockchain Technology", 18.
[607] Enriques and Zetzsche, "Corporate Technologies", 15.
[608] Akın, "Dijital Gelişmeler", 16.
[609] Akın, 16.
[610] Christine Kim, "Northern Trust Wins Patent for Storing Meeting Minutes on a Blockchain", 13 September 2021, https://www.coindesk.com/markets/2018/06/06/northern-trust-wins-patent-for-storing-meeting-minutes-on-a-blockchain/.
[611] Enriques and Zetzsche, "Corporate Technologies", 65.
[612] Kim. Since 2017, Northern Trust has been utilising a private Blockchain it developed with IBM to catch key data.

In conclusion, although virtual AGMs may not be mandatory in the near future because not everyone is integrated, the COVID-19 Pandemic accelerated the transition process as those who previously did not care had to adjust their legislation. Hence, virtual AGMs will appear to be important after the pandemic.

3.9.5. Having Board Meetings via Blockchain

3.9.5.1. Virtual Board Meetings

Holding a virtual board meeting is optional in many countries,[613] but if it is to be held, it is a prerequisite to be stated in the articles of association[614] in Türkiye.[615] In Türkiye, pursuant to TCC No. 6102 Art. 390/1, boards can meet in an electronic environment. In accordance with Art. 1527/1, board meetings can be held virtually provided that the articles of association dictate it. Moreover, in order to hold an electronic meeting, certain conditions are sought, such as having a website dedicated to this purpose and keeping the identities of the voters, proving the suitability of electronic media tools for effective participation with a technical report, and registering and announcing this report.[616] The registration here is constitutive; hence, meetings without registration are invalid.[617] *Merkezi Kayıt Kuruluşu* (MKK) provides services for online meetings in Türkiye. One of them being electronic BoD, various services regarding corporate governance are provided by MKK.[618]

Today, many providers offer services for virtual meetings, for both AGMs and board meetings, in numerous countries.[619] Furthermore, whereas the COVID-19

[613] For the legal frameworks of different regions in the world regarding shareholder and board meetings, see Eknath, Londero, and Simonyan, "Virtual Meetings". For different practices in the USA, see "Are Virtual Board & Committee Meetings Legal?", *OnBoard*, accessed 11 January 2023, https://www.onboardmeetings.com/resources/virtual-board-meetings-law/. California and Illinois have amended their corporate law to facilitate the BoD to meet in any means that provides the communication. Tyra W. Hilliard, "The Law of Virtual Board Meetings", *Corbin Ball & Co.*, accessed 11 January 2023, https://www.corbinball.com/article/31-liability-and-legal-issues-in-meeting-planning/127-the-law-of-virtual-board-meetings.

[614] Eknath, Londero, and Simonyan, "Virtual Meetings". They assert that COVID-19 Pandemic demonstrates the inadequacy of adapting to the restrictions on travel and gatherings because most companies could not hold meetings as they had not included virtual meetings in their articles of association. Therefore, most countries regulated emergency legislation to address the issue.

[615] TCC No. 6102 Art. 1527/1.

[616] TCC No. 6102 Art. 1527/3.

[617] Necla Akdağ Güney, *Anonim Şirket Yönetim Kurulu*, 2. (Istanbul: Vedat Kitapçılık, 2016), 256.

[618] "About Us", accessed 28 May 2023, https://www.mkk.com.tr/en/about-us/about-us; "Merkezi Kayıt Kuruluşu Central Securities Depository of Türkiye", 1 May 2023, https://www.mkk.com.tr/sites/default/files/2023-05/MKK-Corporate-Profile.pdf.

[619] Some firms are providing zoom integration or voting services. See "The Most Effective, Simple, and Secure Way to Run Your Board Meetings", *OnBoard*, accessed 11 January 2023,

Pandemic has increased virtual meetings, as mentioned before, some countries have already installed meetings before the pandemic. For instance, some countries, such as South Africa, since 2011, Türkiye, since 2012,[620] and Costa Rica, since 2018, enables companies to hold virtual meetings.[621] In accordance with Law No. 222 of 1995, Colombia also allows virtual meetings.[622] As per Companies Act of 2017, Pakistan paves the way for attending a meeting through a video link.[623] Furthermore, in Vietnam, pursuant to the 2020 Law on Enterprises Art. 59.4 and Art. 144.3, shareholders can participate in an online meeting and exercise voting rights via electronic voting or other electronic means,[624] and tele- and videoconference are also considered attendance in person for the meetings in Taiwan.[625]

https://www.onboardmeetings.com/. Board management software, such as iDeals Board, Diligent, Boardvantage. See "Virtual Board Meetings: An In-Depth Guide for Board Members", *Board Portal*, 3 June 2021, https://board-room.org/blog/virtual-board-meetings/.

[620] TCC No. 6102 Art. 1527; "Anonim Şirketlerde Elektronik Ortamda Yapılacak Genel Kurullara İlişkin Yönetmelik", Official Gazette No: 28395 § (2012), https://www.mevzuat.gov.tr/File/GeneratePdf?mevzuatNo=16548&mevzuatTur=KurumVeKurulusYonetmeligi&mevzuatTertip=5; "Anonim Şirketlerin Genel Kurul Toplantılarının Usul ve Esasları Ile Bu Toplantılarda Bulunacak Bakanlık Temsilcileri Hakkında Yönetmelik", Official Gazette No: 28481 § (2012), https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=16800&MevzuatTur=7&MevzuatTertip=5.

[621] Eknath, Londero, and Simonyan, "Virtual Meetings".

[622] Moreover, although the health emergency has ended, Decree 398 of 2020, a Covid-19 regulation, seems to be still in force with Decree 1074 of 2015. Nevertheless, Law No. 222 of 1995 Art. 19 is also applied, namely, all participants should be able to simultaneously or successively deliberate or decide in a virtual meeting. "Reuniones Virtuales de Órganos Sociales Después de La Emergencia Sanitaria", *BéndiksenLaw*, 7 July 2022, https://www.bendiksenlaw.co/virtual-meetings-of-corporate-organs-after-the-health-emergency/; "Reunión Del Máximo Órgano Social o de Junta Directiva Puede Ser Presencial, No Presencial o Mixta", *ÁMBITO JURÍDICO*, 19 July 2022; Claro Manuel Cotes, "Aspectos Sobre La Vigencia Del Decreto 398 de 2020 Para Continuar Las Reuniones Virtuales de Órganos Societarios Habiéndose Finalizado La Emergencia Sanitaria", *Lexir*, 25 July 2022, https://lexir.co/2022/07/25/aspectos-sobre-la-vigencia-del-decreto-398-de-2020-para-continuar-las-reuniones-virtuales-de-organos-societarios-habiendose-finalizado-la-emergencia-sanitaria/.

[623] "The Companies Act, 2017", 30 May 2017, https://www.secp.gov.pk/document/companies-act-2017/?wpdmdl=28472.

[624] Eknath, Londero, and Simonyan, "Virtual Meetings"; Duong Le Van, "Convening Efficient Company Meetings in Today's Environment", *Vietnam Investment Review*, 27 September 2021, https://vir.com.vn/convening-efficient-company-meetings-in-todays-environment-88000.html.
However, meeting minutes shall include the place of the meeting; hence, this may cause an obstacle to overcome to have a virtual-only meeting.

[625] Eknath, Londero, and Simonyan, "Virtual Meetings"; Gregory Buxton and Hsueh-ming Teng, "Conducting Virtual Board and Stakeholder Meetings in Taiwan", *AmCham Taiwan*, 21 February 2022, https://topics.amcham.com.tw/2022/02/conducting-virtual-board-and-stakeholder-meetings/; Oli Wong and Hannah Kuo, "Taiwan FSC Promulgated Relevant Requirements for Virtual Shareholders' Meetings of Public Companies", *Lee, Tsai & Partners*, April 2022, https://www.leetsai.com/general-corporate-affairs/the-taiwan-fsc-promulgated-relevant-requirements-for-virtual-shareholders-meetings-of-public-companies; "Board Meeting Requirements", *DLA Piper*, 27 June 2022, https://www.dlapiperintelligence.com/goingglobal/corporate/index.html?t=31-board-meeting-requirements&c=TW; Neesha Wolf, "Virtual AGMs in Taiwan: No Pandemic Required", *Asian Corporate Governance Association (ACGA)*, 13 October 2022, https://www.linkedin.com/pulse/virtual-agms-taiwan-pandemic-required-.

3.9.5.2. Board Meetings and Blockchain

It can be asserted that virtual meetings and meetings using Blockchain systems relate to each other. Hence, they have similar advantages and disadvantages, which apply to both AGMs and board meetings. Regarding benefits of these kinds of meetings, firstly, better attendance should be scrutinised. Those who live in another country can participate in the meetings especially of multinational corporations. Virtual meetings reduce time commitment and eliminates travel time, which will lead to better attendance.[626] Although directors who reside in the same country as the company's headquarters may easily attend the meetings, they still may not participate in a face-to-face meeting because of travel time or time commitment, particularly in a metropolis. Thus, constituting a quorum for meetings would also be easier via virtual meetings.[627]

Secondly, increased diversity should be examined. Diversity provided by virtual meetings[628] would be due to board members from different locations around the world.[629] Thus, companies will be encouraged to recruit directors from far away. This will particularly benefit multinational corporations, which have difficulty in recruiting directors from different countries.[630] Thirdly, meetings via blockchain systems can considerably decrease administrative tasks. Smart contracts and blockchain most likely accelerate document preparation and distribution. Directors can efficiently and easily acquire documents prior to, throughout, and following the meeting; thus, they have more time for decision-making processes and require less time to search for materials.[631] Being better equipped in terms of emergency board meetings and making timely decisions[632] will contribute to achieving good corporate governance. Thus, directors can concentrate on governance issues rather than menial tasks.[633]

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[626] "Virtual Board Meetings: An In-Depth Guide for Board Members"; "Transitioning from In-Person to Virtual Board Meetings.", *Acclime*, 30 August 2022, https://www.acclime.com/insights/virtual-board-meetings/.
[627] "Virtual Board Meetings: An In-Depth Guide for Board Members".
[628] "Virtual Board Meetings: An In-Depth Guide for Board Members"; "Transitioning from In-Person to Virtual Board Meetings."
[629] For more information on board diversity, see *infra* Part 4.6.
[630] "Virtual Board Meetings: An In-Depth Guide for Board Members"; "Transitioning from In-Person to Virtual Board Meetings."
[631] "Virtual Board Meetings: An In-Depth Guide for Board Members"; "Transitioning from In-Person to Virtual Board Meetings."
[632] "Virtual Board Meetings: An In-Depth Guide for Board Members".
[633] "Virtual Board Meetings: An In-Depth Guide for Board Members".

3.9.5.3. Drawbacks of Virtual Meetings and the Blockchain Solution

Virtual meetings have some problems, but blockchain can solve them. Firstly, security risks in terms of confidential information[634] should be analysed. By mitigating the risk of a data breach, blockchain may contribute to preventing security breaches of susceptible issues, such as business strategies and financial performance.[635] Blockchain can be beneficial in this regard because the authentication of the information is uploaded to the system, not the information itself. Moreover, more nodes provide more transparency, contributing to security.

Secondly, technology consists of risks of technical issues. For instance, lost internet connection,[636] unpredicted reboots, and conservative directors who consider technology challenging[637] are amongst technical problems. These can be overcome with blockchain technology because the system refreshes and saves itself at equal intervals; thus, information is less likely to be lost.

Thirdly, whereas in face-to-face meetings, people are more imposed to concentrate and participate in the discussion, virtual meetings may cause unwanted distractions, namely being busy with other things, such as taking care of children and pets, checking the inbox, and grabbing a cup of coffee.[638]

Last but not least, some scholars argue that not being accustomed to, or comfortable with, online meeting protocols may cause less involvement, namely less participation in the discussions.[639] Therefore, publicity has great value regarding technology usage. On the one hand, in virtual meetings, reading body language and expressions may not be as easy as it is in face-to-face ones.[640] It is argued that board chairs may easily keep participants engaged[641] and thus manage the meeting with ease. In addition, some scholars claim that physical and social cues are hard to read in a virtual meeting, and therefore, some members may be hesitant to speak up,[642] causing

[634] "Virtual Board Meetings: An In-Depth Guide for Board Members"; "Transitioning from In-Person to Virtual Board Meetings."
[635] "Virtual Board Meetings: An In-Depth Guide for Board Members".
[636] "Virtual Board Meetings: An In-Depth Guide for Board Members"; "Transitioning from In-Person to Virtual Board Meetings."
[637] "Transitioning from In-Person to Virtual Board Meetings."
[638] "Virtual Board Meetings: An In-Depth Guide for Board Members".
[639] "Transitioning from In-Person to Virtual Board Meetings."
[640] "Virtual Board Meetings: An In-Depth Guide for Board Members".
[641] "Virtual Board Meetings: An In-Depth Guide for Board Members".
[642] "Virtual Board Meetings: An In-Depth Guide for Board Members"; "Transitioning from In-Person to Virtual Board Meetings."

other members to monopolise the conversation and the possibility of decisions being less conscious.[643]

On the other hand, it can be argued that people can participate better in virtual meetings, because some would be more reserved in face-to-face meetings. That is to say, since the virtual environment is not face-to-face, people, particularly introverts,[644] can behave more comfortably when distance comes in between, because they would be shyer face-to-face, and this also applies to AGMs. In fact, board members should be people who can explain their ideas. However, even board members may hesitate to express their opinions in the presence of an AI.[645] Nonetheless, AI and blockchain applications will benefit people who are not normally given the opportunity to express their ideas. Virtual meetings will lower operating costs and thus enhance corporate governance.[646] Moreover, they will reduce energy consumption, except for that of blockchain systems. Nevertheless, it is argued that blockchain technology can halve the global carbon footprint,[647] which is of great value to sustainability.

3.9.6. Terminating the Company via Blockchain

Lastly, this section will scrutinise the potential for implementing Blockchain to dissolve a company. The company may be terminated for various reasons, such as the reason for termination being written in the articles of association, the company being established for a certain period, termination by the general assembly's decision, or bankruptcy. In order for the company to be terminated, a dissolution process is needed to wind up its affairs, such as paying the debts and collecting the receivables.[648]

It can be asserted that owing to the deployment of blockchain to address the processes of dissolution and liquidation of a company, the document load will be reduced, and procedures will be shortened. Moreover, actors such as liquidation officers, and some procedures, especially registration in the trade registry, may need

[643] "Transitioning from In-Person to Virtual Board Meetings."
[644] For a study on virtual reality (VR), see Michael De Medeiros, "VR Interaction Puts Introverts at Ease", *VR Fitness Insider*, 16 February 2017, https://www.vrfitnessinsider.com/vr-interaction-puts-introverts-ease/.
[645] AI may influence board members' decisions. See *supra* Part 2.6.2.
[646] Eknath, Londero, and Simonyan, "Virtual Meetings".
[647] Eknath, Londero, and Simonyan; Coen, "Virtual AGMs"; Murtaza Merchant, "How Blockchain Technology Can Help Halve the Average Global Carbon Footprint by 2050", *Moneycontrol*, 31 October 2022, https://www.moneycontrol.com/news/business/cryptocurrency/how-blockchain-technology-can-help-halve-the-average-global-carbon-footprint-by-2050-9419391.html.
[648] Serhan Dinç, "6102 Sayılı Kanuna Göre Anonim Şirketlerde Sona Erme", *Yıldırım Beyazıt Hukuk Dergisi*, no. 2 (2016): 226.

to be revised with blockchain. The debts of the company are settled using its assets, and what is left is distributed to the shareholders in a liquidation process,[649] for which blockchain technology can be utilised.

Suppose the company is established for a definite term specified in the articles of association. In that case it can be argued that the dissolution process can be automatically put into practice with smart contracts. When the smart contract recognises the condition is fulfilled, it will execute the liquidation process. However, if a definite-term company continues its operations for an indefinite term, the smart contract should understand this fact and not start self-execution. Furthermore, if the purpose of the company is realised or it becomes impossible, the smart contract will still fulfil the process in question. AI may support smart contracts to detect whether the conditions are met in these examples. In addition, another example would be mergers and acquisitions. During a company's termination upon merger or acquisition, the transactions may be made on blockchain, and smart contracts may directly execute them. In fact, AI is usually used in the phase of due diligence.[650]

Blockchain technology may also be deployed in insolvency proceedings and restructuring processes. This demonstrates how preventive and formal corporate restructuring will evolve in the digital era. Actors in an insolvency proceeding, such as insolvency practitioners, creditors, auditors, and evaluators,[651] will be affected by digitalisation. Blockchain systems will also help with the detection of the exact moment of insolvency.[652] In order for the system to detect that moment in time, it can be claimed that the company should already operate in a blockchain.

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[649] "Liquidate Your Limited Company", *Selling Your Business and Closing Down*, accessed 1 February 2023, https://www.gov.uk/liquidate-your-company.

[650] "How AI Is Changing Legal Due Diligence: Artificial Intelligence-Based Tools Are Becoming Increasingly Commonplace" (Mergermarket, 2020), https://www.traverssmith.com/media/6382/how-ai-is-changing-legal-due-diligence.pdf; "AI and Due Diligence: The Breakthrough That Changes the M&A Game" (Admincontrol), accessed 5 December 2022, https://admincontrol.com/content/uploads/2020/11/AI-and-due-diligence.pdf; "AI Due Diligence", *Ansarada*, accessed 5 December 2022, https://www.ansarada.com/due-diligence/ai; Lamia Massaad, "How Does AI Help in the Due Diligence Process?", *Cedar Rose*, accessed 5 December 2022, https://www.cedar-rose.com/article/15458-how-does-ai-help-in-the-due-diligence-process_; "Practical Considerations of Using AI in Due Diligence", *Dentons*, 2 September 2022, https://www.dentons.com/en/insights/articles/2022/august/31/practical-considerations-of-using-ai-in-due-diligence.

[651] Costea, "Blockchain-Based Solutions", 276.

[652] Costea, 278.

Insolvency detection, alerting directors to the possibility of insolvency installation, and meeting legal requirements of pre-insolvency and insolvency processes can be given as examples of areas where blockchain systems can be deployed.[653] Regarding these proceedings, private blockchains may be more suitable because of confidentiality issues; otherwise, the debtor's reputation may be tarnished if the debtor's publicised financial state is temporary.[654]

Since the company's assets are recorded in the blockchain system, insolvency practitioners can retrieve the assets' history, which is time-consuming.[655] Moreover, it will accelerate international cooperation between practitioners and courts in cross-border insolvencies.[656] That is, blockchain technology presents various benefits, especially in insolvency, such as creating a digital trust that eradicates the need for trust between creditors and debtors concerning the restructuring plan.[657]

In fact, it can be argued that the lifespan of companies is also extended by using blockchain. For example, blockchain may prevent termination for just cause, such as the general assembly being unlawfully called to the meeting many times, the rights of minority shareholders being violated, the right to access information and examination being prevented, constant loss, the managing partners overtly evacuating the company, and a regular decrease in the dividends distributed.[658] Owing to blockchain, AGMs can be held easily, minority shareholders' rights are better protected, shareholders can examine any information because of publicity and decentralised structure, and private blockchains will contribute to confidential information.

In conclusion, blockchain will gain importance in dissolving a company, particularly multinational ones. The most important benefits of using blockchain systems would be time savings and cost reductions they bring. In the end, the company, which was established on blockchain beforehand will be terminated by the system. Consequently, it can be claimed that blockchain will be implemented in the upcoming

[653] Costea, 278–79.
[654] Costea, "Blockchain-Based Solutions", 277–78.
[655] Practitioners can add blocks that comprise information about the assets onto blockchain; thus, their market prices are ascertained. Costea, 279.
[656] Costea, 278.
[657] Costea, 276.
[658] These examples of just cause are from Swiss law. Dinç, "Sona Erme", 242.

years. This will not be instantaneous, which is not due to a lack of regulation, but because people are not knowledgeable enough about it.[659]

[659] Costea, “Blockchain-Based Solutions”.

4. DIGITALISATION AND CORPORATE GOVERNANCE

4.1. Corporate Governance

4.1.1. In General

Before examining the impact of digitalisation on corporate governance, one should highlight what corporate governance is composed of. A corporate is regarded as a "nexus of a set of contracts",[660] namely relationships between stakeholders, whether they are formal or informal.[661]

Corporate governance consists of the way the company governs its organisation. It comprises not only the economic interests of shareholders but also owning and managing resources.[662] It is composed of norms that originate from company law and can be observed in the articles of association; at the same time, these rules are affected by economic incentives, customs, and other matters.[663] They regulate the organisation, particularly the company's decision-making processes.[664] The rights and duties of the actors, namely shareholders and the management, are regulated by the principles of corporate governance, which foresee preventive incentives and enforcement mechanisms in the case of a conflict.[665]

Whereas in the narrow sense, corporate governance is the recognition of the rights of the shareholders by the company and the management of the company by establishing systems that allow the shareholders to use these rights effectively; in the broad sense, it is a system that includes policies, processes, and practices for the strategic management and the control of the company. It aims to ensure that the management and audit of companies are carried out as per the framework of the principles of "accountability", "fairness", "responsibility" and "transparency", and create the tools related to corporate governance.

Corporate governance, as a field of study, has emerged because directors, namely agencies, may pursue their own goals rather than considering shareholders' interests. Agency problem arises from the concept of separating ownership and

[660] Michael C. Jensen and William H. Meckling, "Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure", *Journal of Financial Economics* 3, no. 4 (1976): 8–9, https://www.sfu.ca/~wainwrig/Econ400/jensen-meckling.pdf.
[661] Enriques and Zetzsche, "Corporate Technologies", 79.
[662] Nikishova, "Digital Technologies Application", 86.
[663] Möslein, "Blockchain Applications and Company Law", 2020, 5.
[664] Möslein, 5.
[665] Möslein, 5.

control, which causes information asymmetry between the directors and the shareholders.[666] Corporate scandals such as "Enron", "Worldcom", "Parmalat", "Ahold" and "Yanguangxia", and other fraudulent bankruptcies especially demonstrated the need for corporate governance. The principles that will be mentioned below gained even more importance after the scandals in question.

Enhancing incentives between agents and principals, reducing information asymmetry, averting moral hazard and adverse selection, controlling costs, improving risk preferences, and monitoring are amongst the goals of the agency relationship.[667] The agency problem, information asymmetry, and balancing the relationship between shareholders and stakeholders are amongst the reasons why corporate governance is necessary.[668] Consequently, the concept, which started to be used in the US in 1979,[669] has become important all over the world. Corporate governance aims to protect every interest of shareholders and those of stakeholders, equally and ideally.[670] It is a system that manages and controls corporations considering various balances.[671]

The fundamental tenets of corporate governance are "transparency", "fairness", "accountability", and "responsibility".[672] Corporate governance is perceived as a way that guides the corporation, not as a concept that can be fully realised.[673] It provides not only to the legal entity but also to the shareholders and stakeholders.[674] A company's stakeholders are not only shareholders and the management, but also creditors, markets, and even society.[675] Used effectively, corporate governance affects the company well. For instance, it increases competitive capacity and enhances the ability to respond actively and quickly to crises at a low cost.[676]

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[666] Adolf A. Berle and Gardiner C. Means, *The Modern Corporation and Private Property*, Revised Edition (New York: Harcourt, Brace & World, Inc., 1968).
[667] Kaal, 'Blockchain-Based Corporate Governance', 3.
[668] Cafer Eminoğlu, *Türk Ticaret Kanunu'nda Kurumsal Yönetim (Corporate Governance)*, 1. (Istanbul: On İki Levha Yayıncılık A.Ş., 2014), 10.
[669] Oliver E. Williamson, "Transaction-Cost Economics: The Governance of Contractual Relations", *The Journal of Law & Economics* 22, no. 2 (1979): 233–61, http://www.jstor.org/stable/725118.
[670] Ali Paslı, *Anonim Ortaklık Kurumsal Yönetimi (Corporate Governance)*, 1. (Istanbul: Beta, 2004); Eminoğlu.
[671] Eminoğlu, *Corporate Governance,* 1.
[672] Paslı, *Corporate Governance*; Eminoğlu, *Corporate Governance*.
[673] Eminoğlu, 1–2.
[674] Paslı, *Corporate Governance,* 35.
[675] Eminoğlu, *Corporate Governance,* 2.
[676] Eminoğlu, 2.

At the global level, OECD prepared the Corporate Governance Principles. It was lastly published in 2015. The reform process for new rules, especially on sustainability, continues.[677] Corporate governance includes a series of relationships between the management, the BoD, shareholders, and stakeholders.[678] In addition, corporate governance contributes to the formation through which the aims of the company are determined, and thus, the means of achieving those goals and monitoring performance.[679] OECD corporate governance principles constitute an important resource, especially for Continental Europe.[680] The principles such as incentivising effective and transparent markets and conforming to the rule of law principle are valuable resources.

In accordance with Delaware General Corporation Law, corporations must be "managed by or under the direction of a board of directors".[681] However, BoDs do not actually manage companies but direct them by observing the management to save agency costs.[682] BoDs mediate the relationship between shareholders and the directors by providing the management with oversight and incentives to preserve the shareholders' interests.[683] They also play the role of mediators to avert conflicts with and amongst shareholders and stakeholders.

The Cadbury Report from the UK provides the literature with a corporate governance definition, that is, "the system by which companies are directed and controlled".[684] The Sarbanes-Oxley Act affects decision-making and risk management mechanisms in companies in the US.

TCC No. 6102 also takes into consideration corporate governance principles:

> These rules aim to increase the ability of the bodies to take the right decision at the right time and therefore focus on proposals that will bring

[677] Barnali Choudhury and Martin Petrin, "Revisions to the G20/OECD Principles of Corporate Governance—Sustainability in Name Only", *The Oxford Business Law Blog*, 3 November 2022, https://blogs.law.ox.ac.uk/blog-post/2022/11/revisions-g20oecd-principles-corporate-governance-sustainability-name-only.
[678] *G20/OECD Principles of Corporate Governance 2015* (OECD Publishing, 2015), 9, https://doi.org/10.1787/9789264236882-en.
[679] *G20/OECD Principles of Corporate Governance 2015*, 9.
[680] *G20/OECD Principles of Corporate Governance 2015*.
[681] Tit. 8., § 141(a) (2020).
[682] Enriques and Zetzsche, "Corporate Technologies", 72.
[683] Lynne L Dallas, "The Multiple Roles of Corporate Boards of Directors" 40 (n.d.): 801.
[684] Afterwards, the Hampel Report strengthened the Cadbury Report.

companies to a new partnership structure. The foundations of the aforementioned rules are transparency, good and accountable management, and effective internal and external auditing.[685]

Corporate governance permeates all the working mechanisms and relations of a partnership and dominates the work of its organs, units, and branches.[686] It affects various issues, such as the establishment of the company, the principles regarding the management, the rights and obligations stipulated by the articles of association, the rights of the shareholders and the regulation of the relationship between them, the formation of the organs, the informing of the relevant parties, that is, transparency, and the control mechanism of the governing bodies.[687] Hence, the principles "transparency", "fairness", "accountability", and "responsibility" should be considered in transactions and relations. It can be claimed that the use of technology will affect corporate governance.

4.1.2. Digital Corporate Governance

Digital corporate governance consists of processes that conduct the company's affairs by deploying digital technologies.[688] Using AI, blockchain, and smart contracts, namely CorpTech, can be given as examples of digital corporate governance. CorpTech may settle disputes in corporate governance because it can enable all stakeholders to participate in the management.[689] They provide a mechanism that enables transparency in governance actions.[690] Furthermore, it can help change the norms of corporate governance.[691] They enable more transparent, flat, and participatory corporate governance structures.[692] Technology can also promote democratic agendas.[693] CorpTech benefits the company in terms of managing and auditing in line with transparency, responsibility, fairness, and other principles. Hence, this will guarantee that information asymmetry will be eliminated, and the management and the audit will be independent.

[685] Turkish Commercial Code No. 6102 General Preamble, para. 88.
[686] Eminoğlu, *Corporate Governance*, 11.
[687] Eminoğlu, 11–12.
[688] Laptev and Feyzrakhmanova, "Current Trends- Future Prospects", 5.
[689] Carla L. Reyes, Nizan Geslevich Packin, and Ben Edwards, "Distributed Governance", *SSRN Electronic Journal*, 2017, 19, https://doi.org/10.2139/ssrn.2884978.
[690] Reyes, Packin, and Edwards, 18–19.
[691] Reyes, Packin, and Edwards, 19.
[692] Reyes, Packin, and Edwards, 19.
[693] Reyes, Packin, and Edwards, 20.

In fact, digital corporate governance is divided into three groups, namely "remote management", "smart management", and "AI management".[694] Remote management consists of the remote participation of corporate actors, whereas smart management includes pre-programmed algorithms to control the company, and AI management refers to the decision-making by AI.[695]

Blockchain will impact costs, liquidity, record-keeping, transparency of ownership, and other themes, thus altering the power relations amongst actors, including managers, minority shareholders, and auditors that comprise corporate governance.[696] Corporate activities such as electing the BoD can be executed with blockchain rather than paper mailings or secure e-proxy services.[697] Thus, a new director can be elected through blockchain instead of co-opting.[698]

On the other hand, AI has evaluative properties that are essentially beneficial to the corporation in terms of corporate structures and practices.[699] The vast amount of data regarding good governance practices provides AI with findings that aid prospective corporate governance practices.[700] It is also important for sustainability because, as mentioned in the section on AI in the appointment of Board Members,[701] the more suitable directors are selected, the more contributions to corporate governance practices may come to fruition. Some scholars allege that even if CorpTech accelerates processes, corporate governance practices will retain their key function of the restraining agency problem.[702] Furthermore, how transparent, trustworthy, and auditable AIs[703] can be achieved, and what the limit of AIs'

[694] Laptev and Feyzrakhmanova, "Current Trends- Future Prospects", 15.
[695] Laptev and Feyzrakhmanova, 15.
[696] Yermack, "Corporate Governance and Blockchains".
[697] De Filippi and Wright, *Blockchain and the Law*, 134; Lafarre and Van der Elst, "Blockchain Technology", 18–19.
[698] Lafarre and Van der Elst, 18–19.
[699] Chiu and Lim, "Technology vs Ideology", 12.
[700] Darie Moldovan and Simona Mutu, "Learning the Relationship Between Corporate Governance and Company Performance Using Data Mining", in *Machine Learning and Data Mining in Pattern Recognition: 11th International Conference, MLDM 2015, Hamburg, Germany, July 20-21, 2015, Proceedings*, ed. Petra Perner, 1st ed., Lecture Notes in Artificial Intelligence 9166 (Cham: Springer International Publishing : Imprint: Springer, 2015), 368–81, https://doi.org/10.1007/978-3-319-21024-7.
[701] See *supra* Part 2.6.3.
[702] Enriques and Zetzsche, "Corporate Technologies".
[703] Lehner et al., "Accounting and Auditing", 127.

accountability is, which is unavoidably shared between AIs and humans owing to the shared agency,[704] should be examined.

In a blockchain atmosphere, smart contracts may assist the relationship between shareholders and directors and implement transparency and trust that obliterate all agency costs.[705] Thus, it can be asserted that blockchain resolves the agency problem.

Moreover, the DAO shows how technologies can change corporate governance through completely new forms of organisation, especially regarding the separation of powers in the company, and the communication between the shareholders and between the DAO and other stakeholders.[706] In conclusion, DAOs exemplify a promising innovation regarding enhancing blockchain in terms of a transparent and self-managing organisation.[707]

4.2. The Principles of Corporate Governance within the Context of New Technologies

4.2.1. Transparency

The first key element of corporate governance is transparency. Transparency, also referred to as openness and disclosure, seeks to enlighten the public by disclosing information on topics concerning the corporation's management, wealth, and financial status.[708] The limit to this principle is confidential business information. Disclosed information should be revealed to the relevant parties and the public; therefore, it should be truthful, clear, sufficient, and comparable.[709] Thus, the problem of information asymmetry will be eliminated or reduced, and the financial status and performance of the partnership will be reported to the shareholders and other related parties. It will also serve to gain capital by attracting the attention of potential investors.[710] It is stated that this principle should also be realised for society.[711]

[704] Lehner et al., "Accounting and Auditing", 127.
[705] Lafarre and Van der Elst, "Blockchain Technology", 6.
[706] Schubert, "Digital Corporate Governance", 21–22.
[707] Chohan, "Autonomous Organization", 4.
[708] Paslı, *Corporate Governance*, 53.
[709] Paslı, 53.
[710] Paslı, 53–54.
[711] *G20/OECD Principles of Corporate Governance 2015*.

Transparency may be regarded as a precursor to accountability; therefore, a malicious algorithm cannot be held accountable unless it is subject to transparency.[712] Hence, it is reasonable to assume that all principles of corporate governance are interrelated.

Transparency seeks to enlighten shareholders, other actors in the capital market, and the public on the company, especially its financial situation; hence, the company should announce its relationships, reports, plans, projects, and other related documents to the public.[713] According to the General Preamble of TCC No. 6102, although public disclosure is regarded as transparency in the doctrine of joint-stock companies, the target audience of transparency is wider, and transparency is a product of the information society.[714] New tools in the companies enabling transparency are the internet, electronic transfers and websites that are required to be opened; therefore, every capital company should have a website and this website should work as a transparency-providing mechanism.[715] It can be claimed that the requirement of the information society is the use of CorpTech.

It can be argued that full transparency may be attained owing to AI. The selection processes of the directors will be transparent because AI can use clear and predetermined criteria. The same applies to the case that AI itself becomes a director, as people may hide their purpose in the decisions they take. During management activities, AI can demonstrate its decision-making stages, that is, it can be clearly seen by which processes it makes decisions, thus contributing to the fight against information asymmetry. However, AI should be unbiasedly programmed to realise this goal. It can also be claimed that full transparency providing shareholder trust will render the company's data integrity and its auditors, who may also be corrupt, unnecessary.[716]

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[712] Yanisky-Ravid and Hallisey, "Equality and Privacy", 482.
[713] Eminoğlu, 16.
[714] Turkish Commercial Code No. 6102 General Preamble, paras 68, 89.
[715] Turkish Commercial Code No. 6102 General Preamble, para. 89. For Public Disclosure Platform in Türkiye, see "KAP (Public Disclosure Platform)", *MKK*, accessed 29 May 2023, https://www.mkk.com.tr/en/corporate-governance-services/pdp-public-disclosure-platform. See *supra* Part 3.9.5. See also "Merkezi Kayıt Kuruluşu Central Securities Depository of Türkiye"; "E-ŞİRKET (Companies Information Portal)", accessed 29 May 2023, https://www.mkk.com.tr/en/corporate-governance-services/e-company-companies-information-portal.
[716] Yermack, "Corporate Governance and Blockchains", 24; Reyes, Packin, and Edwards, "Distributed Governance", 17–23; Vedat Akgiray, "Blockchain Technology and Corporate Governance Technology,

In terms of transparency, AI needs to be as explainable as possible.[717] However, related to AI's autonomous decision-making, "Explainable AI" encounters "the black-box problem",[718] which adversely affects transparency. Until AIs become transparent enough,[719] the fact that they take decisions and judgements may be unreasonable to expect; hence, their challenges and possible solutions should be further studied so that regulatory bodies, accounting firms, and audited organisations would comfortably transfer the decision-making to them.[720] Bias and lack of transparency due to "the black-box problem" should also be examined.[721]

Transparency in data ensures innocuous AIs, and thus, societal rights and norms, particularly of minority communities, which are generally bereft of resources or representation, will be protected.[722] Increasing transparency in the development, training, and operation of AI systems can help mitigate and decrease the potential harms mentioned earlier.[723]

Transparency consists not only of accounting information but also transparency of ownership.[724] Enhanced transparency will affect profit opportunities attainable by directors, institutional shareholders, shareholder activists, and other actors.[725] AI systems' capabilities and limitations, and their business models should be explainable and transparent to the stakeholders, that is, humans should be apprised of them.[726]

Transparency, which ensures the recording of the transactions in a verifiable way, and trust, which is provided by the immutability of the transactions, are two

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Markets, Regulation and Corporate Governance" (OECD, 2018), 24, https://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=DAF/CA/CG/RD(2018)1/REV1&docLanguage=En.

[717] However, it is subject to numerous restrictions and limitations. Möslein, "Robots in the Boardroom? Artificial Intelligence & Corporate Governance", 13.

[718] Möslein, 13. "The black box problem" refers to situations where it is impossible to know why AI makes the decision. Gözübüyük, "Yapay Zeka Algoritmaları", 1202–1203; A Definition of AI, 5. Pasquale 2015. In addition, technologies that comprise machine learning and deep learning are generally regarded as "black boxes" that are exceedingly difficult to comprehend and interpret. Kokina and Davenport, "Artificial Intelligence", 120.

[719] It would lead to safer AI systems. Yanisky-Ravid and Hallisey, "Equality and Privacy".

[720] Kokina and Davenport, "Artificial Intelligence", 120.

[721] Kokina and Davenport, 120.

[722] Yanisky-Ravid and Hallisey, "Equality and Privacy", 429.

[723] Yanisky-Ravid and Hallisey, 429.

[724] Enriques and Zetzsche, "Corporate Technologies", 69.

[725] Yermack, "Corporate Governance and Blockchains", 17.

[726] Hickman and Petrin, "Trustworthy AI and Corporate Governance", 597.

important features of blockchain.[727] In addition to decentralisation and the lack of a contact person or operator, which provides robustness against most types of classic attack methods,[728] the main advantages of blockchain are regarded as transparency, which makes arbitrariness, influence, and counterfeiting more difficult.[729] It is also highly resistant to censorship and control because information stored cannot be changed or deleted by any, particularly no central authority.[730]

Direct access to the information within the company makes internal communication more transparent and secure,[731] and the fact that accurate information reflecting the current state of the company is accessible to the interest groups of the company ensures the development of the corporate governance approach.[732] Consequently, the company's financial standing will be accessible on the blockchain to anyone, beyond the confines of solely the company's accounting department.[733] Furthermore, blockchain technology provides a neutral territory for actors to collaborate.[734]

Moreover, blockchain provides transparency for various stakeholders, such as institutional shareholders, by tracking their ownership of corporate equities.[735] For instance, debt and equity investors and the managers of the company are identified; thus, transparency lessens the probability of rent-seeking or corrupt behaviours.[736] In addition, detecting managerial ownership would be possible thanks to the transparency blockchain provides because insider buying and selling could be ascertained in real-time.[737] Thus, manipulations, such as backdating, would be difficult.[738]

Blockchain also enhances voting transparency,[739] and it is suggested that transparency provided by CorpTech, especially by blockchain,[740] may replace

[727] Lafarre and Van der Elst, "Blockchain Technology", 6.
[728] Nevertheless, since attacks can still occur, users are responsible for their IT security and must manage their own cryptographic private keys used to sign transactions. Welzel et al., *Mythos Blockchain*, 26.
[729] Welzel et al., 26.
[730] Welzel et al., 26.
[731] Akın, "Dijital Gelişmeler", 7.
[732] Schubert, "Digital Corporate Governance".
[733] Kaal, "Blockchain-Based Corporate Governance", 6.
[734] Kaal, 27.
[735] Yermack, "Corporate Governance and Blockchains".
[736] Yermack, 8.
[737] Yermack, 9.
[738] Yermack, 9.
[739] DeMarinis and Voss, "E-Voting".
[740] Since direct publicity will be provided with Blockchain, transparency will be realised. See Yermack, "Corporate Governance and Blockchains". See also *supra* Chapter 3.

disclosure of beneficial ownership and hinder the "empty voting" strategy, which separates voting rights and other features of share ownership, from being executed secretly.[741] These shifts may alter the balance of power between actors such as managers, directors, and shareholders.[742] Consequently, companies would willingly share information about themselves.[743] Additionally, it has the potential to decrease transaction costs and enhance liquidity within capital markets.[744] For example, there may be lower costs from the selection of directors.

Lastly, regarding DAOs, it is suggested that they ostensibly improve transparency to the detriment of security because DAOs' financial transaction records are kept on blockchain.[745] Hence, this issue should be further analysed.

4.2.2. Fairness

Another core principle of corporate governance is fairness. As per the General Preamble of TCC No. 6102, fairness overlaps the principle of equal treatment in a broad sense.[746] That means fairness applies not only to the shareholders but also to other stakeholders, such as employees and the public.

Fairness is one of the reasons why corporate governance, which particularly attempts to protect the rights of minority shareholders, has emerged. With AI and blockchain deployed in companies, the disadvantages that prevent minority shareholders and foreign shareholders from exercising their rights, which should be protected by fairness, will be eliminated.[747] Consequently, it can be claimed that investments increase owing to the principle of fairness. Hence, lawmakers have established regulations in favour of shareholders.[748] For instance, the right to access information may be regarded as a protective mechanism in terms of equal treatment. In addition, it can be argued that it is affected by the improvements in AI and blockchain technologies.

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[741] Yermack, "Corporate Governance and Blockchains", 9, 24; Enriques and Zetzsche, "Corporate Technologies", 69. Empty voting refers to holding more votes than economic ownership.
[742] Yermack, "Corporate Governance and Blockchains", 9.
[743] Yermack.
[744] Yermack, 19.
[745] Chohan, "Autonomous Organization", 1.
[746] Turkish Commercial Code No. 6102 General Preamble, para. 89.
[747] Eminoğlu, *Corporate Governance*, 17.
[748] Eminoğlu, 17.

Furthermore, fairness includes diversity and non-discrimination[749] and the duty to avoid biases.[750] That is to say, AI should obviate unfair bias and provide accessibility.[751] In addition, stakeholders likely to be affected need to be taken into account and included.[752]

How conflict of interest in the company is resolved is related to the principle of fairness. Fairness can be observed in AGMs. It is essential that shareholders, particularly minority shareholders, equally exercise rights originating from the law and the articles of association. Otherwise, the decisions taken should be null and void. Blockchain may ensure equal treatment with everyone speaking freely and voting easily through online meetings. Thus, especially minority shareholders will not hesitate to express their thoughts, and instead of being hindered, they will be recognised.

Relationships between bodies should also be regulated according to the principle of fairness.[753] The BoD must carefully fulfil its responsibilities towards the general assembly. It is essential that all transactions of the partnership are carried out according to good faith; thus, shareholders and potential investors would trust that the management does not conduct unfair and corrupt transactions.[754] At this point, there is no doubt that AI will contribute to the BoD. Since it will act fairly, except for biased AI, which acts pursuant to the programmer's or the consumer's will, the use of an impartial AI will ensure the realisation of the principle of fairness because it would be independent of humans' subjective understanding of fairness.

In addition, Blockchain-based voting systems may contribute to fair voting processes. E-voting would enhance equality, authorisation, one man one vote principle, authentication, privacy protection, and fairness as well as verifiability and completeness.[755]

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[749] See *infra* Part 4.6.
[750] Möslein, "Robots in the Boardroom? Artificial Intelligence & Corporate Governance", 14.
[751] Hickman and Petrin, "Trustworthy AI and Corporate Governance", 597.
[752] Hickman and Petrin, 597.
[753] Eminoğlu, *Corporate Governance*, 18.
[754] Paslı, *Corporate Governance*, 52–53.
[755] Andreas Meier, "Blockchain-Voting für MyPolitics und OurPolitics", in Blockchain: Grundlagen, Anwendungsszenarien und Nutzungspotenziale, ed. Hans-Georg Fill and Andreas Meier, Edition HMD (Wiesbaden: Springer Fachmedien Wiesbaden, 2020), 337–53, https://doi.org/10.1007/978-3-658-28006-2.

4.2.3. Accountability

4.2.3.1. In General

Accountability, often also referred to as the principle of internal liability,[756] consists of the management's transparency and rightness.[757] Under the principle, decisions should be explainable and have justified reasons.[758] Moreover, it necessitates professionality in decision-making processes,[759] namely, all transactions are expected to be accounted for and justified. BoD members are liable to the partnership, that is, to the shareholders, for the compensation of the losses arising from their decisions. Consequently, it can be claimed that because of these reasons accountability is considered an internal liability.[760]

4.2.3.2. Using AI

4.2.3.2.1. Effects of AI on Accountability

Accountability is built on transparency but is also related to responsibility.[761] Directors who do not feel responsible would not strive for partnership.[762] International reports highlight that directors' free decision-making should be implemented with effective accountability.[763] AI, in this regard, will have a huge advantage because it justifies its decisions. However, there is still a gap in the personality and management of AI in terms of the liability of the directors.[764] There is no consensus on whether AI is subject to the law and hence liable for its actions, and on BoD members' liability for AI's decisions.[765] It is argued that accessible mechanisms need to be anticipated that guarantee adequate redress.[766]

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[756] Paslı, *Corporate Governance,* 55–56; Eminoğlu, *Corporate Governance,* 19.
[757] Turkish Commercial Code No. 6102 General Preamble, para. 89.
[758] Turkish Commercial Code No. 6102 General Preamble, para. 89.
[759] Turkish Commercial Code No. 6102 General Preamble, para. 89.
[760] Paslı, *Corporate Governance,* 56.
[761] Möslein, "Robots in the Boardroom? Artificial Intelligence & Corporate Governance", 13. See *infra* Part 4.2.4.
[762] Eminoğlu, *Corporate Governance,* 21.
[763] See Cadbury Report (1991) *Report of the Committee on the Financial Aspects of Corporate Governance* (London: Gee, 1992), https://ecgi.global/code/cadbury-report-financial-aspects-corporate-governance.
[764] See also *supra* Part 2.6.1.
[765] Laptev and Feyzrakhmanova, "Current Trends and Future Prospects", 12–13.
[766] Möslein, "Robots in the Boardroom? Artificial Intelligence & Corporate Governance", 13.

CorpTech supporters suggest that there will be real-time accounting, and corporations willingly share their transactions.[767] There will be no need for quarterly financial reports issued by the company and its auditors.[768]

A conflict of interest may arise between the management, shareholders, or the corporation itself.[769] Therefore, to have effective corporate governance, there should be regulations on the obligations and the relationships of the management. Pursuant to Millstein Report, the principle of accountability is related to the control mechanism.[770] Directors must duly fulfil their duties, which are prescribed by the law and the articles of association and pursue the interests of the partnership in their transactions.[771] It would be reasonable enough to assume that AI would be more objective[772] in this regard. Thus, the company's performance would improve, and economic success would be achieved.

At this point, it is necessary to mention the directors' duty of care. Most of the time, directors are not independent when making decisions and may take instructions or prioritise the interests of a particular group.[773] In fact, directors should be independent so that they can freely take decisions; thus, they equitably become personally responsible for their decisions.[774] It is claimed that in the case that directors do not freely take decisions, and if the legislators do not make the necessary arrangements, the responsibilities of the directors will be limited and even eliminated.[775]

If AI is programmed free from influences, it will be able to independently take decisions. Thus, the BoD will be freed from being an entity that implements decisions taken by others. AI's personality and whether it can be a director will be decisive concerning its liability. Since it is not currently a member of the BoD, it has no liability.

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[767] Ryan Lazanis, "How Technology Behind Bitcoin Could Transform Accounting As We Know It", *BrainStation*, 22 January 2015, https://brainstation.io/magazine/how-technology-behind-bitcoin-could-transform-accounting-as-we-know-it.
[768] Yermack, "Corporate Governance and Blockchains", 24.
[769] Eminoğlu, *Corporate Governance*, 19.
[770] OECD Publishing, *Corporate Governance: Improving Competitiveness and Access to Capital in Global Markets: A Report to the OECD by the Business Sector Advisory Group on Corporate Governance*, Paris, 1998, https://doi.org/10.1787/9789264162709-en.
[771] Eminoğlu, *Corporate Governance*, 20.
[772] See also *supra* Parts 2.6.2., 4.2.2., and *infra* Part 4.6.
[773] Eminoğlu, *Corporate Governance*, 20.
[774] Eminoğlu, 20.
[775] Eminoğlu, 20.

Regarding the balance between freedom and accountability,[776] it can be argued that AI will be better at this than human members. It can also be claimed that accountability encompasses the duty to monitor.[777] Furthermore, an analogy may be drawn here with the delegation of authority of the BoD. Since it is debatable who is accountable in the delegation of authority, and the majority opinion is that the BoD and its members have a duty of oversight to monitor non-member senior officials;[778] it can be argued that notwithstanding AI's membership, that is, whether AI is considered a board member or not, AI would be subject to the board's duty of oversight and that of its human members.

4.2.3.2.2. Liability of AI

In the case AI has a legal personality, its liability for harm should be analysed. There are reasons why AI may be recognised as a person. For instance, if things go wrong, there will be someone to blame.[779] This may be the solution to possible accountability gaps caused by its "speed, autonomy, and opacity".[780] Remedies such as "first- or third-party compulsory insurance, automatic no-fault compensation funds, and liability caps" has been suggested by the European Parliament.[781] As mentioned before,[782] concerning AI, the parliament also considers a type of electronic personhood.[783]

Regarding the responsibility or liability arising from harm, the question of whether AI is a product or service should be examined. According to the former, namely, if the software is regarded as a product, only the producer will bear the liability for the damages caused by AI following strict product liability.[784] Product liability

[776] Paslı, *Corporate Governance*, 55.
[777] See OECD Publishing, *Corporate Governance*, 22.
[778] Eminoğlu, *Corporate Governance*, 21.
[779] Simon Chesterman, "Artificial Intelligence and the Limits of Legal Personality", *International and Comparative Law Quarterly* 69, no. 4 (October 2020): 82, https://doi.org/10.1017/S0020589320000366.
[780] See Simon Chesterman, "Artificial Intelligence and the Problem of Autonomy", *The Notre Dame Journal on Emerging Technologies*, 2020, https://doi.org/10.2139/ssrn.3450540; Simon Chesterman, "Through a Glass, Darkly: Artificial Intelligence and the Problem of Opacity", *The American Journal of Comparative Law* 69 (2021): 271–94, https://doi.org/10.1093/ajcl/avab012.
[781] Andrea Bertolini, "Artificial Intelligence and Civil Liability", *Artificial Intelligence and Civil Liability, Legal Affairs. Study for the European Parliament*, July 2020, 14.
[782] See *supra* Part 2.6.1.
[783] "Report with Recommendations to the Commission on Civil Law Rules on Robotics". See also Paweł Nowik, "Electronic Personhood for Artificial Intelligence in the Workplace", *Computer Law & Security Review* 42 (September 2021), https://doi.org/10.1016/j.clsr.2021.105584.
[784] Chiu and Lim, "Technology vs Ideology", 19.

accepts that consumers do not affect the operating AI. However, this may not be the case because AI may reach a different conclusion from the initial programming because of the end user's inputs or other reasons.[785]

AI is currently not liable; hence, it is unsettled as a result of the uncertainty of who will be held liable if a liability case is filed. In Türkiye, AIs were normally considered goods; hence, they were subject to the Law on Consumer Protection. As in the EU, the user had no liability, unlike the liability of the producer. However, The EU has progressed in studies with the newly released directive. This indicates that the user may also be liable for AI.[786]

4.2.3.2.3. The EU Directive

As per the AI Ethics Guidelines, relevant mechanisms need to be established to guarantee responsibility, accountability, and possible compensation.[787] Auditing, reporting, and minimising negative impacts[788] are of great importance according to the Guidelines. Hence, the Proposal for AI Liability Directive[789] regulates a liability regime that comprises the liability of the end user in the case of negligence in the instructions. That is to say, strict product liability will no longer exist. It can be claimed that AI should therefore be considered the latter, namely a service. However, regarding the fact of proof, the presumption of a causal link (*causa proxima*) needs to be analysed. In other words, it cannot be asserted that only the designer and producer have responsibility.

4.2.3.2.4. Thoughts on Liability of AI

Regarding the development, accountability and explainability of AI, it may be suggested that software suppliers should be properly governed[790] because AI may act

[785] Chiu and Lim, "Technology vs Ideology", 19.
[786] In 2018, Uber's "self-driving" taxi hit a pedestrian, and it was decided that Uber would not be accused of a crime. Sean Hollister, "Uber Won't Be Charged with Fatal Self-Driving Crash, Says Prosecutor", *The Verge*, 6 March 2019, https://www.theverge.com/2019/3/5/18252423/uber-wont-be-charged-with-fatal-self-driving-crash-says-prosecutor. However, the backup driver was charged with a crime. Moreover, Uber, by itself paid compensation to the victim's family. "Human Driver of 'Driverless' Car Charged in 2018 Ped Death", *Streetsblog*, 16 September 2020, https://usa.streetsblog.org/2020/09/16/human-driver-of-driverless-car-charged-in-2018-ped-death/.
The fact that the backup driver was criminally liable may be comparable to the user's liability in terms of the liability case.
[787] High-Level Expert Group on Artificial Intelligence, "Ethics Guidelines for Trustworthy AI", 19–21.
[788] High-Level Expert Group on Artificial Intelligence, 14,19.
[789] "Proposal for a Directive of the European Parliament and of the Council on Adapting Non-Contractual Civil Liability Rules to Artificial Intelligence (AI Liability Directive) COM(2022) 496 Final".
[790] Chiu and Lim, "Technology vs Ideology", 14.

outside the scope of its programming, as in the example of "radical/disruptive AI".[791] In this case, if there is a corporate loss due to the AI's decision, it should be examined whether there will be product liability or personal liability. Breached fiduciary duties cause individual liability, but the personal accountability of human directors will likely disappear with AI directors.[792]

Firstly, the decrease in the number of humans in the management due to AI directors may hamper human directors' position in terms of personal liability cases that will most likely focus on humans rather than AI.[793] On the other hand, to what extent humans can delegate duties to AI[794] should be examined because the overconfidence of humans, as there are AIs that solve every problem, may lead to errors. In addition, AI's liability may cause the other directors to act irresponsibly.[795]

Secondly, a wholly AI-based management may change the liability regime. For instance, AI may be sued; managerial liability may be abolished; or programmers, producers, or other suppliers may be held liable.[796] It is suggested that product liability will prevail.[797] However, the new AI Directive demonstrates that this last possibility, namely suppliers' liability, may not be the case because consumers will also be liable. Nevertheless, a situation where there are no human managers requires an analysis of who the consumers are.

On the previous question, some scholars argue that the corporation itself, as the user, will be responsible.[798] Whether AI is created by the company or there is an external input, the result is the same.[799] Whereas the former resembles strict product liability, the latter is comparable to consumer liability. It is foreseen that corporate law rules will concentrate on *ex-ante* control of AI,[800] that is, accountability for the

[791] Chiu and Lim, "Technology vs Ideology", 19.
[792] Petrin, "Corporate Management", 1013.
[793] Petrin, 1013–14.
[794] Petrin, 1014.
[795] Chiu and Lim, "Technology vs Ideology".
[796] Petrin, 1015–18.
[797] Petrin, 1018.
[798] Armour and Eidenmüller, "Self-Driving Corporations?", 111.
[799] Armour and Eidenmüller, 111.
[800] Möslein, "Robots in the Boardroom".

decisions, rather than *ex-post* control of managerial behaviour, namely accountability for the outcome.[801]

Some scholars,[802] taking no notice of the possibility of "Super AI", assert that AI lacks true agency because of being subject to human-induced goals and decisions. Hence, they claim that humans and AIs should share accountability. However, AI may be organised like legal persons, such as banks.[803] Thus, it will have capital; and if it is held liable, there will be no need for a real person[804] to be held accountable for the damage caused by AI.

4.2.3.3. Utilising Blockchain

Regarding blockchain, it is claimed that accountability does not necessitate a principal–agent relationship and can still reveal in blockchain across a great variety of stakeholders.[805] It is also suggested that accountability functions differently in public, private, and consortium Blockchains, and the relationship between trust and consensus through transparency is inverse because there is less transparency in private Blockchains.[806]

Since transactions on blockchain can be easily verified, especially through automated processes, auditors' function would transform into being analysts of the amounts of data to be found and developers of corresponding checking algorithms.[807] It is argued that even if there is ex-post inspection, namely not in real-time, problems regarding the secrecy of data, necessitates the auditor continuing the role of the trusted third party.[808]

Another issue that arises in terms of accountability is the version difference between Blockchain systems. For example, Bitcoin version 0.8 was incompatible with

[801] For the role of *ex-ante* and *ex-post* accountability on agents' risk-taking, see Monique M.H. Pollmann, Jan Potters, and Stefan T. Trautmann, "Risk Taking by Agents: The Role of Ex-Ante and Ex-Post Accountability", *Economics Letters* 123, no. 3 (June 2014): 387–90, https://doi.org/10.1016/j.econlet.2014.04.004.
[802] Lehner et al., "Accounting and Auditing".
[803] Banks are joint-stock companies in accordance with Turkish law.
[804] However, it can be argued that there will be the ultimate beneficial owner of AI, just like companies.
[805] Bridget Tyma et al., "Understanding Accountability in Blockchain Systems", *Accounting, Auditing & Accountability Journal* 35, no. 7 (22 August 2022): 1625–55, https://doi.org/10.1108/AAAJ-07-2020-4713.
[806] Tyma et al.
[807] Spindler, "Gesellschaftsrecht und Digitalisierung", 51.
[808] Spindler, 51.

the earlier version. Hence, it was downgraded to the 0.7 version with consensus.[809] In this case, the question of who will be responsible for the loss when there is a version difference in blockchain should be examined. Companies took the loss in this example for the greater good because they knew that the long-term return would be more important than the short-term gain.[810]

4.2.3.4. Regarding DAOs

Concerning DAOs, the possibility of an accountability problem is due to the legal indeterminacy of DAOs.[811] Questions such as how the legal nature of DAOs will be determined, who will be held responsible for the damages they cause to their members and third parties, and which jurisdiction they will be subject to have not yet been answered.[812] It is crucial to ascertain the legal nature of these organisations in order to establish an adequate legal infrastructure in terms of both accountability and the protection of the investor because investors would have no protection without legal recognition.[813] Since DAOs have no legal status, individuals are subject to personal liability instead of limited liability protection.[814] In addition, if DAOs are regarded as general partnerships,[815] which is another opinion in the literature,[816] token-holders will have fiduciary duties as partners, and therefore, the legal liability risk may discourage potential members from participating in the DAO.[817]

However, some argue that since legal personality emerges only when there is one or more individuals who can be held responsible for the actions of the particular

[809] "11/12 March 2013 Chain Fork Information", *Bitcoin*, 16 May 2013, 12, https://bitcoin.org/en/alert/2013-03-11-chain-fork.
[810] Bambara and Allen, *Blockchain*, 222; Magnuson, *Blockchain Democracy*, 41–44.
[811] For instance, similar structures in the US were considered illegal offers of unregistered securities. Chohan, "Autonomous Organization", 3.
[812] Yılmaz Orhan, "Decentralized Autonomous Organizations".
[813] Metjahic, "Dao", 1547.
[814] Metjahic, 1547.
[815] Regarding the general partnership, opponents of this opinion also argue the duration of the organisation. They claim that DAOs are established for a limited period and therefore cannot be general partnerships. However, this opinion is opposed by Metjahic with the argument that DAOs are not for a limited duration or purpose because of the nature of the relationship being between the token holders who are joined together to invest in several different projects. Metjahic, 1562.
[816] Metjahic, 1562. However, the DAO is also regarded as "…an arrangement that bears little resemblance to that of a genuine general partnership…" "Report of Investigation Pursuant to Section 21(a) of the Securities Exchange Act of 1934: The DAO" (The United States Securities and Exchange Commission, 25 July 2017), 14, https://www.sec.gov/litigation/investreport/34-81207.pdf.
[817] Metjahic, 1547.

organisation, DAOs are unsuitable for being legal persons because of their decentralised and autonomous nature.[818]

Another opinion is that DAOs can be characterised as limited liability companies (LLCs) without a partner.[819] It is stated that since DAOs regulate various scenarios with smart contracts, they can continue their activities without a partner, even if the LLC partner is not present for a certain period of time because of death or any other condition.[820] In fact, in Wyoming, DAOs are regarded as a form of LLC; hence, the rights of DAO members may differ substantially from the rights of other LLC members.[821]

In conclusion, accountability covers not only the actions and responsibilities of the managers but also the whole partnership, policies, and management mentality. Therefore, in general, the company should be managed professionally, transparently, and truthfully, in which AI and blockchain will also gain importance. If AI is used not only as a manager in the company but also at other levels, it will enhance the policies of the partnership and ensure its sustainability. However, AI's accountability is still being debated. Furthermore, DAOs' legal status is not yet been determined.

4.2.4. Responsibility

Responsibility, often also referred to as external responsibility,[822] means to consider the interests of legal entities of partnerships, directors, shareholders, and those who are not shareholders but are affected by the operation of the partnership in the process of making decisions.[823] Consequently, the concepts of shareholders and stakeholders need to be analysed. Whereas shareholders have shares in a company, stakeholders include not only shareholders but also others such as creditors, employees, suppliers, players in capital markets, potential shareholders, consumers, and distributors;[824] in short, it comprises anyone who has interests in the company. Hence, stakeholders may actually consist of the public, which also has interests in the company that needs to be

[818] Hassan and De Filippi, "Decentralized Autonomous Organization", 6–7.
[819] Yılmaz Orhan, "Decentralized Autonomous Organizations", 161.
[820] Bayern, "Bitcoins", 1496–97; Bayern, "Autonomous Systems", 102; Yılmaz Orhan, "Decentralized Autonomous Organizations", 161–62.
[821] "Wyoming Decentralized Autonomous Organization Supplement", 17-31–104, accessed 9 February 2023, https://sos.wyo.gov/Forms/WyoBiz/DAO_Supplement.pdf.
[822] Paslı, *Corporate Governance,* 57.
[823] Eminoğlu, *Corporate Governance,* 22–23.
[824] Paslı, *Corporate Governance,* 57.

protected. The relationship between the stakeholders and the company is not one but two-sided, and as long as the rights are protected, the company will also benefit from it. For instance, potential shareholders will become shareholders, or the consumers will choose the company in question.

Under the responsibility principle, the partnership should consider all stakeholders affected by its operation in the process of making decisions.[825] It can be argued that responsibility is related to "environmental, social, and governance (ESG) issues". Thus, the performance and sustainability of the company will increase. The contribution of AI to the responsibility principle is undeniable because an AI programmed to be unbiased in the process of making decisions and to consider the public would follow this principle in a manner that improves corporate governance.

With the broad interpretation of the stakeholder concept, the principle of responsibility imposes a social management mission on the partnership, namely "corporate social responsibility" (CSR),[826] which embraces social responsibilities such as protecting the environment, respecting human rights, contributing to social education, and protecting the weak. CSR, regarded as a reflection of transparency, necessitates striking a balance between shareholders', the company's, and the public's interests.[827] However, the relationship between the company and the public is not one-sided; rather it also benefits the company. A corporation that adopts CSR will gain a reputation that contributes to areas ranging from business potential to brand equity and success.[828]

In accordance with the OECD principles, there should be active cooperation between the stakeholders and the corporation. A corporate governance approach is encouraged to ensure this cooperation. For example, there should be performance-enhancing mechanisms for the participation of employees in management, and the stakeholders should be seasonably and regularly informed on the subjects.

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[825] Paslı, 57.
[826] Paslı, *Corporate Governance*, 58; Eminoğlu, *Corporate Governance*, 23; Hasan Pulaşlı, "Compliance Kavramı ve Yönetim Organının Compliance Sorumluluğu", *Banka ve Ticaret Hukuku Dergisi* XXXV, no. 2 (2019): 33, https://hasanpulasli.com.tr/wp-content/uploads/Pulasli-2019-Compliance-Kavrami-ve-Yonetim-Organinin-Compliance-Sorumlulugu.pdf.
[827] Eminoğlu, *Corporate Governance*, 23.
[828] *G20/OECD Principles of Corporate Governance 2015*.

Moreover, OECD has been planning reform in principles because of changes in corporate governance.[829] It is emphasised that this reform is regarded as the most notable one because it considers stakeholders' interests, thus, investors' sustainability concerns.[830] However, it is also asserted that the inclusion of sustainability is in name only, and since corporate governance and decision-making mechanisms seek to stabilise the interests of the shareholders and those of the stakeholders, corporate governance principles should be engaged with these issues, especially with sustainability.[831]

The transparency of blockchain may also provide trust for outsiders, and therefore, it is important for CSR. However, blockchain technology has a negative feature, namely high energy consumption[832] in terms of sustainability, especially during the current climate crisis.[833] Regarding ESG, this can be a negative feature as well because Blockchains consume a lot of energy. However, many miners have been switching to renewable energy, which means that renewable energy production should be increased.[834] Otherwise, the non-renewable energy would be used for other activities[835] as there would be insufficient renewable energy, which is a current sustainability issue.

4.2.5. Monitoring

One of the principles that needs to be mentioned is monitoring. Wells Fargo scandal[836] shows that mechanisms that ensure that shareholders' or other stakeholders' long-term interests are considered may be flawed because the bodies prioritise their own interests.[837] Corporate law literature claims that companies need a monitoring board

[829] Choudhury and Petrin, "Principles".
[830] Choudhury and Petrin.
[831] Choudhury and Petrin, "Principles".
[832] Regardless of how many miners blockchain comprises, chains are uploaded to the chain periodically, e.g. 10 minutes for the Bitcoin Blockchain and approximately 15 seconds for the Ethereum Blockchain. Although the function of the system is unaffected by the number of computers, the higher the number is, the higher the energy consumption will be. The annual electricity consumption of Bitcoin alone amounts to approximately 204.5 TWh, which is roughly equivalent to the power usage of Thailand. Ellen Meijer, "Blockchain and Our Planet: Why Such High Energy Use?", 6 June 2022, https://pre-sustainability.com/articles/blockchain-and-our-planet-why-such-high-energy-use/#:~:text=Once%20a%20blockchain%20network%20reaches,the%20power%20consumption%20of%20Thailand.
[833] Akın, "Dijital Gelişmeler", 11.
[834] Meijer, "Blockchain and Our Planet: Why Such High Energy Use?"
[835] Meijer.
[836] Wells Fargo, which is one of the largest banks in the US, opened approximately 3.5 million accounts without its consumers' knowledge and fabricated earnings and thus increased stock price.
[837] Enriques and Zetzsche, "Corporate Technologies", 58.

that prioritises shareholder interests and protect the corporation from self-interested directors.[838] However, CorpTech supporters argue that no board is needed to monitor the management because shareholders will gain the ability to do it themselves with the help of technology.[839]

Since AI uses internal and external data, it improves intra-firm monitoring. Accordingly, agency costs may be reduced, and there will be flatter organisational structures.[840] While companies struggled with the social pressures on the company for controlling sustainability risks and addressing social matters, CorpTech will accelerate a more diffused and flatter information structure so that more stakeholders can be empowered.[841]

It is argued that CorpTech may offer a solution to corporate governance challenges.[842] Furthermore, it is suggested that humans may be replaced by technology because they are not ready for challenges brought by technological developments.[843] No law, ethical standards, best practices, or market pressure could ensure that shareholders and other stakeholders consider their long-term interests.[844]

AIs may be more effective at monitoring corporate agents because they have the information-processing capacity and are powerful, disinterested, and faster than humans[845] unless they are programmed to be biased and discriminatory. AI may also assist the governance of companies by reducing the cost of monitoring agents by principals.[846] The placement of human directors as monitors by AI[847] leaves the BoD one role, that is, choosing AI.[848] In addition to monitoring[849] the agents, AI processes

[838] Melvin Aron Eisenberg, "The Structure of Corporation Law", *Columbia Law Review* 89, no. 7 (November 1989): 1461, https://doi.org/10.2307/1122809.
[839] Enriques and Zetzsche, "Corporate Technologies", 68.
[840] Philippe Aghion, Benjamin F Jones, and Charles I Jones, "Artificial Intelligence and Economic Growth", 264–65.
[841] Chiu and Lim, "Technology vs Ideology", 38–39.
[842] Enriques and Zetzsche, "Corporate Technologies".
[843] Enriques and Zetzsche, 68.
[844] Enriques and Zetzsche, 58.
[845] Enriques and Zetzsche, 59.
[846] Hamdani et al., "Technological Progress and the Future of the Corporation", 229.
[847] Enriques and Zetzsche, "Corporate Technologies", 70.
[848] Hamdani et al., "Technological Progress", 230.
[849] Moreover, anyone can monitor the company with blockchain because everything is transparent with it.

information to make better predictions.[850] Thus, there will be much less need for the BoD to focus on issues related to monitoring.

It is emphasised that the BoD needs to enhance its monitoring responsibilities either by expanding the purview of existing committees to include oversight of CorpTech or by establishing new technology committees with identical responsibilities.[851] Thus, the board will have more time to concentrate on corporate strategy.[852] In addition, BoDs will be composed of experienced and expert directors, and the need for accounting experts will lessen.[853] It is alleged that shared leadership approaches will be highlighted, and there will be no need for monitoring the management.[854]

On the one hand, AI may reinforce human judgement-based decisions and detect compliance failures and hence improve the BoD's monitoring role; on the other hand, it may weaken this role with its director-friendly analytical tools.[855] That is to say, CorpTech governance[856] may increase as well as reduce agency costs. The former is the result of a human-dominated board that supervises AI, whereas the latter ensues from a CorpTech-based board or a board that ignores the risks of technology.[857]

Moreover, a BoD's monitoring function concentrates on the "governance, risk management, and compliance (GRC) systems".[858] It is claimed that the probability of the improvement in technology trivialising the BoD's core function of monitoring is far-fetched.[859] That is to say, in the foreseeable future, the BoD seems to proceed to perform key monitoring and mediation functions.[860]

Shares are often held through intricate networks of intermediaries, particularly when it comes to cross-border voting.[861] Regarding shareholder monitoring, the AGM

[850] Hamdani et al., "Technological Progress", 229.
[851] Enriques and Zetzsche, "Corporate Technologies", 61.
[852] Hamdani et al., "Technological Progress", 230.
[853] Hamdani et al., 230.
[854] Bankewitz, Aberg, and Teuchert, "Digitalization", 58.
[855] Enriques and Zetzsche, "Corporate Technologies", 90.
[856] For effective governance over information technology, see Lawrence J Trautman and Kara Altenbaumer-Price, "The Board's Responsibility For Information Technology Governance", *J. Marshall J. Computer & Info. L. 313* 28 (2011): 31.
[857] Enriques and Zetzsche, "Corporate Technologies", 90.
[858] Geoffrey Parsons Miller, *The Law of Governance, Risk Management, and Compliance*, Second Edition (New York: Wolters Kluwer, 2017).
[859] Enriques and Zetzsche, "Corporate Technologies", 90.
[860] Enriques and Zetzsche, 61.
[861] Lafarre and Van der Elst, "Blockchain Technology", 12.

has three functions, namely information, forum, and decision-making.[862] Shareholders are informed, discuss, and take decisions in AGMs.[863] Consequently, the effect of blockchain on monitoring can be observed in the AGMs held via blockchain technology. Monitoring is easier thanks to the real-time transparency blockchain provides. Moreover, since virtual AGMs encourage shareholders in demanding votes,[864] as mentioned before, they would have control over the management, and the requirement for board monitoring would be reduced.[865]

Blockchain can also be utilised to impose rules and sanctions by mapping them in technical codes and automating them.[866] In this vein, smart contracts can be deployed, for instance, to automatically represent an ownership interest, distribute dividends, or allocate profits and losses without needing an accountant or other officer, or referring to them in a bylaw.[867] Accordingly, it can be claimed that blockchain technology presents new approaches to corporate governance by offering alternative solutions. For instance, it may remove intermediaries, namely agents.[868] Furthermore, the system will perform only when the conditions, i.e. contract parameters, are fulfilled by the parties and authenticated by the algorithm.[869] In a Blockchain environment, the principal-agent relationship will evolve in terms of the cost structure because of the decreased oversight and monitoring.[870] Smart contracts facilitate agency relationships to be coordinated comprehensively, error-free, and with zero transaction costs.[871] Consequently, blockchain may hinder participants in transactions and agency relationships from circumventing rules.

The automation feature of DAOs reduces transaction costs and administrative costs, minimises or eliminates the risk of mistakes in discretion and implementation, and even the risk of directors acting in their own interests, and also reduces the need for employees to monitor other employees.[872] Consequently, it can be argued that

[862] Lafarre and Van der Elst, 8.
[863] Lafarre and Van der Elst, 8.
[864] Enriques and Zetzsche, "Corporate Technologies", 70.
[865] Bankewitz, Aberg, and Teuchert, "Digitalization", 63.
[866] Möslein, "Blockchain Applications and Company Law", 2020, 5.
[867] De Filippi and Wright, *Blockchain and the Law*, 133.
[868] Kaal, "Blockchain-Based Corporate Governance", 5.
[869] Kaal, 6.
[870] Kaal, 6.
[871] Kaal, 6.
[872] Yılmaz Orhan, "Decentralized Autonomous Organizations", 159.

Blockchain-based legal entities cast doubt on the belief in the necessity of a managerial role in corporate governance.[873]

4.3. Shareholder Rights

This part touches upon the impact of CorpTech on shareholder rights[874] briefly because it is a very vast area. Shareholders are voters who determine directors, and the ability to easily replace directors indicates the quality of shareholder rights.[875] However, they tolerate restrictions on their rights to maximise their wealth.[876] Some scholars claim that companies that possess stronger shareholder rights exhibit elevated firm value, increased profitability and sales growth, lower capital expenditures, and engage in fewer corporate acquisitions.[877] Consequently, it can be posited that there is a correlation between shareholders' rights and corporate performance. Furthermore, if blockchain and AI enhance shareholder rights, the performance of the company will increase, and there will be a more democratic atmosphere.

The exercise of shareholder rights is increasingly becoming digital. Not only the trading decisions but also all internal procedures and controls will be digital in order to ensure increased rule enforcement.[878] Some opinions in the literature are on how new technologies should be used to enhance corporate practices.[879] For instance, shareholder identification and proxy fights,[880] shareholder proposals, (virtual) shareholder meetings,[881] (electronic) voting, and digitalised compliance and risk management[882] are amongst the areas in which technology can be deployed.

Shares of publicly traded companies are usually retained by a series of intermediaries that aggravate the act of exercising shareholder rights and may limit

[873] Kaal, "Blockchain-Based Corporate Governance", 6.
[874] For shareholder rights in Turkish company law, see İpekel Kayalı, "Turkish Company Law", 250–52.
[875] Paul A. Gompers, Joy L. Ishii, and Andrew Metrick, "Corporate Governance and Equity Prices", *Quarterly Journal of Economics* 118, no. 1 (February 2003): 1.
[876] Gompers, Ishii, and Metrick, 1.
[877] Gompers, Ishii, and Metrick.
[878] Zetzsche, "Corporate Technologies", 16.
[879] Enriques and Zetzsche, "Corporate Technologies", 59.
[880] See George S Geis, "Traceable Shares and Corporate Law", *Northwestern University Law Review*, 2018, 52.
[881] Michael D. Goldman and Eileen M. Filliben, "Corporate Governance: Current Trends and Likely Developments for the Twenty-First Century", *25 DEL. J. CORP. L*, 2000, 683–713; Reyes, Packin, and Edwards, "Distributed Governance"; Lafarre and Van der Elst "Blockchain Technology"; Van der Elst and Lafarre, "Blockchain and Smart Contracting".
[882] Kenneth A Bamberger, "Technologies of Compliance: Risk and Regulation in a Digital Age", *Texas Law Review* 88, no. 4 (n.d.): 669–739.

shareholder engagement.[883] Generally, companies cannot identify the shareholders. The identification of the shareholders is important for the relationship between the company and its shareholders to continue. Their direct communication is crucial to exercise shareholder rights and shareholder engagement.[884] Companies may benefit from Blockchain systems to identify their shareholders. In this regard, shareholders would be provided with real-time observation of the share transfer process, thus ensuring transparent ownership records, and reducing the costs of trading.[885] Since it is a decentralised and transparent database, blockchain enables simple and unambiguous identification of shareholders.[886] Blockchain can list all the shareholders and demonstrate changes in shareholders by adding new blocks,[887] and shares would be traceable.[888] Thus, with a prerequisite of exercising shareholder rights, that is, identification, shareholders can exercise their rights, such as voting, information, and taking legal action.[889]

Regarding organising meetings, blockchain also plays an important role. Since AGMs are where shareholders exercise their rights,[890] blockchain will ensure that shareholders are treated equally.[891] It can be claimed that shareholder verification, which is mentioned in the AGM via blockchain,[892] improves shareholder participation, hence corporate governance. The will of the shareholders will be reflected in AGMs and the reports.[893] Furthermore, decisions can be taken in a way that prevents prejudice and conflict of interest.[894]

[883] "Directive (EU) 2017/828 of the European Parliament and of the Council of 17 May 2017 Amending Directive 2007/36/EC as Regards the Encouragement of Long-Term Shareholder Engagement", n.d., para. 4.
[884] "Directive (EU) 2017/828 of the European Parliament and of the Council of 17 May 2017 Amending Directive 2007/36/EC as Regards the Encouragement of Long-Term Shareholder Engagement", para. 4.
[885] Yermack, "Corporate Governance and Blockchains", 9.
[886] Möslein, "Blockchain Applications and Company Law", 2020, 3.
[887] Möslein, 4.
[888] Geis, "Traceable Shares and Corporate Law".
[889] Möslein, 3.
[890] Göktürk, "Pay Sahipliği Hakları".
[891] Akın, "Dijital Gelişmeler", 21.
[892] See *supra* Part 3.9.4.2.
[893] Akın, "Dijital Gelişmeler", 21.
[894] Akın, 21.

If virtual meetings are properly utilised, shareholder democracy[895] will be enjoyed because issues such as voting procedures, proxy voting, and engaging with the shareholders will be resolved.[896] Voting processes would be accelerated, and transparency[897] and accuracy would be ensured; thus, shareholders would be motivated to participate in corporate governance.[898] Hence, companies should develop fair and well-balanced solutions that ensure management accountability and that prevent the disfranchisement of shareholders.[899] In this vein, blockchain will eliminate the problems related to the operation of the AGM and deal with the issues related to the company's activities and shareholder rights in more detail.[900] Thus, complaints such as not being admitted to the meeting room, not have the opportunity to speak at the meeting, or the opposition not being recorded in the minutes will be eliminated.[901]

As for the remote participation facilitated by blockchain, shareholders' effective participation in the AGM[902] ensures that they exercise voting rights.[903] Thus, cross-border shareholders' rights can be enjoyed, improving practices such as cross-border listing, trading, and settlement.[904] Moreover, a shareholder may participate in AGMs themselves or appoint a person, who are not necessarily a shareholder, as their representative. If it is posited that AI has a personality, it can attend the AGM as a proxy. For this very reason, whether the AI will behave as per the wishes of the shareholder or not should be examined.

On the one hand, a "Narrow AI", in which input and output data are determined beforehand, would act according to the shareholder's will. On the other hand, a "General AI" or a "Super AI" does not necessarily follow the intents of the

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[895] Christoph Van der Elst, "Corporate Governance and Blockchain Technology (DLT)" (3rd International Conference on European Company Law and Corporate Governance, Zagreb, 2018), 13, https://eclcg-conf.weebly.com/uploads/2/5/1/8/25181752/1-5_van_der_elst.pdf.
[896] Eknath, Londero, and Simonyan, "Virtual Meetings".
[897] Transparency may cause an anonymity problem in voting, but it would be limited to a minority of corporations because confidential voting is not used by most companies. Yermack, "Corporate Governance and Blockchains", 23.
[898] Aaron Wright and Primavera De Filippi, "Decentralized Blockchain Technology and the Rise of Lex Cryptographia", *SSRN Electronic Journal*, 2015, https://doi.org/10.2139/ssrn.2580664; Yermack, "Corporate Governance and Blockchains", 23.
[899] The fact that Johannesburg Stock Exchange collaborates with a service provider to facilitate communication between clients and shareholders, and an e-GMS system platform in Indonesia can be given as examples of virtual meetings. Eknath, Londero, and Simonyan, "Virtual Meetings".
[900] Akın, "Dijital Gelişmeler", 16.
[901] Akın, 16.
[902] *G20/OECD Principles of Corporate Governance 2015*, 20–21. Also, TCC No. 6102 Art. 425.
[903] TCC No. 6102 Art. 434.
[904] DeMarinis and Voss, "E-Voting".

shareholder. Hence, the outcome may not be clear. For example, for the vote, if AI decided on its own, it would not act as a proxy. However, there is another solution to the problem of not being able to attend the general meeting. In the event that shareholders cannot attend the general meeting because of distance, without needing a proxy, they can join it from another place with online participation,[905] which was launched for the first time in 2012 in Türkiye. Since blockchain improves recording of the votes, proxy voting processes would also be enhanced, as mentioned in the blockchain chapter.[906]

Concerning the right to information and inspection, "financial statements, consolidated financial statements, annual activity reports of the BoD, audit reports, and BoD's profit distribution proposal shall be made available for inspection by the shareholders at the registered office or branch offices no later than fifteen days prior to the general assembly."[907] If AI is included in the BoD, documents can be accessed from anywhere with the use of technologies, since they were deployed in preparation anyway, especially with blockchain, they are instantly and irreversibly recorded. Shareholders can inspect them whenever they want, which is important in terms of transparency.

Moreover, shareholders may request information[908] from the BoD about the company's business and from the auditors about the method and results of the audit. Furthermore, the information must be true and diligent within the framework of honesty and accountability. AI-assisted boards and boards with AI members can easily share information anytime. The same goes for AI as an auditor. In addition, blockchain is an important tool for ensuring reliable information sharing because the system requires miners[909] that authenticate the information.

[905] Voting through electronic means may improve shareholder participation. Raffaele Lener and Salvatore L. Furnari, "Company law during the blockchain revolution. The rise of 'CorpTech'", *Open Review of Management, Banking and Finance*, 2020, https://openreviewmbf.org/2020/11/09/company-law-during-the-blockchain-revolution-the-rise-of-corptech/.
[906] See *supra* Part 3.9.4.2.
[907] TCC No. 6102 Art. 437 (1).
[908] TCC No. 6102 Art. 437 (2).
[909] Anyone who is part of the ledger is called a "miner", who has two roles, viz. verifying and recording the transaction. Bheemaiah, *The Blockchain Alternative*, 57. See also Iyer and Dannen, *Ethereum Smart Contracts*.

AI may also assist shareholders and investors[910] with investment and voting[911] decisions.[912] Moreover, blockchain may provide a voting system that authenticates voters and assures an equitable corporate voting process.[913] There will also be no need for the right to request a special audit[914] because everything will be transparent and always accessible thanks to CorpTech.[915]

Lastly, in a DAO, shareholders have tokens that convey ownership and voting rights.[916] That is to say, the members of the DAO are registered under different addresses and have tokens that provide the right to participate in the management, namely the decision-making processes of the DAO.[917] Token holders can propose investment projects, and if a project has received the majority of the votes, the DAO will automatically initiate a corresponding transaction using smart contracts.[918] Thus, shareholders will be able to participate directly in company decisions.

4.4. Minority Shareholders' Rights

Protecting minority shareholders is one of the roles of corporate governance. Since the EU seeks to build a single capital market, corporate governance policies in the EU are shareholder focused.[919] Unfair prejudice is prevented by minority shareholder protection; thus, the majority cannot take the ultimate decision-making power.[920]

The agency problem originated from the clash of interests amongst the shareholders and the directors in the corporation. Shareholders are examined in different categories, namely majority and minority shareholders. Whereas majority

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[910] Möslein, "Robots in the Boardroom? Artificial Intelligence & Corporate Governance", 3.
[911] Zetzsche, "Corporate Technologies", 15.
[912] Möslein, 3.
[913] Enriques and Zetzsche, "Corporate Technologies", 64.
[914] TCC No. 6102 Art. 438.
[915] After Swiss Corporate Law Reform 2020, the Federal Council enacted a DLT bill in 2021 that enables the existence of shares in the form of cryptographic tokens represented on a Blockchain. Michael Güntert et al., "Ledger-Based Securities: Introduction of DLT Shares in Switzerland", *Lexology*, 19 March 2021, https://www.lexology.com/library/detail.aspx?g=b4f6e6cd-d595-4f3a-9506-0672f36d3bfe.
[916] Schubert, "Digital Corporate Governance", 20–21; Dimitropoulos, "The Law of Blockchain", 1136; Armin Krishnan, "Blockchain Empowers Social Resistance and Terrorism Through Decentralized Autonomous Organizations", *Journal of Strategic Security* 13, no. 1 (April 2020): 47, https://doi.org/10.5038/1944-0472.13.1.1743.
[917] El Faqir, Arroyo, and Hassan, "Overview", 2.
[918] Schubert, "Digital Corporate Governance", 21; Dimitropoulos, "The Law of Blockchain", 1136.
[919] Chiu and Lim, "Technology vs Ideology", 34.
[920] Kevin O'Flaherty, "What Are Minority Shareholders? | What Power Does A Minority Shareholder Have?", *O'Flaherty Law*, 16 November 2020, https://www.oflaherty-law.com/learn-about-law/what-are-minority-shareholders-what-power-does-a-minority-shareholder-have.

shareholders[921] exert control over the company, minority shareholders have no such power.[922] However, the ones who have the majority shares may not be in control of the corporation. This indicates that control does not necessarily mean that it is about the shares.[923]

While agency conflict may be encountered between the management[924] and the shareholders, this problem may also be observed between minority and majority shareholders, especially in the case of Türkiye.[925] As mentioned before, agency problem causes information asymmetry.[926] Since the majority does not share information with the minority, one of the biggest issues between the majority and the minority is the lack of information. When the minority shareholders have no knowledge of the company, they start a war against the majority because they do not know anything about the company.[927] In that sense, if there is a system using AI, the minority will get the information right from AI.[928] For example, they will know the value of the shares. That is to say, AI can be thought of as a tool to gather information on the company in determining the value of the company.[929]

Minority shareholders cannot always secure seats, and owing to the lack of transparency, they may not have information regarding their investments. Hence, the management takes decisions without consulting them. Consequently, they have minority shareholders' rights such as blocking special resolution and requiring a written resolution to be circulated.[930] Regarding this issue, with real-time transparency blockchain ensures this information asymmetry will dissipate. Providing continuous

[921] In the case of Türkiye, usually, families or groups are majority shareholders. Meltem Karatepe Kaya, "Notion of Protection of Minority Shareholders; Theoretical Framework", 2020, 212.
[922] Karatepe Kaya, 197.
[923] For the concept of control, see Karatepe Kaya, 199–200.
[924] Professional/institutional managers, instead of shareholders, have brought themselves to the fore in corporate governance. Chiu and Lim, "Technology vs Ideology", 35. See also Stephen M. Bainbridge, "Director v. Shareholder Primacy in the Convergence Debate", https://doi.org/10.2139/ssrn.299727; Stephen M. Bainbridge, "Director Primacy and Shareholder Disempowerment", 1735–58, http://www.jstor.org/stable/4093531.
[925] Karatepe Kaya, "Minority Shareholders", 212.
[926] See *supra* Part 4.1.1.
[927] AI can show information on balance sheets, cash flows, and other aspects such as sales numbers and expenses.
[928] Thus, there will be no need for main lawsuits, such as the cancellation of general assembly decisions, board member responsibilities, and the solution of the company.
[929] For example, if the company is to be dissolved due to just cause (TCC No. 6102 Art. 531), AI may help the dissolution process.
[930] "Minority Shareholder Rights – What Are My Rights and How Do I Protect Them?", *Harper James*, 8 July 2022, https://harperjames.co.uk/news/minority-shareholder-rights-and-protection/.

access to financial records by deploying Blockchain systems will ensure that shareholders regularly ascertain accurate and precise information about the company, and thus, the elimination of information asymmetry will prevent litigation arising from internal disputes.[931] Consequently, there will be no need for exercising aforementioned rights because they will be actively participating in corporate governance.

Since AI may reflect its programmers' or users' biases,[932] it, as a director, may benefit the majority shareholders by merging the minority shareholders' rights and interests. However, real-time transparency CorpTech provides helps minority shareholders overcome information asymmetry. AI and blockchain being deployed, they would be treated equally, as mentioned in fairness.[933] In addition, AI may improve the quality of BoD by evaluating it.[934]

AI strengthens corporate governance roles, such as shareholder monitoring and BoD decision-making.[935] If AI is effective in the process of decision making, the influence of the majority will be eliminated. Thus, decisions will be fair for the minority and will affect them equally as everyone else. In other words, not everything the majority wants can come true. Nevertheless, this will be achieved if AI investigates objectively. That is to say, negative results can be obtained if there is the possibility of a biased AI.

Directors generally act of their own accord as long as it is in the interest of the company as a whole. They do not inform shareholders unless their consent is required.[936] Furthermore, to remove a director, a minority shareholder brings the resolution to the table.[937] If AI takes part in the management, it may be asserted that there will be no situations where the exercise of this minority shareholder right is needed. Provided that it is unbiased, AI as a member of the BoD would consider minority shareholders' rights. Helping the process of making decisions, AI would offer a more objective perspective. Similarly, AI that appoints board members would choose unbiased and objective persons.

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[931] Akın, "Dijital Gelişmeler", 15.
[932] Eroğlu and Karatepe Kaya, "Board Diversity", 18.
[933] See *supra* Part 4.2.2.
[934] Kieran Moynihan, "What Will the Board of the Future Look Like?", n.d., 1.
[935] Chiu and Lim, "Technology vs Ideology", 12–13.
[936] "Minority Shareholder Rights – What Are My Rights and How Do I Protect Them?"
[937] "Minority Shareholder Rights – What Are My Rights and How Do I Protect Them?"

Whereas human directors consider the interests of the corporation, or may even serve their own interests, AI tends to treat everyone equally. Minority shareholders who are not informed of all decisions cannot feel assured whether directors are taking decisions in their best interests. Decisions will be explainable thanks to the transparency AI will provide.[938] In terms of fairness, minority shareholders' rights will be protected as they will be treated equally.

In addition, shareholder primacy has gained prominence, especially after institutional shareholders emerged, who are generally minority shareholders.[939] Hence, they focus on a different shareholder primacy that gives importance to minority shareholder protection.[940] Institutional investors may benefit from AI in examining the risks at the investee corporation.[941] Moreover, institutional shareholders generally engage in shareholder activism,[942] especially defensive activism[943]. Owing to blockchain, the acquisition of shares, which is important for shareholder activism, would be quick and cheap but more transparent, as mentioned in the section on transparency.[944] In addition, the transparency blockchain provides facilitates the liquidation of shares more easily.[945]

It would seem that blockchain technology ensures that shareholders vote and express their opinions, regardless of whether the meeting is held physically or online.[946] In the same vein, the right to information and examination will be used more effectively.[947] All of these will contribute to equal treatment of all the shareholders in a company.

Lower costs provided by blockchain enable small shareholders to participate in decision-making processes.[948] Some scholars argue that although blockchain

[938] Other CorpTechs, such as Blockchain systems, also contribute to transparency and therefore minority shareholders' rights with immediate and shared information.
[939] Chiu and Lim, "Technology vs Ideology", 32,33.
[940] Chiu and Lim, 32–33.
[941] Chiu and Lim, 12.
[942] For the theoretical aspects of shareholder activism, see Ekrem Solak, "The Evolving Role of Shareholders and the Future of Director Primacy Theory" (PhD thesis, The University of Edinburgh, 2018), 63–101.
[943] See Solak, 71.
[944] See *supra* Part 4.2.1.
[945] Yermack, "Corporate Governance and Blockchains", 9. According to Yermack, this feature may cause a shift from the "voice" to the "exit" channel of corporate governance.
[946] Akın, "Dijital Gelişmeler", 16.
[947] Akın, 16.
[948] Lafarre and Van der Elst, "Blockchain Technology", 18.

technology enables a discussion platform and virtual-only meetings are the only opportunity for shareholders to take the floor, very few shareholders utilise the forum function, and hence the benefits of ad hoc questions and face-to-face discussions may vanish.[949] Furthermore, whereas some scholars claim that during virtual meetings, questions may be disregarded, which is more arduous at a physical meeting, blockchain can facilitate the transparency of the questions and demonstrate the absence of the answers; thus, there would be no time limit to ask questions contrary to face-to-face meetings.[950]

Lastly, AI, which can be utilised together with smart contracts,[951] can analyse human behaviours during the preparation and implementation of the contract and imitate these simple behaviours and save people from the workload that can be considered drudgery[952] and thus enable them to concentrate on more complex work steps.[953] In the processes of mergers and acquisitions, in which AI is deployed, smart contracts can be actively used; accordingly, processes have the potential to be automated, and the workload of transactions will be notably reduced; thus, these developments allow investors to control their investments continuously and regularly.[954]

Thanks to blockchain, minority shareholders will be informed before the decision-making; thus, their rights will be protected more effectively.[955] Regarding the impact of blockchain on institutional shareholders and shareholder activists,[956] whereas transparency in trading and ownership data may adversely affect profitability, the liquidity of a blockchain-based market can decrease selling expenses, which would emphasise exit rather than voice.[957] That is to say, cheap and fast execution will lead to the entries and the exists being easier. According to the literature, this diminishes the importance of the BoD as a mediator amongst shareholders.[958] In addition, the DAO enables protection for minorities against unwelcome decisions by the majority,

[949] Lafarre and Van der Elst, 19.
[950] Lafarre and Van der Elst, 19.
[951] Schubert, "Digital Corporate Governance", 19–20.
[952] Akın, "Dijital Gelişmeler", 18.
[953] Schubert, "Digital Corporate Governance", 20.
[954] Akın, "Dijital Gelişmeler", 18.
[955] Schubert, "Digital Corporate Governance", 20.
[956] Zetzsche, "Corporate Technologies", 16.
[957] Yermack, "Corporate Governance and Blockchains", 19–20.
[958] Enriques and Zetzsche, "Corporate Technologies", 69–70.

which includes that anyone can withdraw their investment from the DAO before the decision is implemented or, depending on the structure, that the DAO can be split up upon application.[959]

4.5. Compliance

Compliance,[960] which refers to acting in accordance with the law, is due to legal, contractual, or ethical rules,[961][962] whereas regulatory compliance is the fulfilment of legal requirements.[963] Satisfying obligations under positive law is required as per regulatory compliance.[964] It is necessary to guarantee that the corporation's directors and employees comply with legal regulations and correspondingly raise their awareness.[965]

It can be claimed that compliance is reflected in TCC No. 6102, which does not have a specific article regarding compliance.[966] Corporations and their controllers declare that they will comply with the legislation with a declaration of intent,[967] which could be observed in the repealed Art. 349 on the deed of establishment. Overall supervision (Art. 375/1, e), one of the non-delegable duties and authorities of the BoD, and the duty of care (Art. 369) may be given as examples of compliance.[968]

Compliance is interconnected with corporate governance because compliance with legislation and good management rules is already one of the goals of corporate governance.[969] Since compliance also considers harmony, they obviously are interrelated concepts.

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[959] Schubert, "Digital Corporate Governance", 21.
[960] The principle of compliance also comprises compliance with corporate governance principles. In accordance with the "apply or explain" approach, examining how compliant partnerships that declared that they would comply is named a "compliance audit". Ali Paslı,"'Compliance' Kavramının Anonim Ortaklıklar Hukukundaki Anlamı ve Sorumluluk Sistemine Etkisi", *İstanbul Üniversitesi Hukuk Fakültesi Mecmuası* 71, no. 2 (2013): 318–19.
[961] Tuğçe Nimet Yaşar, "Şirketler Hukuku Açısından 'Compliance' Kavramı ve Borsaya Kayıtlı Şirketlerde Uygulanması" (2018), 29–32; Pulaşlı, "Compliance", 32–33; Tuğçe Nimet Yaşar, *Anonim Şirketler Hukukunda Uyum (Compliance)*, 1. (Istanbul: On İki Levha Yayıncılık A.Ş., 2020), 21–28.
[962] Compliance also includes the company's internal directives.
[963] Paslı, 317; Eminoğlu, *Corporate Governance*, 26.
[964] Paslı, 317.
[965] Eminoğlu, *Corporate Governance,* 27.
[966] Pulaşlı, "Compliance", 53.
[967] Eminoğlu, *Corporate Governance,* 27.
[968] Pulaşlı, "Compliance", 53.
[969] See Yaşar, "Compliance", 91–97; Yaşar, *Compliance*, 99–106.

It can be argued that AI can act like a compliance officer of the company and check all the compliance issues.[970] It can also be suggested that AI will influence operational and internal control issues, such as strategy development, risk management,[971] and compliance.[972][973] Whereas AI is better at analysing old data, humans tend to assume them as a secondary position; hence, it can be claimed that the use of AI in companies enhances their positions in terms of risk management[974] and improves compliance.[975]

AI reduces false positives, lowers costs, and addresses human error.[976] It can detect non-compliance early and can subsequently mitigate it.[977] Thus, it can reduce penalties and liabilities. In practice, compliance-driven work is conducted by machine learning.[978] AI offers numerous benefits to companies. It learns from data and recognises patterns.[979] Thus, in the field of corporate compliance, it affects two areas, namely due diligence and financial misappropriation.[980] For instance, it may identify and report illicit behaviour.[981] AI may be deployed to satisfy the conditions of regulatory compliance, such as preventing money laundering and drawing up

[970] Regulations change all the time. Hence, compliance officers may have difficulty following the new rules. In Türkiye, mevzuat.gov.tr is an official website that includes the legislation. It reflects the accumulated version of the law. AI as a compliance officer may function like mevzuat.gov.tr. In this way, when there is a new change, it would be in the system.
[971] Saqib Aziz and Michael Dowling, "Machine Learning and AI for Risk Management", in *Disrupting Finance*, ed. Theo Lynn et al. (Cham: Springer International Publishing, 2019), 33–50, https://doi.org/10.1007/978-3-030-02330-0_3.
[972] Bamberger, "Technologies of Compliance".
[973] Enriques and Zetzsche, "Corporate Technologies", 66.
[974] Enriques and Zetzsche, 66.
[975] "Digital Darwinism", 56.
[976] Beyza Bayam-Trojanowska, "Use the Excellence of Artificial Intelligence (AI) to Improve Your Compliance Posture", *Nordcloud*, accessed 9 November 2022, https://nordcloud.com/how-ai-can-help-you-obtain-regulatory-compliance/.
[977] Enriques and Zetzsche, "Corporate Technologies", 66.
[978] Chiu and Lim, "Technology vs Ideology", 11.
[979] Chiu and Lim, 12.
[980] Michael Volkov, "Artificial Intelligence, Hype and Financial Misconduct", *Corruption, Crime & Compliance*, 25 July 2018, https://blog.volkovlaw.com/2018/07/artificial-intelligence-hype-and-financial-misconduct/.
[981] "Regulation Driving Banking Transformation: Insights into the Key Regulatory Developments Shaping APIs, Artificial Intelligence, Blockchain and Cloud" (Global Transaction Banking, Deutsche Bank, October 2018), 30.

compliant financial reports.[982] Nonetheless, whether or not AI can replace legal and compliance departments remains to be seen.[983]

When suggesting that AI is unbiased,[984] it may be asserted that this refers to the fact that AI has no agenda on its own.[985] Some scholars are of the view that AI is not subject to human biases.[986] Specifically, by demonstrating various unorthodox but factual views, AI may contribute to overcoming challenges on the board arising from "groupthink"[987] and peer pressure against the collision of opinions,[988] which impede the BoD's efficacy.[989] However, since humans have biases, the programmers of AIs also have them.[990] Consequently, it can be argued that AI can make biased decisions in accordance with its programmers or users.

The inherent subjectivity of law and the associated legal risks involved cause compliance to be a struggle.[991] In addition, not everyone adequately knows the law to evaluate the full legal risk, or those who know it well may intentionally obscure and twist it;[992] therefore, AI may be useful. For example, there are AI-enhanced

[982] "Regulation Driving Banking Transformation: Insights into the Key Regulatory Developments Shaping APIs, Artificial Intelligence, Blockchain and Cloud"; "Wolters Kluwer and Chartis Research to Explore Benefits of Artificial Intelligence for Managing Regulatory Change", *Bloomberg*, 2 May 2019, https://www.bloomberg.com/press-releases/2019-05-02/wolters-kluwer-and-chartis-research-to-explore-benefits-of-artificial-intelligence-for-managing-regulatory-change. In practice, the term "compliance culture" is used. It pertains to the part of the organisation's culture that is concerned with beliefs and values in accordance with Ethics and Compliance. S Ramanathan, "Compliance Culture – Its Importance and How to Prevent It from Becoming Just a Buzzword", 16 July 2019, https://cfo.economictimes.indiatimes.com/news/compliance-culture-its-importance-and-how-to-prevent-it-from-becoming-just-a-buzzword/70224217?redirect=1.

[983] See Leora Morgenstern, "Toward Automated International Law Compliance Monitoring (TAILCM)": (Fort Belvoir, VA: Defense Technical Information Center, 1 July 2014); McCarty, "Artificial Intelligence and Law"; Frank Pasquale, "A Rule of Persons, Not Machines: The Limits of Legal Automation", *The George Washington Law Review* 87, no. 1 (2019): 55, https://doi.org/10.21236/ADA608547.

[984] Gramitto Ricci, "Artificial Agents", 901.

[985] Enriques and Zetzsche, "Corporate Technologies", 67.

[986] Enriques and Zetzsche, 67.

[987] Akshaya Kamalnath, "The Perennial Quest for Board Independence- Artificial Intelligence to the Rescue?", 2019, 9.See Irving L. Janis, *Victims of Groupthink* (Boston: Houghton Mifflin, 1972). See also Paul't Hart, "Irving L. Janis' Victims of Groupthink", *Political Psychology* 12, no. 2 (June 1991): 247, https://doi.org/10.2307/3791464.

[988] Kamalnath, "Artificial Intelligence", 8–9.

[989] Enriques and Zetzsche, "Corporate Technologies", 67.

[990] Generally, AI workers are male, young, and have technical degrees. Fedyk et al., "Audit Process".

[991] Donald C Langevoort, "Caremarkand Compliance: A Twenty Year Lookback", *Temple Law Review* 90 (2018): 734.

[992] Langevoort, 734.

compliance tools,[993] which are trained by a data set.[994] Thus, AI can detect compliance failures.[995]

Regarding blockchain's contribution to compliance, the principle of separation of powers may be addressed. By creating a decentralised communication structure, this principle, which is an important element of corporate governance, may be realised.[996] Thus, illegal transactions of majority shareholders in the management of the company can be detected earlier in a company where information asymmetry disappears or at least decreases with technology.[997] Owing to transparency and real-time monitoring, illegal activities will be immediately detected. Blockchain technology discloses wrongdoings, and since it is very difficult to change the date, it will contribute to complying with the law.

By using blockchain and smart contract technologies together, management processes of the company can be significantly automated.[998] Contract compliance may provide the creation of contracts without needing third parties, such as lawyers.[999] In the case of fulfilment of the conditions determined by the BoD or, if necessary, the AGM, the administrative procedures to be automatically applied are also suitable for the implementation of smart contracts.[1000] Furthermore, the purpose of the DAO is to replace the risk factor, that is, humans who do not fully comply with the law, and this should make investments more secure against the human-caused damage.[1001]

In addition, AI is largely deployed in the phase of due diligence,[1002] especially in the processes of mergers and acquisitions. It can be argued that AI can also be utilised with smart contracts during these processes.[1003] For instance, a large number of contracts could be concluded as smart contracts, and the system can search through

[993] Enriques and Zetzsche, "Corporate Technologies", 76.
[994] Armour and Eidenmüller, "Self-Driving Corporations?", 97.
[995] Enriques and Zetzsche, "Corporate Technologies", 90.
[996] Akın, "Dijital Gelişmeler", 16.
[997] Akın, 16.
[998] Akın, 17–18.
[999] Jeff Golembiewski, "What Blockchain Technology Is and What Your Association Should Know about This Trending Technology.", *NIMBLE AMS*, 18 July 2019, https://www.nimbleams.com/blog/preparing-your-association-for-blockchain/.
[1000] Akın, "Dijital Gelişmeler", 18.
[1001] Schubert, "Digital Corporate Governance", 21.
[1002] "How AI Is Changing Legal Due Diligence: Artificial Intelligence-Based Tools Are Becoming Increasingly Commonplace"; "AI and Due Diligence"; "AI Due Diligence"; Massaad, "Due Diligence"; "Practical Considerations of Using AI in Due Diligence".
[1003] Schubert, "Digital Corporate Governance", 20.

several clauses and check them for discrepancies in the contract.[1004] The machine would learn through the application independently to identify abnormalities in the contract by recognising the contract and thus enable people to concentrate on more complex processes.[1005]

The automation of processes inevitably simplifies the structures to be monitored in the company; thus, the BoD can devote more time to compliance in other areas of the company.[1006] Therefore, the consequences of not using AI during these processes should be investigated. For instance, a board member in a joint-stock company is subject to the duty of care. Some technologies accelerate the processes, and since a company aims to generate revenue, it needs to be cognisant of the developments in the world.[1007] Moreover, there are examples around the world, particularly SMEs, that consult an AI.[1008] Hence, it should be analysed whether not adopting it indicates a failure to fulfil the duty of care.

In the scope of the "Business Judgment Rule", AI may provide data on the ideal behaviour model.[1009] Thus, AI will make a great contribution to acting in accordance with the law. However, decisions taken by adhering to AI may also be against the law. At this stage, it depends on the correctness of the data as well as whether the algorithm works in accordance with the law.[1010] That is to say, AI does not necessarily take sound and reasonable decisions.

If BoD, whose scope of liability is determined by the Business Judgement Rule, uses AI, it will be relieved of its responsibility or duty.[1011] In this case, whether BoD has a liability to consult AI or not is the question that needs to be answered. Although this rule gives freedom of decision-making to the BoD, necessary and sufficient information should comprise a basis for the decision-making process.[1012] Decisions

[1004] Schubert, 20.
[1005] Schubert, 20.
[1006] Schubert, 20.
[1007] For example, "Umazi Collaborates with Artesian : DueDil to Automate and Accelerate SME Corporate Due Diligence", *Fintech News*, 7 February 2022, https://www.fintechnews.org/umazi-collaborates-with-artesian-duedil-to-automate-and-accelerate-sme-corporate-due-diligence/.
[1008] Nick Drydakis, "Artificial Intelligence and Reduced SMEs' Business Risks. A Dynamic Capabilities Analysis During the COVID-19 Pandemic", *Information Systems Frontiers* 24, no. 4 (August 2022): 1223–4, https://doi.org/10.1007/s10796-022-10249-6.
[1009] Akın, "Dijital Gelişmeler", 20.
[1010] Akın, 20.
[1011] Akın, "Dijital Gelişmeler", 20.
[1012] Akın, 20.

that are made with due diligence and after considering correct data prevent liability from emerging, even if there is damage.[1013]

In conclusion, CorpTech consists of solutions regarding corporate governance, such as instruments for setting activities related to investor relations, corporate voting, and the internal operations of the BoD, managing risks, and enhancing compliance functions.[1014]

4.6. Board Diversity as a Current Corporate Governance Discussion

Corporate governance regulations have essentially concentrated on board composition, namely board size and independence, as a beneficial tool for improving corporate governance standards.[1015] AI in companies has currently led to new discussions in corporate governance, such as board diversity,[1016] especially gender diversity. This section will examine the impacts of AI on board diversity.

Board diversity seeks to enhance the decision-making process and efficiency; thus, diverse BoDs contribute to companies' success.[1017] The eligibility of the board members affects the firm's economic efficiency. Hence, although the shareholders, in principle, seem to have the discretion to nominate the board members,[1018] various conditions, such as ensuring diversity on the board, are imposed on the qualifications of the members to improve the firm's performance.[1019]

BoDs generally comprise white men who have expansive and strong networks, which women usually do not have. The effect of the network on the nomination of female directors was investigated by Allemand et al..[1020] They observed a twenty-eight per cent decrease in the probability of women being appointed as a director when the appointed director has connections with the incumbent directors. This result may show

[1013] TCC No. 6102 Articles 369, 553.
[1014] Enriques and Zetzsche, "Corporate Technologies", 59.
[1015] See Ahmed Sarhan, Collins G. Ntim, and Basil Al-Najjar, "Board Diversity, Corporate Governance, Performance and Executive Pay", *International Journal of Finance and Economics* 24, no. 2 (2019): 761–86, https://doi.org/10.2139/ssrn.3534932.
[1016] It is related to social justice discussions. Eroğlu and Karatepe Kaya, "Board Diversity", 5.
[1017] Eroğlu and Karatepe Kaya.
[1018] In joint-stock companies, BoD members are generally appointed by the shareholders in the AGM.
[1019] Moreover, although corporations have prioritised shareholder wealth, corporate governance rules are, nowadays, shaped by notions such as board diversity and ESG. See Gregory H Shill and Matthew L Strand, "Diversity, ESG, and Latent Board Power" 46 (n.d.): 71.
[1020] Isabelle Allemand et al., "Role of Old Boys' Networks and Regulatory Approaches in Selection Processes for Female Directors", *British Journal of Management* 33, no. 2 (April 2022): 784–805, https://doi.org/10.1111/1467-8551.12485.

homophily[1021] and robustness in corporations[1022] because people generally want to work together with people close to them in terms of *habitus.* This may have not only psychological grounds but also reasons like looking after the interests of one's own group.

Conversely, diverse professional backgrounds and skills provide different mindsets. When these happen, different problem-solving methods can be acquired. Accordingly, the decision-making process will be well executed.[1023] However, since this may, in general, benefit only the company's or the shareholders' interests, the directors are not willing to have diversity on boards.

Regarding AI, it may be suggested that member selection by AI[1024] provides diversity, especially gender diversity,[1025] pluralism, transparency, and accountability, which are aforementioned principles of corporate governance,[1026] because AI normally chooses people that are overlooked.[1027] Gender diversity,[1028] as one aspect of board diversity, has a huge influence on the company's decision-making processes and success.[1029] On the one hand, AI selecting BoD members may give rise to diversity on

[1021] See generally Miller McPherson, Lynn Smith-Lovin, and James M Cook, "Birds of a Feather: Homophily in Social Networks", *Annual Review of Sociology* 27, no. 1 (August 2001): 415–4, https://doi.org/10.1146/annurev.soc.27.1.415.

[1022] For the homophily in appointing foreign directors, see John M Barrios et al., "Boards of a Feather: Homophily in Foreign Director Appointments Around the World".

[1023] Diversity in a problem-solving group is examined by Hong and Page. They conclude that a team composed of randomly selected members outperforms a team of top-performing members. See Lu Hong and Scott E. Page, "Groups of Diverse Problem Solvers Can Outperform Groups of High-Ability Problem Solvers", Proceedings of the National Academy of Sciences 101, no. 46 (16 November 2004): 16385–89, https://doi.org/10.1073/pnas.0403723101.

[1024] AI used by Amazon for recruitment was biased against women, Zuiderveen Borgesius, "Discrimination", 25.

[1025] Eroğlu and Karatepe Kaya, "Board Diversity", 24.

[1026] See *supra* Part 4.2.

[1027] Erel et al., "Selecting Directors Using Machine Learning", 18 June 2021.

[1028] For the overview of the literature on the gender composition of the board, see Anja Kirsch, "The Gender Composition of Corporate Boards: A Review and Research Agenda", *The Leadership Quarterly* 29, no. 2 (April 2018): 346–64, https://doi.org/10.1016/j.leaqua.2017.06.001.

[1029] David A. Carter, Betty J. Simkins, and W. Gary Simpson, "Corporate Governance, Board Diversity, and Firm Value", 33–53, https://doi.org/10.1111/1540-6288.00034; Sarhan, Ntim, and Al-Najjar, "Board Diversity"; Sanjukta Brahma, Chioma Nwafor, and Agyenim Boateng, "Board Gender Diversity and Firm Performance: The UK Evidence", 5704–19, https://doi.org/10.1002/ijfe.2089; Richard Kersley et al., "The CS Gender 3000 in 2021: Broadening the Diversity Discussion" (Credit Suisse Research Institute, n.d.). However, some researchers suggest that there is no discernible connection between performance and the level of gender diversity. See David A. Carter et al., "The Gender and Ethnic Diversity of US Boards and Board Committees and Firm Financial Performance", *Corporate Governance: An International Review* 18, no. 5 (September 2010): 396–414, https://doi.org/10.1111/j.1467-8683.2010.00809.x; John Wachudi and Josphat Mboya, "Effect of Board Gender Diversity on the Performance of Commercial Banks in Kenya", *European Scientific Journal* 8 (2012): 128–48; Levent Ataünal and Aslı Aybars, "Gender Diversity in The Board Room and Its

the board; on the other hand, AI as a member may also provide the BoD with different ideas and opinions. Whereas the former indicates that members will have diverse *habitus*, the latter demonstrates that AI, as a member, will aid pluralism.

Diversity in the boardroom is hard to find. For instance, Chilean companies have a low rate of nationality and gender diversity in boardrooms.[1030] Consequently, there are quota regulations to provide especially for gender diversity in different countries. However, soft law rules do not cause the intended effect,[1031] whereas hard law regulation ensures gender diversity.[1032] Hence, it can be argued that appointments by AI will ensure women's participation in the management.

It is also suggested that gender diversity does not contribute much to the success of companies because female members usually have careers and education outside of business.[1033] Women lack business connections which companies generally consider when hiring. Moreover, it can be claimed that women with business education lack connections. When recruiting, AI seeks different criteria that are more suitable for the job description. It can be suggested that recruitment by AI will be an element in increasing the proportion of women in boardrooms.

Why appointment by AI is a preferred method and the outcomes of boards that are created by humans are as follows: Since appointers want the ones resembling

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Financial Performance Effect: Evidence from an Emerging Market", 71–90, https://doi.org/10.33203/mfy.344407. Ataünal and Aybars argue that the relationship between performance and gender diversity is either non-existent or insubstantial. However, they highlight the fact that female directors constitute approximately 10% of their research sample. That is to say, they emphasise that this should not be a reason not to regulate gender quotas. For negative effects of gender diversity on the company's cash holdings see Muhammad Atif, Benjamin Liu, and Allen Huang, "Does Board Gender Diversity Affect Corporate Cash Holdings?", *Journal of Business Finance & Accounting* 46, no. 7–8 (July 2019): 1003–29, https://doi.org/10.1111/jbfa.12397. For the correlation between women as the BoD members and employment downsizing, and its impact on firm performance, see Ming-Yuan Chen and Chun-Lin Kao, "Women on Boards of Directors and Firm Performance: The Mediation of Employment Downsizing", *The International Journal of Human Resource Management* 33, no. 13 (2021): 2597–2629, https://doi.org/10.1080/09585192.2020.1867617.

[1030] Felipe Arenas-Torres, Miguel Bustamante-Ubilla, and Roberto Campos-Troncoso, "Diversity of the Board of Directors and Financial Performance of the Firms", *Sustainability* 13, no. 21 (22 October 2021): 11687, https://doi.org/10.3390/su132111687.

[1031] See Ruth Mateos de Cabo et al., "Do 'Soft Law' Board Gender Quotas Work? Evidence from a Natural Experiment", *European Management Journal* 37, no. 5 (October 2019): 611–24, https://doi.org/10.1016/j.emj.2019.01.004.

[1032] See Beate Sjafjell, "Gender Diversity in the Boardroom and It's Impacts: Is the Example of Norway a Way Forward?", *Deakin Law Review* 20, no. 1 (18 September 2015): 25; Mateos de Cabo et al., "Soft Law".

[1033] Sudheer Reddy and Aditya Mohan Jadhav, "Gender Diversity in Boardrooms – A Literature Review", ed. Yogesh Pai P, *Cogent Economics & Finance* 7, no. 1 (1 January 2019), https://doi.org/10.1080/23322039.2019.1644703.

them,[1034] namely having similar *habitus,* applicants tend to imitate existing directors to be appointed.[1035] In the event that women directors mimic stereotypical white-male directors, they may label minorities and other women,[1036] and the diversity provided would be futile. Moreover, after being appointed, outnumbered female directors usually attempt to be compatible. For instance, they try not to disturb white males during decision-making processes.[1037] Therefore, diversity should be *bona fide*, not tokenistic, so that groupthink can be avoided.[1038]

As a result of these reasons, various voluntary initiatives attempt to ameliorate the homogeneity of the BoD.[1039] Furthermore, some countries regulated[1040] hard law or soft law rules on gender quotas.[1041] For instance, notwithstanding the high level of gender equality at work,[1042] Norway mandated forty per cent representation by women in BoDs.[1043] This shows that even Norway tightens the reins in order to ensure diverse boards. Spain took Norway as an example and enacted a gender quota of forty per cent. However, the regulation, which comprises an incentive to the companies, was a soft

[1034] Akshaya Kamalnath, "Gender Diversity as the Antidote to 'Groupthink' on Corporate Boards", *Deakin Law Review* 22, no. 1 (23 February 2018): 103, https://doi.org/10.21153/dlr2017vol22no1art723.
[1035] Erica Beecher-Monas, "Marrying Diversity and Independence in the Boardroom: Just How Far Have You Come, Baby?", *SSRN Electronic Journal*, 2007, 405–6, https://doi.org/10.2139/ssrn.985339.
[1036] Donald C Langevoort, "Overcoming Resistance to Diversity in the Executive Suite: Grease, Grit, and the Corporate Promotion Tournament", n.d., 1631; Beecher-Monas, "Diversity", 405.
[1037] Beecher-Monas, 406.
[1038] Kamalnath, "Groupthink", 103.
[1039] Mariassunta Giannetti and Tracy Yue Wang, "Public Attention to Gender Equality and Board Gender Diversity", *Journal of Financial and Quantitative Analysis*, 19 April 2022, 1–27, https://doi.org/10.1017/S0022109022000400.
[1040] For regulations in the US, see Shill and Strand, "Diversity", 297–303. For Nasdaq Listing Rule 5605(f) regarding diverse members, namely a director who self-represents themselves as female, an underrepresented minority, see "Rulebook - The Nasdaq Stock Market- 5600. Corporate Governance Requirements", accessed 12 November 2022, https://listingcenter.nasdaq.com/rulebook/nasdaq/rules/nasdaq-5600-series. "The US Securities and Exchange Commission (SEC)" approves this regulation. David A. Bell, Ron C. Llewellyn, and Julia Forbess, "SEC Adopts Nasdaq Rules on Board Diversity", *Harvard Law School Forum on Corporate Governance*, 19 August 2021, https://corpgov.law.harvard.edu/2021/08/19/sec-adopts-nasdaq-rules-on-board-diversity/.
[1041] It is argued that regulatory measures, namely gender quotas, are ineffective in improving firm performance. Therefore, it is claimed that there must be other reasons triggering quotas for women other than the desire to improve firm performance. See Giuseppina Iacoviello, MariaCaterina Mazzei, and Giovanni Riccardi, "The Gender Composition of the Board and Firm Performance. The Role of Regulatory Measures", *Corporate Ownership and Control* 13, no. 1 (2015): 1385–95, https://doi.org/10.22495/cocv13i1c11p10. Promoting and upholding principles of fairness and equal treatment within society may be amongst the reasons for the regulatory interventions. See Muzaffer Eroğlu, "Anonim Şirket Yönetim Kurullarında Üye Çeşitliliğinin Sağlanması İçin Belirli Nitelikte Üye Atanmasına İlişkin Zorunluluk İçeren Kurallar", *Yeditepe Üniversitesi Hukuk Fakültesi Dergisi* 0, no. 2-1 *dublicate*-18585 (2014): 575–630, http://search/yayin/detay/201767.
[1042] Sjafjell, "Gender Diversity".
[1043] It is the first regulation on gender diversity on BoDs.

law quota.[1044] Hence, only nine per cent of the companies complied with it.[1045] This demonstrates the difference in effectiveness between hard law and soft law. Non-compliance with gender diversity targets is most likely due to the less severe sanctions in soft law rules.

It is also argued that women who do not have the necessary skills have seats in the boardroom because of quotas. With better algorithms, AI can select more suitable women. It can analyse more accurately with appropriate inputs. However, the female quota should remain in the event that AI discriminates. Moreover, it is claimed that the female quota is necessary even though AI can be appointed as a director because women's point of view can make a difference in corporate governance.[1046] It is also suggested that the presence of more than one woman will have a positive impact on the BoD[1047] because one female is affected by the others just as human members are affected by AI. Accordingly, diversity needs to reach a certain rate so that it can be effective. Otherwise, one or two exemplary members appointed just for the sake of diversity will follow the majority.

Diversity on the board will bring a different approach that ensures that the BoD does not overlook internal problems or market trends.[1048] Women are inclined to be highly motivated because they work harder until they reach the management level. On the other hand, the fact that they were accepted into the group in question may lead to not expressing opinions so as not to cause obstacles. This would be analogous to the situation where human members agree to the "robo-director" on whatever it suggests. Hence, BoDs with high diversity in every aspect are needed. Diversity enhances decision-making and monitoring functions because diverse boards can overcome groupthink with females who are "outsiders".[1049]

[1044] Mateos de Cabo et al. "Soft Law".
[1045] Mateos de Cabo et al. mention that quota-compliant companies received no benefit from the incentive. They argue that the results demonstrate the government's lack of commitment to the regulation. Mateos de Cabo et al..
[1046] Eroğlu and Karatepe Kaya, "Board Diversity".
[1047] Eroğlu and Karatepe Kaya, 22.
[1048] Elena Bajic, "Why Companies Need To Build More Diverse Boards", *Forbes*, accessed 8 December 2022, https://www.forbes.com/sites/elenabajic/2015/08/11/why-companies-need-to-build-more-diverse-boards/?sh=76e75612662c.
[1049] Kamalnath, "Groupthink", 105.

Last but not least, blockchain will also contribute to diversity as mentioned in the section of board meetings.[1050] It may increase diversity on the grounds that virtual meetings would enable directors with different *habiti* to be a part of the BoD, regardless of their location.[1051]

In conclusion, it can be argued that the inclusion of AI as a member contributes to board diversity. It provides a more rational perspective to the board. In addition, having real persons also adds features such as fairness and good faith to the BoD. A hybrid boardroom makes more sense than the possibility of autonomous AI boardrooms. Hence, how AI can be used in companies should be searched in more detail. However, the legal infrastructure in these matters is not fully developed.

[1050] See *supra* Part 3.9.5.2.
[1051] "Transitioning from In-Person to Virtual Board Meetings."

5. CONCLUSION

5.1. Significance and Contribution

The digitalisation of company law comprises the use of digital technologies to present new opportunities to companies. AI and blockchain are amongst the leading technologies in this regard. Whereas AI is examined in terms of the benefits it provides to the management and auditing. AI makes a breakthrough in simulating human cognitive functions, such as decision-making, which is a substantial element for corporate governance; thus, results will be better with AI in certain tasks, and agency costs may be reduced. Analysing a vast amount of data, AI will help the company take reasonable decisions after considering all kinds of risks. Thus, it will contribute to reducing the risk of conflict of interest and incompetent members. AI will also affect external audit. Hence, it will lead to investigations and regulations in the imminent future.

Blockchain is scrutinised regarding its deployability in companies from the establishment to the termination. In conjunction with blockchain technology, smart contracts enable automatic execution, which allows DAOs to be formed. All of these indicate a paradigm shift in company law. The digitalisation of company law will reshape the notions of the company and corporate governance. It will lead to the reinterpretation of concepts of company law, AI in the management, and corporate assets being digitalised. Blockchain may even replace the traditional means of proving ownership. DAOs will challenge agency constructions in corporate governance.

The first chapter discussed AI and company law. “AI as a director”, “AI-assisted decision-making processes”, and “AI in the appointment of the board members” were the main management areas in which AI can be utilised. Today, AI still cannot be a board member because of the requirement of members being natural persons in many countries. However, AI does not even have a legal personality. Hence, its personality should be solved, whether by entitling an electronic or another type of personality to AI.

Moreover, the role of AI in external audit will be important because although AI tools are already used, it seems possible that AI will do the audit entirely in the coming years. Just like the board members’ situation, the external auditor’s personality should be regulated for AI to be an auditor. While partiality and bias are issues for

human auditors, they may also apply to AI. Therefore, diversity in programmers can be a solution. In addition, AI's ethical principles will deepen and include topics such as human rights and sustainability.

The second chapter focused on blockchain technology and company law. Blockchain, which enables transactions to be maintained without necessitating the participation of a reliable intermediary or third-party, may be the solution to the problems of record-keeping. Hence, blockchain technology may trivialise centralised authorities. The chapter also analysed smart contracts and DAOs. Moreover, it examined the stages in which blockchain can be deployed. In the future, companies will most likely be formed in blockchain, and there may be an international registry. Regarding commercial records, it can be argued that the stock register will be integrated into blockchain; thus, shareholder identification would be easier. Articles of association may also be contained in blockchain with smart contracts.

Blockchain technology provides both remote participation and voting; hence, AGMs and board meetings can be held via blockchain system. Virtual AGMs, which change the traditional format, most likely enable shareholder engagement. Blockchain will redound to the e-voting technology; thus, AGMs will have efficiency and integrity. Less travel will decrease carbon footprint and save money and time. Furthermore, shareholders can efficiently hold the BoD accountable because they can actively participate in the meeting. Last but not least, blockchain technology will facilitate the company's dissolution. That is, the company established on blockchain can be liquidated via blockchain in the same way. Transactions in this phase will be done on blockchain. Blockchain can also be used for preventive issues such as insolvency detection.

The third chapter scrutinised digitalisation and corporate governance. Digital corporate governance comprises processes that conduct the company's affairs utilising digital technologies. This chapter examined the effect of CorpTech on corporate governance through principles. First, it analysed transparency, which eliminates information asymmetry. Whereas blockchain technology is based on transparency, AI states reasons when making decisions. Hence, technology enhances transparency. Second, fairness, which comprises diversity, non-discrimination, and other concepts, was highlighted. AI eliminates unfair bias provided that it is impartially programmed,

and blockchain technology contributes particularly to the e-voting process, which enhances equality.

Third, accountability was emphasised according to AI's personality and that of DAO. AI's personality and whether it can be a director will determine its liability. Currently, it has no personality and cannot be a board member. In addition, since strict product liability will no longer exist, not only the designer and producer but also the user may be held accountable for AI's actions. Moreover, controversy continues about the personality of the DAO. Afterwards, responsibility was discussed regarding the environmental impact of blockchain, which includes energy consumption and sustainability. Furthermore, regarding monitoring, AI may be more efficient because it has the information-processing capacity and is faster than humans. In addition, it can be argued that there will be no need for a monitoring mechanism thanks to the transparency provided by blockchain. Nonetheless, it is unlikely that it will replace the board in the foreseeable future.

These technologies affect both shareholders' and minority shareholders' rights. Exercising shareholder rights has become digital. Shareholder identification, proposals, virtual meetings, and e-voting are areas where technology can be deployed. AI and blockchain technology contribute to equal treatment. For instance, if AI is unbiased, everyone will be treated equally. In terms of compliance, AI can detect non-compliance and reduces human error. Blockchain can also detect wrongdoings owing to transparency and real-time monitoring.

Last but not least, board diversity as a current issue was depicted. AI in management will increase diversity, particularly gender diversity. For instance, AI as an appointer will select people from various backgrounds provided that it is unbiased. Since AI will affect decisions as a member, there should also be human members who have different *habiti.* In addition, Blockchain-enabled meetings will provide members from different places, which pave the way for diversity.

5.2. Future of Research

Company law initially dealt with the possible uses of the Internet, with the impacts approximately being restricted within simplified communication at a wide variety of levels.[1052] However, the utilisation of big data and new analysis approaches for

[1052] Spindler, "Gesellschaftsrecht und Digitalisierung", 55.

directors' liability, which has not yet been fully explored, could be of greater practical importance because knowledge can entail increased liability.[1053] Therefore, AI's personality will be an important topic for future research.

The complete ramifications of blockchain technology remain uncertain, but it may not herald a revolution in company law because the problems such as majority-minority conflicts or control of the organs are of a fundamental nature and not dependent on the technology.[1054] However, processes such as insolvency proceedings and preventive restructurings are based on blockchain, so new studies may arise regarding liquidity issues. Pre-insolvency and insolvency proceedings being executed by blockchain technology will contribute to detecting and preventing insolvency and thus rescue companies.

Furthermore, whether companies are obliged to become compatible with blockchain or not should be examined. Regarding AI, it can be suggested that companies do not have to use it, but there are exceptions. However, if the implementation of blockchain becomes mandatory, and in this case, if it is not used, it will be non-compliance. On the other hand, it can be argued that not using it, even though it is not mandatory, may be a violation of the obligation of board members to exercise due care. That is to say, blockchain technology exists, and within the framework of the duty of care, whether BoDs are obliged to adapt the companies to blockchain will most likely remain on the agenda. Moreover, the practice of deploying AI in mergers and acquisitions during the due diligence phase may affect board members' obligations.

As mentioned above, board members have a duty of care towards the well-being and best interests of the company. However, new technologies accelerate processes, and the company is an organisation established for the purpose of generating income. Hence, board members need to be aware of the developments in the world. Blockchain systems are currently used in the supply chain process, especially in transportation law around the world. The consequences of not deploying blockchain in the company when it is used in the world, especially in SMEs, should

[1053] Spindler, 55.
[1054] See Spindler, "Gesellschaftsrecht und Digitalisierung", 55.

be examined. Determining whether it constitutes a breach of the duty of care necessitates further research.

Lastly, although DAOs have many advantages regarding corporate governance, they also have legal risks, such as the lack of consensus on the legal nature of DAOs leading to the inability to determine the boundaries of the responsibilities attributed to them and the rights and obligations of the DAO and those of its founders and participants.[1055] Moreover, some of DAOs' features are still ambiguous. For instance, whether decentralisation should only be on the infrastructural level, that is, blockchain network, or should also include the governance level, namely not being controlled by any groups, is being discussed.[1056] It can be argued that the latter property should also be present to be fit for purpose. Another example would be the notion of autonomy, which may or may not contain members or actors. In addition, an organisation that is consisted of smart contracts may not be regarded as an entity.

[1055] The fact that DAOs are not subject to any jurisdiction also raises questions about the enforceability of the necessary sanctions, even in the event that the legal nature and the limits of liability in this direction can be determined. Yılmaz Orhan, "Decentralized Autonomous Organizations", 162.
[1056] Hassan and De Filippi, "Decentralized Autonomous Organization", 6.

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EDUCATION

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Undergraduate	Marmara University, Faculty of Arts and Sciences, Translation and Interpreting (English)	2023
Undergraduate	Marmara University, Faculty of Law	2016

PROFESSIONAL EXPERIENCE

Intern (Istanbul Bar Association) (2016-2017)

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FOREIGN LANGUAGES

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HOBBIES & INTERESTS

Culinary Arts, Travelling, Classical Music, Playing the Guitar, and Swimming