



ISTANBUL MEDENİYET UNIVERSITY
INSTITUTE OF GRADUATE STUDIES
DEPARTMENT OF PRIVATE LAW

**Preparation of Articles of Association Through Smart
Contracts in Joint-Stock Company: A Legal View**

Master's Thesis

Merve Koca

June 2024

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Supervisor

Asst. Prof. Meltem Karatepe Kaya

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THESIS JURY APPROVAL

This Master's thesis titled "Preparation of Articles of Association Through Smart Contracts in Joint-Stock Company: A Legal View" written by Merve Koca 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.

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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.

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Merve KOCA

GENİŞ ÖZET

Anonim Şirket Esas Sözleşmesinin Akıllı Sözleşmeler Aracılığıyla Hazırlanması: Hukuki Bir Bakış

Koca, Merve

Yüksek Lisans Tezi, Özel Hukuk Anabilim Dalı

Danışman: Dr. Öğr. Üyesi Meltem Karatepe Kaya

Haziran 2024

Bir şirketin anayasal belgesi niteliğinde olan esas sözleşme, şirketin kuruluş anından fesih tarihine kadar işlerliğini sürdürecektir. Şirketin iç ve dış ilişkileri ile pay sahiplerinin birbirlerine ve şirkete karşı hak, yetki ve yükümlülüklerini düzenler. Esas sözleşmenin hazırlanması, şirket kuruluşuna ilişkin prosedürlerden biridir. Türkiye'deki yasal düzenlemelere göre kuruluş süreci, ana sözleşmenin yazılı hale getirilmesi, kurucular tarafından imzalanması ve imzaların noter tarafından onaylanması ile başlar. Tescil süreci ticaret siciline tescil ile sona erer ve şirket tescille birlikte tüzel kişilik kazanır. Esas sözleşmenin hukuki niteliğine ilişkin çeşitli görüşler mevcuttur. Baskın görüşe göre esasen hukuki işlem niteliğinde olan esas sözleşme akdi olup, tesciline kadar 6098 sayılı Türk Borçlar Kanunu'nun Genel Hükümler başlıklı birinci kısmının kuruluş, butlan, irade beyanlarının geçersizliği ve yorumlara ilişkin hükümleri uygulanabilecektir.

Bu çalışmada, şirketin temel ilişkilerini düzenleyen hükümler bütününden oluşan esas sözleşmenin tescilden önce Borçlar Kanuna tabi bir sözleşme niteliğinde olması görüşünden hareketle akıllı sözleşmelerin esas sözleşmeye entegre edilmesi bağlamında bir hukuki değerlendirme yapılmaktadır. Esas sözleşmenin akıllı sözleşme aracılığıyla düzenlenmesiyle kurumsal yönetimde maliyetlerin azaltılması, süreden tasarruf sağlanması, işlemlerin otomatik şekilde gerçekleştirilmesi hedeflenmektedir. Türk mevzuatı ve akıllı sözleşmelerin Türk mevzuatına uyumu doğrultusunda

hazırlanan bu çalışma, son zamanlarda şirketlerin dijitalleşmesine yönelik artan ilgiye istinaden şirketin temel yapı taşlarını oluşturan esas sözleşmenin nasıl dijitalleştirilebileceğini ve bu süreçte yaşanabilecek sorunları inceleyen bir ön araştırma niteliği taşımaktadır.

Tezin ilk bölümünde anonim şirketlerde esas sözleşme hazırlığı incelenmektedir. Esas sözleşmede bulunması gereken hükümler, kanuna aykırı hükümlerin durumu, sözleşmenin kurulma anı, sicile tescilden önce ve sonraki durumlar ele alınacaktır. Mevzuata bakıldığında 6102 sayılı Türk Ticaret Kanunu'nun (TTK) 335. maddesi uyarınca şirket, tescilden önce, kurucuların kanuna uygun olarak düzenleyecekleri esas sözleşmede şirket kurma iradelerini açıklamaları, sermayenin tamamını ödemeyi kayıtsız şartsız taahhüt etmeleri, imzaların noterce onaylanması veya ticaret sicili memuru ya da yardımcısı huzurunda esas sözleşmeyi imzalamaları üzerine kurulur ve ticaret siciline tescil ile tüzel kişilik kazanır. Tescil, ana sözleşmenin şirket ve tüm hissedarlar için bağlayıcı ve düzenleyici bir belge haline gelmesini sağlar. Ayrıca, esas sözleşmenin tüm hükümlerinin ticaret siciline tescil ve Türkiye Ticaret Sicili Gazetesi'nde ilan edilmesiyle birlikte, esas sözleşmenin içeriği üçüncü kişilere açık hale gelir. Ardından esas sözleşmenin tescilinden sonraki objektif ve sübjektif eksikliklerin durumu, TTK'nın 353. Maddesi kapsamında butlan, hak düşürücü süre ve fesih davaları incelenmektedir.

Esas sözleşmenin içeriğine ilişkin temel düzenleme TTK'nın 339. maddesinin 2. fıkrasında düzenlenmiştir. Bu maddede esas sözleşmede yer alması gereken hususlar sayılmıştır. Öte yandan esas sözleşmeye ilişkin bir diğer düzenleme TTK'nın 354. maddesinde yer almaktadır. TTK'nın 340. maddesi kapsamında esas sözleşmenin içeriği, emredici, şarta bağlı ve ihtiyari hükümler ve bu hükümlerde sapabilme durumu değerlendirilmektedir.

Esas sözleşmenin içeriğini değiştirmek ve yeni hükümler eklemek veya mevcut hükümleri tamamen veya kısmen kaldırmak için esas sözleşmenin değiştirilmesi gerekir. TTK'nın 452. maddesi, esas sözleşmede aksi kararlaştırılmamışsa, genel kurula esas sözleşmeyi değiştirme yetkisi

verir. Aynı maddede bu hakkın kullanımına ilişkin bazı sınırlamalar da öngörülmüştür. Bu bağlamda, esas sözleşme değişikliklerinin kanunda öngörülen şartlara uygunluğu ve kapsamı da ele alınacaktır.

İkinci bölümde blok zinciri teknolojisine genel bir bakış ile akıllı sözleşmelerin blok zinciri teknolojisi kullanılarak nasıl uygulandığını kavramak amaçlanmıştır. Temel olarak blok zinciri, işlemlerin ağdaki her bir paydaş tarafından onaylanmasına dayalı olarak çalışan, bu şekilde eklenen bloklarla büyüyen ve değiştirilemez olduğu kabul edilen merkezi olmayan, halka açık bir depolama veri tabanıdır. Blockchain teknolojisi, Satoshi Nakamoto'nun "Bitcoin: A Peer-to-Peer Electronic Cash System" adlı makalesi ile gündeme gelmiştir. Merkezi olmayan bir yapıya sahip olan Blockchain teknolojisi, uçtan uca eşler arası bir ağdan oluşmaktadır. Veriler bir merkezde depolanmaz. Dağıtık defter teknolojisi kullanılarak herhangi bir merkezi ortam ya da birim olmaksızın bir işlemin geçerliliğinin ve güvenliğinin sağlanmasıdır.

İkinci bölümün blokzincire ilişkin kısmının devamında, bir işlemin blok zinciri ağına eklenmesi, zincirin oluşumu, bloklar ve değişimleri ile veri kaydı kavramlarına değinilecektir. Anahtar bilgilerin bir zincirden diğerine aktarılmasını sağlayan ve ana blok zinciri defterine 'sabitlenmiş' kendi yazılım koduyla ayrı olarak yönetilen defter olan yan zincir hususu ve kullanım alanları açıklanacaktır. Yan zincirlerin kullanımı ile doğabilecek potansiyel faydalar belirtilecektir.

İkinci bölümün ikinci kısmında ise akıllı sözleşmeler kavramı açıklanmaktadır. Yirmi yılı aşkın bir süredir varlığını sürdürmekte olan kavram ilk olarak 1996 yılında Nick Szabo tarafından "Smart Contracts: Dijital Piyasalar için Yapı Taşları" adlı makalesinde kullanılmıştır. Akıllı sözleşmeler blok zinciri teknolojisini kullanan uygulamalardandır ve Bitcoin'den sonra blok zinciri teknolojisinin temel özelliklerinden biri olan standartlaştırılmış kurallar özelliğini bünyesinde barındıran ikinci nesil dağıtık defter teknolojisinin bir örneğidir. Akıllı sözleşme, geleneksel bir sözleşmenin,

taraf larca üzerinde mutabık kalınan edimlerin otomatik olarak işlerlik kazanmasını sağlayacak kodlardan oluşturulan ve bilgisayar yazılımları aracılığıyla yürütülen kodlara aktarılması olarak tanımlanabilir. Akıllı sözleşmeler bir blok zinciri platformu üzerinde çalışarak program kodunun depolanmasını sağlar. Bu kod, belirli koşulların yerine getirilmesi üzerine sözleşme şartlarının kendi kendine yürütülmesini sağlar.

İki tür akıllı sözleşme vardır: zincir içi ve zincir dışı. Zincir içi akıllı sözleşmeler tamamen kendi kendini yürütür ve blok zincirinde saklanır. Zincir dışı akıllı sözleşmeler ise geleneksel anlamda blok zincirinin dışında kurulur. Akıllı sözleşmeler dört aşamadan oluşan bir yaşam döngüsüne sahiptir: oluşturma, dondurma, yürütme ve sonuçlandırma. Oluşturma aşamasında, ilgili taraflar sözleşme şartları ve hükümleri üzerinde anlaşır lar. Müzakere sürecinin ardından hükümler bilgisayar koduna dönüştürülür ve blok zincirine gönderilir. Katılımcılara ait düğümlerin çoğunluğunun devamlılığı dondurma olarak adlandırılır. Akıllı sözleşmenin cüzdan adresine yapılan tüm transferler dondurulur ve düğümler sözleşmenin yürütülmesi için gerekli şartların karşılandığından emin olmak için bir yönetim kurulu gibi hareket eder. Ardından, sözleşme doğrulanır ve yürütülür. Yürütüldükten, saklandıktan ve onaylandıktan sonra, sözleşmenin yaşam döngüsünün son aşaması olan sonuçlandırmaya ulaşılır.

Mevcut literatür, teknik ve hukuki tartışmalarda akıllı sözleşmelerin temel özelliklerinin tanımlanmasından yoksundur. Her disiplin akıllı sözleşmelerin farklı bir özelliğini vurgulamaktadır. Bu kapsamda detaylı açıklamalara çalışmamızda yer verilmiştir. Bunun yanı sıra, akıllı sözleşmeler tamamen dijitalleştirilmiştir, birçoğunun yalnızca dijital biçimde var oldukları bilinmelidir. Bu kapsamda esas sözleşmenin bir blok zincirinde saklanması halinde zincirdeki işlemleri denetlemek için güvenilir bir üçüncü tarafa ihtiyaç duyulmayacaktır. Akıllı sözleşmeler, sözleşme kapsamındaki yükümlülüklerin ilgili tarafların herhangi bir müdahalesi veya eylemine gerek olmaksızın yerine getirilebildiği önemli bir özellik sunmaktadır.

Akıllı sözleşmeye ilişkin açıklamaların devamında blok zincirinde oluşturulan bir akıllı sözleşmenin değişmezliği üzerinde durulmaktadır. İstisna olarak dışarıdan müdahaleye kapalı olmasına rağmen bazı bilgilerin manuel olarak doğrulanması gerekliliği karşısında Oracle kavramı ele alınmaktadır. Oracle, dış dünyadan gelen bilgileri depolayan ve ileten bireysel bir programdır. Bu kapsamda, blok zinciri tabanlı sistemlerin gerçek dünya personeli veya harici olaylarla etkileşime girmesi için bir araç sağlayarak sözleşmenin gerçek zamanlı olarak değişen koşullara uyarlanmasına olanak tanınması nedeniyle akıllı sözleşmelerin güncellenmesi bakımından kullanım alanı bu kısımda ayrıca değerlendirilmektedir.

Diğer bir kısımda ise, geleneksel sözleşmelerin akıllı sözleşmeler karşısındaki durumu ele alınmaktadır. Geleneksel sözleşmelerin bilgisayar kodunda oluşturulan ve merkezi bir otorite olmaksızın bir blok zincirinde saklanan anlaşmalar olan akıllı sözleşmelerle ikame edildikleri için yakında modasının geçeceği düşünülmektedir. Bu doğrultuda akıllı sözleşmelerin geleneksel sözleşmeye nazaran avantajlı yanlarına değinilmekte ve işlem riskini azalttığı, yönetim ve hizmet maliyetlerini düşürdüğü, kurumsal süreçlerin verimliliğini artırmaya yardımcı olduğu noktalar belirtilmektedir.

İkinci bölümün son kısmında, akıllı sözleşmelerin yasal anlamda sözleşme olup olmadığı tartışılmaktadır. Bu konudaki farklı görüşler ele alınmaktadır. Bu görüşler doğrultusunda akıllı sözleşmelerin yasal olarak tanınmasının çeşitli bölgelerdeki durumu belirlenmektedir. Yine bu hususta yapılmış akademik çalışmalarda çıkarımlara yer verilmektedir. Devamında ise akıllı sözleşmenin kurumsal yönetimdeki fonksiyonu, denetim süreçleri gibi yönetim işlevlerinin faydaları açıklanarak belirli koşullara dayalı olarak önceden tanımlanmış eylemleri yürütmek üzere tasarlanabilecek başkaca kurumsal işlemler için kullanılabilirliği tartışılmaktadır. Bunun yanı sıra, akıllı sözleşmeler kurumlar arası iş birliğini kolaylaştırdığından iş birliğine dayalı işler örneklenmektedir.

Üçüncü bölümde, şirket esas sözleşmesinin hazırlanmasında akıllı sözleşmelerin kullanılması birinci ve ikinci bölümde paylaşılan bilgiler doğrultusunda değerlendirilerek bir sonuca ulaşılmaktadır. Bu kapsamda şirket yönetimi bağlamında, akıllı sözleşmelerin kullanımı, ana sözleşmelerin oluşturulmasını ve yürütülmesini kolaylaştırabilir, şeffaflığın artırılması, şirket yönetimi görevlerinin otomasyonu ve dağıtılmış defter teknolojisi aracılığıyla gelişmiş güvenlik gibi faydalar sunabilir. Ayrıca, akıllı sözleşmelerin şirket yönetimi bağlamında kullanımı, çeşitli sektörlerdeki dijital dönüşüm ve teknolojik ilerlemelerdeki daha geniş eğilimlerle uyumludur. Akıllı sözleşmeler, bilgileri bir blok zincirinde güvenli bir şekilde depolayabilir, güncelleyebilir ve doğrulayabilir ve ana sözleşme de dahil olmak üzere sözleşmeye dayalı anlaşmaları yönetmek için güvenilir ve kurcalamaya karşı korumalı bir yöntem sunar.

Tüm bu anlatımlar ışığında esas sözleşmenin akıllı sözleşme olarak blokzincir üzerinden hangi şekillerde hazırlanabileceği, irade beyanları, tarafların sözleşme yapma ehliyetlerinin tespiti ve akıllı sözleşmenin altında yatan program kodu “eğer... o zaman” şeklinde hükümlerin nasıl formüle edileceği tartışılmaktadır. Devamında akıllı sözleşmenin temel işlevi olan otomatik icra noktasında esas sözleşme ve hükümleri değerlendirilmektir. Otomatik icraya konu olabilecek imza, tescil, pay defterine kayıt ve üçüncü kişilere bildirim gibi işlemler bulunmakta olup, bu hususlar üçüncü bölümün farklı başlıkları altında incelenmektedir.

Aynı doğrultuda, akıllı sözleşmelerin esas sözleşmede öngörülen şekil şartına uyumlanması ile esas sözleşmede düzenlenen şirketin işletme konusu, şirketin sermayesi, her bir payın itibari değeri, sermayenin ödenme şekli ve şartları, ilk yönetim kurulu üyeleri gibi diğer tüm hükümler açıklayıcı-düzenleyici bir yan ve koruma yükümlülüklerinin icrai nitelikte olmayıp açıklayıcı nitelikte olmasının akıllı sözleşme kapsamında değerlendirilmesi yapılacaktır. Ayrıca şirketlerin esas sözleşmelerinde düzenlenen ilan, mali yıl ve diğer prosedürlerin entegre blokzincir sistemleri ile nasıl

kolaylaştırılabileceđi ile ilgili akıl yrtlmektedir. Bunun yanı sıra, hkmszlk ve kısmi hkmszlđe iliřkin hkmlerin akıllı szleřme bakımından deđerlendirilmesi yapılırken esas szleřme deđiřikliklerinin akıllı szleřmenin esnek olmayan yapısı karřısındaki durumu ele alınacaktır.

Son kısımda ise esas szleřmenin akıllı szleřme ile hazırlanması halinde karřılařılabilecek potansiyel sorunlar, teknik sınırlar detaylı olarak incelenmektedir. Esas szleřmelerin akıllı szleřmeler aracılıđıyla hazırlanması birok avantaj sađlamakla birlikte akıllı szleřmenin yapısı geređi birok teknik soruna da neden olabilmektedir. Ayrıca, 6698 sayılı Kiřisel Verilerin Korunması Kanunu hkmleri aısından deđerlendirmelere de yer verilmiřtir. Bylece akıllı szleřmenin esas szleřmeyi konu edinmesi halinde verimliliđin hangi bařlıklar altında sađlanacađı bu uygulamaya adım adım geiř sreci daha net bir řekilde deđerlendirilecektir. Hem avantajları ynnden hem de dezavantajları ynnden ele alınan geliřmelerle, esas szleřme odađında kurumsal ynetimin deđiřimine ynelik bir temel oluřturulmaktır.

Anahtar Kelimeler: Esas Szleřme, Akıllı Szleřmeler, Anonim řirket, Blokzincir, Merkeziyetsiz Otonom Organizasyonlar

ABSTRACT

Preparation of Articles of Association Through Smart Contracts in Joint-Stock Company: A Legal View

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Master's Thesis, Department of Private Law

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The articles of association are the constitutional document of the company and contain various provisions that will maintain the functioning of the company from the moment of incorporation until the date of dissolution. It regulates the internal and external relations of the company and the rights, powers, and obligations of the shareholders towards the company and each other. The preparation of the articles of association is one of the procedures for the establishment of a company. According to the legal regulations in Turkey, the incorporation process starts with the drafting of the articles of association, signatures by the founders, and notarization of the signatures. The process ends with registration in the trade registry. With this registration, the company gains a legal personality. There are different opinions regarding the legal nature of articles of association. According to the most widely held opinion, articles of association, which are essentially legal transactions, are contractual. The provisions of the first part of the Turkish Code of Obligations No. 6098, titled General Provisions, regarding the establishment, nullity, invalidity of declarations of intention, and interpretations, may apply until their registration.

In this study, a legal evaluation is made in the context of integrating smart contracts into the articles of association, based on the opinion that the articles of association, which are a set of provisions regulating the basic relations of the company, are a contract subject to the Code of Obligations before registration. By regulating the articles of association through smart contracts,

it is aimed at reducing costs in corporate governance, saving time, and performing transactions automatically. This study, which has been prepared in line with Turkish legislation and the compliance of smart contracts with Turkish legislation, is preliminary research examining how the articles of association, which constitute the basic building blocks of the company, can be digitised and the problems that may arise in this process, in line with the increasing interest in the digitalization of companies recently.

Keywords: Articles of Association, Smart Contracts, Joint-Stock Company, Blockchain, Decentralised Autonomous Organisations



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ABBREVIATIONS

DAO	: Decentralized Autonomous Organization
DLT	: Distributed Ledger Technology
et al.	: <i>et alia</i> (and others)
GDPR	: General Data Protection Regulation (EU) 2016/679
JSC	: Joint-Stock Company
MERSIS	: <i>Merkezi Sicil Kayıt Sistemi</i> (Central Registry Record System)
para.	: Paragraph
PDPL	: Turkish Personal Data Protection Law, Act No. 6698, Date: 24/03/2016, Publication of the Official Gazette 7/4/2016-29677
P2P	: Peer-to-peer
TCC	: Turkish Commercial Code, Act No. 6102, Date: 13/1/2011, Publication of the Official Gazette 14/2/2011-27846
TCO	: Turkish Code of Obligations, Act No. 6098, Date: 11/1/2011, Publication of the Official Gazette 4/2/2011-27836

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1. INTRODUCTION

In recent years, the convergence of blockchain technology and traditional legal frameworks has led to ground breaking innovations in various sectors,¹ including finance,² supply chain management,³ corporate governance⁴ and healthcare.⁵ Among these innovations, smart contracts have emerged as a disruptive force, offering automated and immutable execution of contractual agreements through blockchain-based code.

¹ Wubing Chen et al., 'A Survey of Blockchain Applications in Different Domains', in *Proceedings of the 2018 International Conference on Blockchain Technology and Application*, ICBTA '18 (New York, NY, USA: Association for Computing Machinery, 2018), 17–21, <https://doi.org/10.1145/3301403.3301407>.

² Cynthia Cai, 'Triple-entry Accounting with Blockchain: How Far Have We Come?', *Accounting & Finance* 61 (18 October 2019), <https://doi.org/10.1111/acfi.12556>.

³ Recent research and a survey on the application of blockchain technology to Norwegian companies show that these new blockchain techniques have increased digitally-enabled distributions and reduced marketing costs by 10% with well-defined and more efficient pricing models and supply chains. For further information see Anne H. Gausdal, Karen V. Czachorowski, and Marina Z. Solesvik, 'Applying Blockchain Technology: Evidence from Norwegian Companies', *Sustainability* 10, no. 6 (June 2018): 1985, <https://doi.org/10.3390/su10061985>. For different studies in supply chain see Robert Philipp, Gunnar Prause, and Laima Gerlitz, 'Blockchain and Smart Contracts for Entrepreneurial Collaboration in Maritime Supply Chains', *Transport and Telecommunication* 20 (21 November 2019): 365–78, <https://doi.org/10.2478/ttj-2019-0030>; Eren Yiğit, 'Improving Supply Chain Management Using Smart Contracts' (Master, Kadir Has Üniversitesi, 2023), <https://tez.yok.gov.tr/UlusalTezMerkezi/>; Daniel Ferreira, Jin Li, and Radosława Nikolowa, 'Corporate Capture of Blockchain Governance', *The Review of Financial Studies* 36, no. 4 (1 April 2023): 1364–1407, <https://doi.org/10.1093/rfs/hhac051>.

⁴ David Yermack, 'Corporate Governance and Blockchains', *Review of Finance* 21, no. 1 (2017): 7–31, <https://doi.org/10.1093/rof/rfw074>; Fiammetta Piazza, 'Bitcoin and the Blockchain as Possible Corporate Governance Tools: Strengths and Weaknesses', *Penn State Journal of Law & International Affairs* 5, no. 2 (23 June 2017): 262, <https://elibrary.law.psu.edu/jlia/vol5/iss2/3>; Alexander Kaan Avdzha, 'The Coming Age of Blockchain Technology in Corporate Governance' (Master, Tilburg University, 2017), https://www.researchgate.net/publication/325380963_The_Coming_Age_of_Blockchain_Technology_in_Corporate_Governance; Robert Leonhard, 'Corporate Governance on Ethereum's Blockchain', SSRN Scholarly Paper (Rochester, NY, 30 May 2017), <https://doi.org/10.2139/ssrn.2977522>; 'Blockchain Technology and Corporate Governance Technology, Markets, Regulation and Corporate Governance' (Organization for Economic Co-operation and Development (OECD) Directorate for Financial and Enterprise Affairs Corporate Governance Committee, 2018), [https://one.oecd.org/document/DAF/CA/CG/RD\(2018\)1/REV1/En/pdf](https://one.oecd.org/document/DAF/CA/CG/RD(2018)1/REV1/En/pdf); Anne Lafarre and Christoph Van der Elst, 'Blockchain Technology for Corporate Governance and Shareholder Activism', *European Corporate Governance Institute (ECGI) - Law Working Paper No. 390/2018*, *Tilburg Law School Research Paper No. 2018-7*, 1 March 2018, <https://doi.org/10.2139/ssrn.3135209>; Niamh Brennan, 'Corporate Governance Implications of Disruptive Technology: An Overview', *The British Accounting Review* 51 (1 October 2019): 100860, <https://doi.org/10.1016/j.bar.2019.100860>; Dulani Jayasuriya Daluwathumullagamage and Alexandra Sims, 'Blockchain-Enabled Corporate Governance and Regulation', *International Journal of Financial Studies* 8, no. 2 (June 2020): 36, <https://doi.org/10.3390/ijfs8020036>; Akram Almatarneh, 'Blockchain Technology and Corporate Governance: The Issue of Smart Contracts – Current Perspectives and Evolving Concerns', *Éthique Et Économique* 17, no. 1 (2020), <https://papyrus.bib.umontreal.ca/xmlui/handle/1866/23114>.

⁵ Marko Hölbl et al., 'A Systematic Review of the Use of Blockchain in Healthcare', *Symmetry* 10, no. 10 (October 2018): 470, <https://doi.org/10.3390/sym10100470>; Elif Çalık, 'A New Approach: Using Smart Contract to Ensure the Security of the Shared Electronic Health Records' (PhD, Ankara Yıldırım Beyazıt Üniversitesi, 2022), <https://tez.yok.gov.tr/UlusalTezMerkezi/>.

In this context, articles of association which serve as foundational documents outlining the governance structure and operational guidelines of companies, can be considered to be integrated into smart contracts, an application of the blockchain. This is because the articles of association represent centuries-old legal frameworks regulating corporate behaviour and decision-making processes.

This thesis explores the integration of smart contracts into company articles of association, offering insights into the benefits, challenges, and legal considerations. Smart contracts, powered by blockchain technology, automate and enforce contractual agreements, potentially revolutionizing corporate governance and operations. By embedding smart contract clauses into articles of association, companies can enhance transparency, efficiency, and compliance while reducing administrative overhead. However, this integration poses regulatory, contractual, and technical challenges that must be carefully navigated. This thesis provides practical recommendations and examples to assist companies in leveraging smart contracts effectively within their articles of association.

1.1. Literature Review

In recent years, there has been a growing interest in the use of smart contracts for various business applications. These self-executing contracts, built on blockchain technology, have the potential to revolutionize the way companies operate and interact with their stakeholders.⁶

One specific application where smart contracts can be utilized is in the preparation of articles of association in a company.⁷ By utilizing smart contracts in the preparation of articles of association, companies can streamline the process and ensure greater accuracy and transparency in their governance structures. Smart contracts can automate the creation and execution of articles of association, ensuring that all necessary clauses and provisions are included. Additionally, smart contracts can also incorporate real-time data from external sources, such as regulatory requirements or changes in corporate laws, to ensure that the articles of association are always up to date and compliant with the latest regulations. This digital approach to preparing

⁶ Kevin Werbach and Nicolas Cornell, 'Contracts Ex Machina', 67 *Duke Law Journal* 313, 18 March 2017, <https://papers.ssrn.com/abstract=2936294>.

⁷ Hamed Taherdoost, 'Smart Contracts in Blockchain Technology: A Critical Review', *Information* 14 (13 February 2023): 117, <https://doi.org/10.3390/info14020117>.

articles of association can also enhance the efficiency of corporate governance processes.⁸ Furthermore, smart contracts can provide an immutable record of the articles of association, ensuring that any changes or amendments made to the document are transparent and auditable.

Overall, the use of smart contracts in the preparation of articles of association can provide numerous benefits for companies, including automation, accuracy, transparency, compliance, and efficiency.

1.2.Aim and Scope

This thesis aims to achieve the following objectives:

To examine the theoretical underpinnings of smart contracts and articles of association and their respective roles in corporate governance.

To analyse the legal, regulatory, and technical challenges associated with the integration of smart contracts with articles of association.

To assess the potential benefits and risks of implementing smart contracts within the framework of articles of association.

To explore case studies and real-world applications of smart contracts in corporate governance settings.

To propose recommendations and best practices for effectively leveraging smart contracts while aligning with existing legal and regulatory frameworks.

1.3. Problems and Key Research Questions

To address the objectives outlined above, this thesis will explore the following research questions:

What are the theoretical foundations of smart contracts and articles of association, and how do they intersect within the context of corporate governance?

What legal, regulatory, and technical challenges arise from the integration of smart contracts with articles of association, and how can they be addressed?

⁸ Almatarneh, 'Blockchain Technology and Corporate Governance'.

What are the potential benefits and risks associated with implementing smart contracts within the framework of articles of association, and how do they impact corporate governance practices?

What are the real-world applications and case studies of smart contracts in corporate governance settings, and what insights can be drawn from them?

What recommendations and best practices can be proposed for effectively leveraging smart contracts while ensuring compliance with existing legal and regulatory frameworks?

1.4. Overview and Contribution

Traditionally, articles of association have served as the cornerstone of corporate governance, delineating the rights, responsibilities, and relationships among shareholders, directors, and other stakeholders. These documents establish the organizational structure, decision-making mechanisms, and procedural rules governing corporate affairs. However, the advent of smart contracts introduces a paradigm shift in contractual governance, enabling self-executing agreements enforced by code rather than traditional legal enforcement mechanisms.

This thesis seeks to explore the intersection of smart contracts and articles of association within the realm of corporate governance. As companies increasingly explore the potential of blockchain technology to streamline operations and enhance transparency, the integration of smart contracts with articles of association presents both opportunities and challenges. Understanding the implications of this convergence is essential for policymakers, legal practitioners, corporate executives, and stakeholders alike.

1.5. The Importance of Study

The integration of smart contracts with articles of association holds immense potential to revolutionize corporate governance practices. By embedding contractual terms and governance protocols into blockchain-based code, companies can automate decision-making processes, enhance transparency, and reduce the reliance on intermediaries. Moreover, smart contracts offer the promise of greater efficiency, security, and accuracy in executing contractual obligations, potentially mitigating disputes and enhancing stakeholder trust.

1.6. The Planned Structure of the Research

Chapter 1 introduces the research scope, aim, importance, and methodology.

Chapter 2 provides an overview of the articles of association under Turkish regulation.

Chapter 3 examines the theoretical and conceptual foundations of blockchain technology and smart contracts, highlighting their key characteristics and functionalities.

Chapter 4 explores the potential benefits and risks of implementing smart contracts within the framework of articles of association. It draws insights from theoretical frameworks and analyzes the legal and regulatory challenges associated with the integration of smart contracts with articles of association. It considers issues such as enforceability, jurisdiction, and compliance.

Finally, the conclusion summarises the key findings of the thesis and suggests avenues for future research.

By investigating the intersection of smart contracts and articles of association in corporate governance, this thesis aims to contribute to the growing body of literature on blockchain technology, legal innovation, and organisational governance.

1.7. Research Methodology

To achieve the outlined objectives, this thesis adopts a mixed-methods research approach that integrates qualitative and quantitative analysis, alongside "Black letter" Doctrinal Analysis, Critical Doctrinal Analysis, and interdisciplinary research on subjects such as technology, engineering, economy, and sociology.

The qualitative component will involve an exhaustive review of existing literature, encompassing academic papers, books, legal documents, and research articles. This review aims to establish a theoretical framework and identify key concepts, challenges, and opportunities related to smart contracts and articles of association in corporate governance. Furthermore, the "Black letter" Doctrinal Analysis will focus on researching relevant legal rules of company law, while the Critical Doctrinal Analysis will delve into the critical evaluation of legal doctrines.

Through these qualitative approaches and interdisciplinary research, this study aims to provide a comprehensive understanding of the intersection of smart contracts and articles of association in corporate governance. The findings will contribute not only

to theoretical knowledge but also offer practical insights for stakeholders and policymakers.

2. ARTICLES OF ASSOCIATION IN JOINT-STOCK COMPANY UNDER TURKISH REGULATION

2.1. In General

In legal terminology, the term "person" encompasses entities that possess the capacity for rights and obligations. Any entity acknowledged by the legal system as having the capability to hold rights and obligations falls under the definition of a person.⁹ The concept of rights and obligations extends beyond real individuals to encompass groups organized for a common purpose or to manage specific resources in order to protect collective interests and meet common needs.¹⁰ These organized groups, known as legal persons,¹¹ are granted rights and obligations by the legal system.¹² They possess an independent identity from the individuals or entities that formed them.

It is essential to establish rules by the will of the partners to regulate the management of the legal personality formed by individuals who unite for a common purpose. The permanence of these rules will be possible with a document to be issued.

⁹ Jale G. Akipek, Turgut Akıntürk, and Derya Ateş Karaman, *Türk Medeni Hukuku Başlangıç Hüükümleri / Kişiler Hukuku*, vol. 1 (İstanbul: Beta, 2018), 229.

¹⁰ Mehmet Bahtiyar, *Anonim Ortaklık Anasözleşmesi* (İstanbul: Beta, 2001), 5.

¹¹ As stated in Article 47 of the Turkish Civil Code, Act No:4721 Date: 22/11/2001, Publication of Official Gazette 08/12/2001-24607, a legal person is a community of persons organised to have an independent existence and a community of independent property dedicated to a specific purpose.

¹² Akipek, Akıntürk, and Ateş Karaman, *Türk Medeni Hukuku Başlangıç Hüükümleri / Kişiler Hukuku*, 1:499.

Joint stock company¹³ (JSC) possess legal personality¹⁴ and necessitate a framework of fundamental regulations determined by the partners' intent at the time of their establishment. These regulations are outlined in the articles of association,¹⁵ which is an essential component of forming a JSC. According to an approach that has been made in Swiss law on the status of all legal personalities and which is generally accepted for JSCs, the articles of association are a set of legal rules that function as the constitution of the legal personality and derive its legal basis directly from the autonomy of will.¹⁶

In Turkish law, the terms 'main contract',¹⁷ 'articles of association',¹⁸ 'partnership agreement',¹⁹ 'company contract',²⁰ and 'status'²¹ are used to express the basic document/transaction, which is the building block of the JSC in the doctrine. The

¹³ A joint stock company (JSC) is a company with a specific capital divided into shares, and it is only liable for its debts with its assets. The minimum capital required is 250,000 Turkish Liras, which may increase to at least 500,000 Turkish Liras for non-public JSCs accepting the registered capital system. Before registration, the company must pay at least one-quarter of the nominal value of the committed shares in cash, with the remaining amount to be paid within 24 months of the company's registration. The company's articles of association or the board of directors may establish the payment schedule. Shareholders are only responsible to the company for the capital shares they have committed. The law does not prohibit the establishment of JSCs for any economic purpose or subject matter. A JSC must have an association agreement written and registered with the trade registry at the location of its headquarters. JSCs can issue both registered and bearer shares to represent their ownership and may also issue bonds and similar debt instruments. It is possible to establish a JSC with a single share, and both real and legal persons may be shareholders. In general, the approval of the general assembly is not required for the transfer of shares, giving shareholders the freedom to transfer their shares to others. JSCs engaging in specific activity areas and surpassing the threshold values of criteria determined by total assets, annual net sales revenue, and number of employees are subject to an independent audit. It is only JSCs that offer their shares to the public and trade them on the stock exchange. For further information about JSC see Ferna İpek Kayalı, 'Turkish Company Law', in *Turkish Private Law*, 3rd ed. (Ankara: Seçkin Yayınevi, 2024), 241.

¹⁴ Article 125 of the Turkish Commercial Code (TCC), Act No. 6102, Date: 13/1/2011, Publication of the Official Gazette 14/2/2011-27846

¹⁵ Article 339 of the TCC.

¹⁶ Cem Veziroğlu, *Anonim Ortaklıklar Hukukunda Esas Sözleşme Özgürlüğü ve Sınırları* (İstanbul: On İki Levha Yayıncılık, 2021), 171.

¹⁷ Erdoğan Moroğlu, 'Anonim Ortaklık Ana Sözleşmesi ve Hukuki Niteliği', in *Makaleler*, Prof. Dr. Kemal Oğuzman'ın Anısına Armağan, İstanbul Beta 2000 (İstanbul: On İki Levha Yayıncılık, 2010), 429; Bahtiyar, *Anonim Ortaklık Anasözleşmesi*, 7., 'ana sözleşme', Hayri Domaniç, *Anonim Şirket Ana Mukavelelerine Yazılması Gerekli ve Mümkün Unsurlar*, Ord. Prof. Dr. Halil Arslanlı'nın Anısına Armağan (İstanbul: Fakülteler Matbaası, 1978), 309–406., 'ana mukavele'.

¹⁸ Hayri Domaniç, *Anonim Şirketler Hukuku ve Uygulaması: TTK Şerhi II* (İstanbul: Temel Yayınları, 1988), 143.; Ünal Tekinalp, Reha Poroy, and Ersin Çamoğlu, *Ortaklıklar Hukuku I*, 13th ed. (İstanbul: Vedat Kitapçılık, 2014), 309.; Oğuz İmregün, *Anonim Ortaklıklar*, 4th ed. (İstanbul: Yasa Yayıncılık, 1989), 34., 'esas sözleşme', Halil Arslanlı, *Anonim Şirketler I: Umumi Hükümler*, 3rd ed. (İstanbul: Fakülteler Matbaası, 1960), 26.; Tuğrul Ansay, *Anonim Şirketler Hukuku*, 6th ed. (Ankara: Banka ve Ticaret Hukuku Araştırma Enstitüsü, 1982), 40., 'esas mukavele'.

¹⁹ İmregün, *Anonim Ortaklıklar*, 34., 'ortaklık sözleşmesi'.

²⁰ Arslanlı, *Anonim Şirketler I: Umumi Hükümler*, 26., 'şirket mukavelesi'.

²¹ Ansay, *Anonim Şirketler Hukuku*, 40., 'statü'.

legislator has used the term ‘articles of association’²² for JSCs. In addition, Article 135 para. 1 of the Turkish Commercial Code (TCC) No. 6102 states that the concept of ‘company agreement’ refers to the articles of association in JSCs, the company agreement in partnership and limited liability companies, and the main contract in cooperatives. Consequently, numerous provisions of the TCC employ the concept of ‘company agreement’ as a general concept for all commercial companies.

As in German and Swiss law, the articles of association are not directly defined in the TCC. However, the JSC’s articles of association are not explicitly defined in the law and have various definitions proposed in legal doctrine.²³ These definitions differ depending on the legal nature of articles of association, subject matter, parties, basis, and functions.²⁴ To understand the articles of association and their scope, one should start by understanding the characteristics of the definitions rather than just the definitions themselves.

Hence, it can be said that the articles of association determine the organisational structure of the JSC; therefore, they concern the collective interests embodied within the company.²⁵

2.2. Purpose and Scope of Articles of Association

The preparation of the articles of association is one of the procedures related to the establishment of a company.²⁶ The establishment process commences with the performance of the articles of association in writing, signatures by the founders²⁷, and

²² See Article 339 of the TCC.

²³ Ernst Hirsch, *Ticaret Hukuku Dersleri*, 3rd ed. (İstanbul: Hak Kitabevi, 1948), 202; Bahtiyar, *Anonim Ortaklık Anasözleşmesi*, 8–9; Moroğlu, ‘Anonim Ortaklık Ana Sözleşmesi ve Hukuki Niteliği’, 429.

²⁴ Veziroğlu, *Anonim Ortaklıklar Hukukunda Esas Sözleşme Özgürlüğü ve Sınırları*, 170.

²⁵ Veziroğlu, 173.

²⁶ For further information about the establishment of JSC in Turkey, see the booklet in English ‘Republic of Türkiye - Ministry of Trade’, 6–7, accessed 26 May 2024, <https://www.trade.gov.tr/establishing-company-in-turkey/establishing-company-in-turkey-booklet>.

²⁷ As stated in article 337 para. 1 of the TCC, the founders are real persons and legal entities who have committed shares and signed the articles of association. For further information see Hasan Pulaşlı, *Şirketler Hukuku Şerhi*, 3rd ed., vol. 1 (Ankara: Adalet Yayınevi, 2018), 755–59.

notarization of the signatures. The process ends with registration in the trade registry.²⁸ It is through this registration that the company becomes a legal personality.²⁹

The articles of association are the fundamental document that establishes, identifies, introduces, and safeguards the company, as well as outlines the rules governing the company.³⁰ The articles of association are the company's constitutional document³¹ and contain various provisions that will maintain its functionality from the moment of establishment until the date of dissolution.³² Similarly, under English law, Section 17 of the Companies Act 2006 stipulates that the articles of association are one of the documents that constitute a company's constitution.³³

Articles of association regulates the internal and external relations of the company³⁴ and the rights, authorities and obligations of the shareholders towards the company and each other.³⁵ It is a multilateral treaty that has a specific form and is open to accession.

The most crucial function of the articles of association is to supplement or amend the provisions of the law applicable to the company in accordance with the structure of the business and the needs of the shareholders.³⁶ Although ready-made uniform drafts are used in practice, this is inconvenient due to the fact that some information must be

²⁸ In Turkey, various registries are maintained to document specific facts or transactions, including the civil registry, land registry, and ship registry. Registration in these registries can either establish a specific legal situation (constitutive effect) or confirm the existence of an already established legal situation (declarative effect). For further information about trade registry see Sabih Arkan, *Ticari İşletme Hukuku*, 29th ed. (Ankara: Banka ve Ticaret Hukuku Araştırma Enstitüsü, 2023), 265–78.

²⁹ Tekinalp, Poroy, and Çamoğlu, *Ortaklıklar Hukuku I*, 305.

³⁰ Veziroğlu, *Anonim Ortaklıklar Hukukunda Esas Sözleşme Özgürlüğü ve Sınırları*, 167.

³¹ The articles of association are often referred to as the 'constitution' of a JSC due to their regulatory function within the partnership and their broad sphere of influence. They hold the highest position in the hierarchy of norms within the partnership order, which is considered a legal order in itself. The general assembly, as the legislative body of the partnership, has the authority to regulate the constitution of the partnership. Veziroğlu state that the similarity between the articles of association and the constitution goes beyond mere analogy and carries normative implications. Veziroğlu, 188.

³² Necla Akdağ Güney, *Anonim Şirketlerde Kuruluş* (İstanbul: Vedat Kitapçılık, 2014), 279.

³³ Expert Participation, 'Companies Act 2006', Text (Statute Law Database), accessed 18 May 2024, <https://www.legislation.gov.uk/ukpga/2006/46/section/17>. See also BPP Learning Media (Firm), *Company and Commercial Law: Course Book*, Third edition, Business Essentials (London: BPP Learning Media, 2013), 57.

³⁴ Veziroğlu, *Anonim Ortaklıklar Hukukunda Esas Sözleşme Özgürlüğü ve Sınırları*, 169.

³⁵ Moroğlu, 'Anonim Ortaklık Ana Sözleşmesi ve Hukuki Niteliği', 429.

³⁶ Rauf Karasu, *Anonim Şirketlerde Emredici Hükümler İlkesi*, 2nd ed. (Ankara: Yetkin Yayınları, 2015), 29.

shown in the articles of association, and some issues cannot be valid if they are not stated in the articles of association.

The main issues regarding the articles of association are regulated in Articles 339 and 340 of the TCC. The provisions of the articles of association shall be prepared by the founders, provided that they are not contrary to the mandatory provisions of the law. Although it is possible to amend the articles of association, it requires a qualified majority.³⁷ This situation prevents the rapid change of company policy and ensures permanence and trust in transactions.³⁸

2.3. Legal Nature of the Articles of Association

The process of preparing and adopting the articles of association resembles the conclusion of any contract. However, it is important to note that the legal implications for the articles of association diverge from those of the law of obligations.³⁹ In terms of that, the legal characterization of the articles of association is a profoundly intricate and disputed matter that forms the doctrinal underpinnings of both corporate law and the law of obligations.⁴⁰ This fundamental issue is not only significant in terms of intellect and theory but also in terms of practicality. The determination of whether the articles of association are considered an objective norm or a legal transaction, and if they are a legal transaction, the specific type of transaction they are, is crucial in determining the applicable laws to be applied to the articles of association. Indeed, it is impossible to separate the consideration of questions such as the nullity, interpretation, or modification of the provisions of the articles of association from the question of their legal nature.⁴¹

Alongside the contract and norm theories, which reflect opposing viewpoints regarding the legal nature of the articles of association, there are also compatibilist methods that seek to find a medium ground between these two positions. The conclusions of the examination of the legal nature of the articles of association are shaped by the specified target point and criteria. As a matter of fact, if the focus is on the establishment phase of the partnership, the articles of association are explained

³⁷ For the exception, see Article 421 para. 2 of the TCC.

³⁸ Akdağ Güney, *Anonim Şirketlerde Kuruluş*, 279.

³⁹ Gül Okutan, 'Anonim Ortaklıklarda Paysahipleri Sözleşmeleri' (PhD, İstanbul, İstanbul Üniversitesi, 2001), 74, İstanbul Üniversitesi Hukuk Fakültesi Kütüphanesi.

⁴⁰ Veziroğlu, *Anonim Ortaklıklar Hukukunda Esas Sözleşme Özgürlüğü ve Sınırları*, 178.

⁴¹ Veziroğlu, 178–79.

based on a legal transaction (contract) based on the autonomy of the will of the founders. Upon registration, the articles of association of a partnership gain a wider scope of impact. They serve as objective standards that are based on the partnership's capacity to create laws (legal autonomy). The articles of association also regulate the partnership's activities and provide a way for making amendments.⁴²

Theories of legal personality closely link to the legal nature of articles of association. However, there are points where the logical connection between the two breaks down. It is also feasible to argue for both the contract and norm theories within the context of a specific legal personality theory.⁴³

2.3.1. In the Case of More Than One Founding Member

The articles of association have a constitutive feature for the company. Pursuant to Article 335 para. 1 of the TCC, a company is established by declaring the intention to establish a company in the articles of association.⁴⁴

In legal doctrine, there have been different opinions regarding the legal nature of articles of association. Essentially, these opinions have pitted contract theory against norm theory.⁴⁵ To summarize, there are three main opinions. The first one is the contract opinion.

2.3.1.1. Contract Opinion

The opinion posits that the articles of association should be considered a contract, grounded in the legal transactions and the founders' freedom of will during the partnership's establishment phase.⁴⁶ The contractual opinion considers the article of association as a special form of the contract.⁴⁷ The formation of this contract⁴⁸ is based

⁴² Veziroğlu, 179.

⁴³ Veziroğlu, 180–81.

⁴⁴ İsmail Kırca, Feyzan Hayal Şehirali Çelik, and Çağlar Manavgat, *Anonim Şirketler Hukuku*, vol. 1 (Ankara: Banka ve Ticaret Hukuku Araştırma Enstitüsü, 2013), 298; Akdağ Güney, *Anonim Şirketlerde Kuruluş*, 279.

⁴⁵ Akdağ Güney, *Anonim Şirketlerde Kuruluş*, 280.

⁴⁶ Esra Hamamcıoğlu, 'Anonim Ortaklıklarda Anasözleşme Değişikliği, İstanbul 2011.' (Unpublished PhD thesis, İstanbul, Marmara Üniversitesi, 2011), 12.

⁴⁷ Kemal Şükrü Onsun, *Ticaret Şirketleri* (Ankara: Türkiye Matbaacılık ve Gazetecilik, 1949), 103; Arslanlı, *Anonim Şirketler I: Umumi Hükümler*, 26; Ansay, *Anonim Şirketler Hukuku*, 58; Yaşar Karayalçın, *Ticaret Hukuku II, Şirketler Hukuku*, 2nd ed. (Ankara: Sevinç Matbaası, 1973), 56–70; Kırca, Şehirali Çelik, and Manavgat, *Anonim Şirketler Hukuku*, 1:298; Tekinalp, Poroy, and Çamoğlu, *Ortaklıklar Hukuku I*, 309; Pulaşlı, *Şirketler Hukuku Şerhi*, 1:763–64.

⁴⁸ Moroğlu argued that the articles of association transformed into objective legal rules after the registration of the partnership, whereas Moroğlu explained the subjection of subsequent shareholders to the articles of association with the nature of an adhesion contract. Moroğlu, 'Anonim Ortaklık Ana

on the agreement of the founders and the declaration of participation for the partners who join later. Following the registration of the company, the articles of association can be amended by a majority but not unanimously⁴⁹, and these amendments are binding on all shareholders. Consequently, some shareholders may be obliged to comply with the amended rules, even if they disagree. Nonetheless, this does not alter the contractual nature of the articles of association. In essence, when an individual becomes a partner in a company governed by the majority principle, they are deemed to have consented to this principle from the outset.⁵⁰

An article of association is a company law contract that regulates the rights and obligations of the shareholders, as well as their relations with the company and each other.⁵¹ According to this opinion, the provisions of Part 1, titled General Provisions of the Turkish Code of Obligations (TCO) No. 6098⁵² on contracts, are also applicable to the articles of association.⁵³

2.3.1.2. Theory of Real Personality

The second opinion put forward by *Von Gierke* is the objective norm⁵⁴, which is based on the theory of real personality.⁵⁵ According to the theory of reality, the establishment of a legal personality is rooted in a 'constitutive collective act' specific to social law. This act, which is distinct from individual law, does not constitute a legal transaction or establish a legal relationship between parties. Instead, it creates a subject of rights. Similarly, the status of companies with legal personality is defined by objective norms that do not constitute a contract but are based on the autonomy of the legal personality. These norms are stipulated through a 'collective action specific to social law'. The legal personality itself holds the power to create law, forming the legal basis of these

Sözleşmesi ve Hukuki Niteliği', 429. According to Bahtiyar, the articles of association retain the characteristics of an adhesion contract both before and after partnership registration. Nevertheless, the author is of the opinion that the articles of association are 'mixed and unique', since they have the characteristics of 'both a norm and a contract'. Bahtiyar, *Anonim Ortaklık Anasözleşmesi*, 10–11.

⁴⁹ For the exception, see Article 421 para. 2 of the TCC.

⁵⁰ Veziroğlu, *Anonim Ortaklıklar Hukukunda Esas Sözleşme Özgürlüğü ve Sınırları*, 185; Arslanlı, *Anonim Şirketler I: Umumi Hükümler*, 252.

⁵¹ Ünal Tekinalp, *Sermaye Ortaklıklarının Yeni Hukuku*, 4th ed. (İstanbul: Vedat Kitapçılık, 2015), 117.

⁵² Turkish Code of Obligations (TCO), Act No: 6098, Date: 11/1/2011, Publication of Official Gazette 4/2/2011-27836

⁵³ Kırca, Şehirli Çelik, and Manavgat, *Anonim Şirketler Hukuku*, 1:298; Hakan Çebi, *Şirketler Hukuku* (Ankara: Seçkin Yayınevi, 2020), 120.

⁵⁴ Okutan, 'Anonim Ortaklıklarda Paysahipleri Sözleşmeleri', 75.

⁵⁵ Çebi, *Şirketler Hukuku*, 120; Okutan, 'Anonim Ortaklıklarda Paysahipleri Sözleşmeleri', 76.

norms. Shareholders adhere to the articles of association, a "status transaction," and the autonomy of the legal personality.⁵⁶

In conclusion, by preparing the articles of association, the founders objectively create a law that is valid for everyone. For this reason, subsequent entrants to the company do not conclude a new contract but are subject to the existing articles of association.⁵⁷ The articles of association shall bind both the existing shareholders and the persons who subsequently become shareholders in the company.⁵⁸

2.3.1.3. A Legal Transaction with Elements of Organisational Law

The third opinion is the modified norm opinion. According to this opinion, the articles of association occur as a special type of legal transaction with elements of organisational law. The sole function of this type of legal transaction, which can be described as an organisational contract, is not to regulate rights and obligations. For this reason, it cannot be assumed that the articles of association, which create a new independent union of intentions and contain appropriate organisational arrangements, cannot be considered because they only establish pure obligations under the law of obligations.⁵⁹

In the context of the aforementioned theory, the focus is on the subject matter of the articles of association, its sphere of influence, its regulatory function, and the method of amendment. The articles of association comprise general and abstract provisions designed to be applied in unforeseen situations and among individuals. They possess a broad sphere of influence and binding power. Not only the parties to the articles of association (founders), but also the shareholders who subsequently join the company are automatically subject to the articles of association.⁶⁰ Advocates of the theory argue that it's impossible to justify, on a contractual basis, the fact that a subsequent shareholder is bound by the articles of association without their express or implied consent. This is because the new shareholder, who may not even be aware of the provisions of the articles of association, cannot be considered a party to the articles of association. Furthermore, for this individual to become a party to the articles of

⁵⁶ Veziroğlu, *Anonim Ortaklıklar Hukukunda Esas Sözleşme Özgürlüğü ve Sınırları*, 190–91.

⁵⁷ Bahtiyar, *Anonim Ortaklık Anasözleşmesi*, 11.

⁵⁸ Karasu, *Anonim Şirketlerde Emredici Hükümler İlkesi*, 29.

⁵⁹ Çebi, *Şirketler Hukuku*, 120.

⁶⁰ Okutan, 'Anonim Ortaklıklarda Paysahipleri Sözleşmeleri', 74.

association, their intent alone is not sufficient; all current parties to the articles of association must approve this transaction.⁶¹

In the context of publicly traded or closed JSCs with a widely dispersed shareholder base, it is evident that there is no direct contractual relationship among the shareholders. They may be unknown to each other, lack mutual knowledge, and the composition of shareholders may change over time. However, under the law governing JSCs, individuals who acquire shares in the company become shareholders. Consequently, the provisions outlined in the company's articles of association are bind them, similar to the provisions of the law or general transaction terms. Therefore, the provisions of the articles of association are objective legal norms because they apply to all individuals who form part of the legal personality, irrespective of their intentions.⁶²

2.3.1.4. Cohesive Approaches

In today's debate on the legal nature of the articles of association, the opposing contract and objective norm theories are no longer able to garner support. With an inclusive, multifaceted and flexible perspective, different features of the articles of association are evaluated together, and as a result, harmonising and more realistic approaches are developed.⁶³

- Modified Norm Theory

German case law and Swiss legal doctrine currently recognize the "modified norm theory" as the most closely aligned approach to the norm theory. According to this theory, the articles of association drafted by the founders constitute a contract until the partnership is registered with the trade registry. Upon registration and the subsequent acquisition of legal personality by the partnership, the articles of association attain an independent legal existence, separate from the founders. They then evolve into a set of objective norms that define the company's constitution and hold enforceable rights against third parties, including later-joining shareholders. As a result, some argue that upon registration, the articles of association shed their contractual nature.⁶⁴

⁶¹ Veziroğlu, *Anonim Ortaklıklar Hukukunda Esas Sözleşme Özgürlüğü ve Sınırları*, 186–87.

⁶² Veziroğlu, 187–88.

⁶³ Veziroğlu, 193.

⁶⁴ Okutan, 'Anonim Ortaklıklarda Paysahipleri Sözleşmeleri', 80; Veziroğlu, *Anonim Ortaklıklar Hukukunda Esas Sözleşme Özgürlüğü ve Sınırları*, 194–95.

- Mixed Opinions

It is often argued that the articles of association possess a "dual character," are 'sui generis,' or have a "mixed" character. This is because they exhibit characteristics of both a contract and an objective norm. According to the mixed view, the articles of association are considered neither an objective norm nor a contract after the partnership's registration. This perspective sets the mixed view apart from other harmonizing views and reflects the pragmatic approach of the Swiss doctrine. Proponents of the mixed view argue that the question of legal nature does not address practical needs and that practical problems can be addressed independently of this issue.⁶⁵

It is contended that the articles of association exhibit a 'bidirectional' or 'sui generis' structure, as they encompass both contractual and objective norm characteristics.⁶⁶ For as much as the validity of the articles of association comes from a legal transaction based on autonomy of will, its addressees, such as new shareholders, declare their will. In this respect, the association's articles exhibit contractual characteristics. On the other hand, the legal entity itself determines the articles of association that form its constitution. Furthermore, it binds not only the shareholders but also the company's organs. For the aforementioned reasons, we also liken the provisions of the articles of association to objective norms.⁶⁷

Amid differing opinions, another perspective posits that the articles of association should be regarded as a distinct institution in corporate law, rather than a contract or law. According to this viewpoint, the articles of association embody the specification, finalization, and customization of the legal framework of a JSC within the realm of its autonomy of will.⁶⁸

- Obligation and Organisation Agreement

⁶⁵ Veziroğlu, *Anonim Ortaklıklar Hukukunda Esas Sözleşme Özgürlüğü ve Sınırları*, 196.

⁶⁶ According to Bahtiyar, the articles of association can be classified as either mixed or unique. He posits that the terms "mixed" and "unique" are employed to denote the coexistence of normative and contractual characteristics within the articles of association, thus signifying their dual nature. Bahtiyar, *Anonim Ortaklık Anasözleşmesi*, 31.

⁶⁷ Veziroğlu, *Anonim Ortaklıklar Hukukunda Esas Sözleşme Özgürlüğü ve Sınırları*, 196.

⁶⁸ Veziroğlu, 197.

The perspective closest to contract theory defines the articles of association as a unique contract that combines the characteristics of an obligation contract and an organization contract.⁶⁹ This viewpoint, prevalent in German corporate law doctrine, aligns with the classification of the provisions of the articles of association in terms of content.⁷⁰ The articles of association encompass specific provisions for the legal personality that determine the partnership's corporate structure, as well as provisions regarding the partnerships' internal relations.⁷¹

The distinct feature of this viewpoint, which aligns it with contract theory, is the assertion that the articles of association do not lose their contractual nature after the partnership becomes a legal personality. This contract is unique and characterized by two aspects. This is because the articles of association encompass both obligation and organizational contract features.⁷²

2.3.1.5. *Understanding Different Perspectives*

In line with all aforementioned opinions, the articles of association arise from the declarations of the intention of the founders of the company (if there are more than one) directed towards each other. For this reason, the articles of association, which are essentially legal transactions, have a contractual character, and until their registration⁷³, the provisions of part one titled General Provisions of the TCO regarding formation, nullity, defective declarations of intention, and interpretations may be applied.⁷⁴

However, the articles of association also have the characteristics of an organisational agreement. After the company is registered in the trade registry and gains a legal personality, the articles of association will become a binding and regulating document⁷⁵ for the company and all shareholders. Hence, once the company is registered, the articles of association will lose their contractual basis, and the

⁶⁹ Kırca, Şehirali Çelik, and Manavgat, *Anonim Şirketler Hukuku*, 1:50.

⁷⁰ Veziroğlu, *Anonim Ortaklıklar Hukukunda Esas Sözleşme Özgürlüğü ve Sınırları*, 198.

⁷¹ Veziroğlu, 198.

⁷² Veziroğlu, 199.

⁷³ According to Moroğlu, this contract constitutes an ordinary partnership relationship until the company gains a legal personality. For further information about this opinion see Moroğlu, 'Anonim Ortaklık Ana Sözleşmesi ve Hukuki Niteliği', 437.

⁷⁴ Akdağ Güney, *Anonim Şirketlerde Kuruluş*, 280.

⁷⁵ Bahtiyar, *Anonim Ortaklık Anasözleşmesi*, 23.

provisions of part one titled General Provisions of the TCO will have a very limited application after the registration of the company.⁷⁶

2.3.2. In Single-Member Companies

According to the latest regulation, TCC, it is now permissible to establish a company with a single person. However, in such cases, there will be no contract⁷⁷ due to the nature of the transactions. This is because a contract is a bilateral legal transaction between at least two parties, and it requires the participation of more than one person.⁷⁸ Therefore, in the establishment of a company with a single-member, the declaration of intention⁷⁹ of the sole founder to establish a company is in the form of a unilateral legal transaction⁸⁰ and the article of association will be replaced by a letter of undertaking.⁸¹

In the case of single-member companies, the establishment process is carried out by notarization of the signature under the document containing the founder's declaration of intention, which is unilateral and does not have to be received by the other party. For this reason, the provisions of part one titled General Provisions of the TCO regarding the unilateral declaration of intention that does not have to be received by the other party shall be applied to the founding transaction.⁸²

However, after the company's registration in the trade registry, the articles of association assume an autonomous nature, independent of the founder's declaration of intent. It serves as a regulatory and binding document for the company and its shareholders, possessing an objective character. Therefore, it can characterize the articles of association as having a dual nature.⁸³

2.4. Formation of Articles of Association

Pursuant to Article 339 Para. 1 of the TCC, the articles of association must be made in writing, and the signatures in the agreement must be approved by a notary public, or

⁷⁶ Akdağ Güney, *Anonim Şirketlerde Kuruluş*, 281.

⁷⁷ Tekinalp, Poroy, and Çamoğlu, *Ortaklıklar Hukuku I*, 315.

⁷⁸ Pulaşlı, *Şirketler Hukuku Şerhi*, 1:763.

⁷⁹ For further information about declaration of intention see Fikret Eren and Ünsal Dönmez, *Eren Borçlar Hukuku Şerhi*, vol. 1 (Ankara: Yetkin Yayınları, 2023), 184.

⁸⁰ Ünal Tekinalp, *Tek Kişilik Ortaklık I - Tek Pay Sahipli Anonim Ortaklık* (İstanbul: Vedat Kitapçılık, 2011), 82–83; Hasan Pulaşlı, *Şirketler Hukuku Genel Esaslar*, 5th ed. (Ankara: Adalet Yayınevi, 2017), 314; Tekinalp, Poroy, and Çamoğlu, *Ortaklıklar Hukuku I*, 309; Kırca, Şehirali Çelik, and Manavgat, *Anonim Şirketler Hukuku*, 1:298.

⁸¹ For the opposite opinion see Bahtiyar, *Anonim Ortaklık Anasözleşmesi*, 27.

⁸² Akdağ Güney, *Anonim Şirketlerde Kuruluş*, 281.

⁸³ Akdağ Güney, 281.

the agreement must be signed in the presence of the officer or deputy manager at the trade registry.

According to the Communiqué on Signature of The Company Establishment Agreement in the Trade Registry Offices⁸⁴ issued by the Turkey Ministry of Trade, the articles of association are prepared in Central Registry Record System (MERSIS). MERSIS is a central registry system in Turkey where trade registry transactions are carried out and trade registry data is stored electronically. New companies can be established online through MERSIS.⁸⁵ Furthermore, a copy of the agreement to be taken from MERSIS by the directorate must be signed by the founders and their representatives in the presence of the manager, deputy manager, or a staff member authorised by them.

The articles of association shall not be null unless they are performed in compliance with the form requirement in accordance with the law. Since it is a nullity, it shall not bind the founders and shall not be taken as a basis for registration.⁸⁶ Shareholders and third parties cannot demand fulfilment of the articles of association. However, if the registration has somehow taken place without fulfilment of the form requirement, the registration remedies the deficiency of the form, and the defect is cured.⁸⁷

2.5. Legal Personality and Provisions of the Articles of Association Contrary to the Law

There are objective or subjective deficiencies that may cause partial or complete nullity of articles of association. These deficiencies have different consequences before and after the company gains legal personality.⁸⁸

It should be noted that, under Article 355 of the TCC, a company shall be established prior to registration in a manner to be effective only for the shareholders upon the founders' declaration of their intention to establish a company in the articles of association prepared in accordance with the law, their unconditional commitment to pay the entire capital, notarization of the signatures by a notary public, or their

⁸⁴ Official Gazette Date: 06.12.2016 Official Gazette Number: 29910

⁸⁵ "Establishing a Business", *Presidency of the Republic of Türkiye Investment Office*, accessed 28 February 2024, <https://www.invest.gov.tr/en/investmentguide/pages/establishing-a-business.aspx>.

⁸⁶ Moroğlu, 'Anonim Ortaklık Ana Sözleşmesi ve Hukuki Niteliği', 430.

⁸⁷ Çebi, *Şirketler Hukuku*, 121.

⁸⁸ Akdağ Güney, *Anonim Şirketlerde Kuruluş*, 281.

signature on the articles of association in the presence of the trade registry officer or its deputy manager.⁸⁹ The company gains legal personality upon registration in the trade registry.⁹⁰ For this reason, this company, which was established before registration in such a way that it only affects the shareholders, is pre-company.⁹¹⁹²

2.5.1. Status Before Gaining Legal Personality

During the period from the establishment of the company to its registration, the company has not yet gained legal personality⁹³, and the deficiencies in the articles of association may be asserted without any limitation. Registration has a constitutive effect.⁹⁴ Therefore, there is no need for a separate announcement to gain legal personality; only registration is sufficient. The registration also has a curative-remedial effect⁹⁵ on deficiencies. The company came into existence despite the deficiencies of the establishment. Defects in the procedure of establishment do not require the nullity of the company. As such, there is a pre-company⁹⁶ subject to the provisions of the TCO regarding nullity. This company, which is characterised as a simple partnership⁹⁷ in terms of its legal nature⁹⁸, may be affected by the deficiencies in different ways explained below.

The existence of a nullity reason affecting the entire articles of association at the pre-company stage; breach of Article 27 of the TCO nullity of the entire articles of

⁸⁹ Emrullah Kervankıran, 'Ön Şirket ve Hukuki Niteliği', *Marmara Üniversitesi Hukuk Fakültesi Hukuk Araştırmaları Dergisi* 18, no. 2 (1 December 2012): 352, <https://dergipark.org.tr/tr/pub/maruhad/issue/48277/615903>.

⁹⁰ İpek Kayalı, 'Turkish Company Law', 242.

⁹¹ Tekinalp, Poroy, and Çamoğlu, *Ortaklıklar Hukuku I*, 314; Çebi, *Şirketler Hukuku*, 115.

⁹² In order to avoid confusion, it is necessary to clarify that the concepts of pre-incorporation company and pre-company are different from each other. The pre-incorporation company differs from the pre-company (pre-joint-stock company), which will be established by drafting the articles of association of the company. A pre-incorporation company is a phenomenon that may occur during the establishment phase of commercial companies before the signing of the articles of association. At this stage, more than one person comes together and negotiates to establish a certain partnership. These are generally in the nature of preparatory negotiations. For further information see Ceren Tarhanlı, *Türk ve Alman Hukukunda Ön-Anonim Şirket* (İstanbul: On İki Levha Yayıncılık, 2013)., Kervankıran, 'Ön Şirket ve Hukuki Niteliği'.

⁹³ Article 355 para. 1 TCC.

⁹⁴ Kırca, Şehirali Çelik, and Manavgat, *Anonim Şirketler Hukuku*, 1:298.

⁹⁵ Article 353 TCC.

⁹⁶ Tekinalp, *Tek Kişilik Ortaklık I - Tek Pay Sahipli Anonim Ortaklık*, 86.

⁹⁷ Akdağ Güney, *Anonim Şirketlerde Kuruluş*, 282; Tekinalp, Poroy, and Çamoğlu, *Ortaklıklar Hukuku I*, 308–15; Mehmet Bahtiyar, *Ortaklıklar Hukuku, 11th Ed.* (İstanbul: Beta, 2016), 134; Kırca, Şehirali Çelik, and Manavgat, *Anonim Şirketler Hukuku*, 1:298.

⁹⁸ In Turkey, there are different opinion regarding the legal nature of the pre-company. The prevailing opinion is that the pre-company is a simple partnership. See Kervankıran, 'Ön Şirket ve Hukuki Niteliği' 352-55.

association. The nullity is absolute, can be asserted by anyone against anyone, and is taken into consideration by the judge ex officio. The nullity of some of the provisions of the articles of association shall not affect the other provisions under Article 27, para. 2 of the TCO. However, if the interpretation of the intention of the parties in the circumstances leads to the conclusion that the articles of association would not have been concluded without the provisions deemed nullity, the entire contract is absolutely nullity.⁹⁹

If the nullity is not due to the content of the article of association, but due to the defective declarations of intention and the lesion regulated in the TCO, the person whose declarations of intention are defective is not bound by the provisions of the article of association.¹⁰⁰ It is possible to apply the statute of limitations regulated in articles 28 and 39 of the TCO.¹⁰¹

Since the articles of association are a whole in themselves, the failure of one of the parties to be bound by the articles of association also affects the others, and the articles of association become null. However, if the simple partnership can continue its existence without the partner whose intention is defective, articles of association deemed may be partially effective and registered under Article 27, para. 2 of the TCO.¹⁰²

Article 335 of TCC regulates the formation requirement for articles of association. In accordance with para. 2 of Article 12 of the TCO, the formation requirement stipulated in the law for agreement is a condition of validity, and the agreements made in case of non-compliance with this formation will be nullity. Under this regulation, the nullity of the article of association may be claimed if it is not made according to the formation stipulated in the law.¹⁰³

2.5.2. Status After Gaining Legal Personality

With the registration, the company gains a legal personality¹⁰⁴ and continues to exist independently of the intentions of the founders. Registration ensures that the articles

⁹⁹ Akdağ Güney, *Anonim Şirketlerde Kuruluş*, 282.

¹⁰⁰ For opposite opinion see Hamamcıoğlu, 'Anonim Ortaklıklarda Anasözleşme Değişikliği, İstanbul 2011.', 39.

¹⁰¹ Akdağ Güney, *Anonim Şirketlerde Kuruluş*, 282.

¹⁰² Akdağ Güney, 282–83.

¹⁰³ Akdağ Güney, 283.

¹⁰⁴ Tekinalp, *Tek Kişilik Ortaklık I - Tek Pay Sahipli Anonim Ortaklık*, 86.

of association become a binding and regulating document for the company and all shareholders. In addition, upon the registration of all provisions of the articles of association with the trade registry and their announcement in the Turkish Trade Registry Gazette¹⁰⁵, the content of the articles of association becomes public¹⁰⁶ to third parties.¹⁰⁷

Prior to company registration, a minimum of 25% of the shares subscribed in cash must be submitted.¹⁰⁸ Following the submission, the relevant amounts must be deposited into a bank account opened under the name of the company. Once the bank has confirmed the receipt of payment, the trade registry must be notified.

The provisions of part one, titled General Provisions of the TCO, shall not apply to objective and subjective deficiencies after registration.¹⁰⁹ Even if the deficiencies asserted before registration of establishment of the company, it does not change the result. Deficiencies to be asserted after registration may be possible within the framework of special regulations on this subject. Article 353 of TCC stipulates that the company may not be rendered null or void. However, a dissolution for a lawsuit may be filed within a preclusive period of three months after the registration. After the expiry of the preclusive period, it will not be possible to file a dissolution for lawsuit based on objective or subjective deficiency.¹¹⁰

2.6. Interpretation of the Articles of Association

There is no consensus as to the interpretation criteria according to which the provisions of the articles of association shall be interpreted. Although there are various criteria for interpretation, it is useful that a single interpretation criterion not be taken as a basis.¹¹¹

When interpreting an article of association provision, whether the company is registered or not, the nature of the interpreted article of association provision and the relations it regulates should be taken into consideration. Until the articles of association are registered, since the dispute concerns only the founders, it should be

¹⁰⁵ Article 344 para. 1 TCC.

¹⁰⁶ For the publicity of the trade register, see E. Ernst Hirsch, *Ticaret Hukuku Dersleri*, vol. 1 (İstanbul: İstanbul Üniversitesi Yayınlarından No:79, 1939).

¹⁰⁷ Veziroğlu, *Anonim Ortaklıklar Hukukunda Esas Sözleşme Özgürlüğü ve Sınırları*, 170.

¹⁰⁸ Article 354 para. 1 TCC.

¹⁰⁹ Akdağ Güney, *Anonim Şirketlerde Kuruluş*, 284.

¹¹⁰ For the exception, see Article 210 para. 3 of the TCC.

¹¹¹ Karasu, *Anonim Şirketlerde Emredici Hükümler İlkesi*, 34.

interpreted subjectively like other legal transactions. At this stage, there is no legal benefit in making an objective interpretation. On the other hand, after the articles of association are registered in the trade registry, objective interpretation is required since the provisions of the agreement become an objective norm. However, it would be appropriate to accept the subjective interpretation criterion in the interpretation of formal provisions that address only a certain segment. On the other hand, the objective interpretation criterion should be accepted for the company's creditors, employees and shareholders who subsequently join the company in order not to undermine their trust in the articles of association.¹¹²

2.7. The Principle of Mandatory Provisions in the Articles of Association

2.7.1. In General

The provisions of the law may be mandatory or supplementary provisions. As the number of mandatory provisions increases, the freedom of contract¹¹³ will be limited to the same extent. This situation will restrict the shareholders' ability to freely regulate their rights and powers in their relations within the company.¹¹⁴ The principle of mandatory provisions containing these restrictions is included in the provisions regarding JSC by the TCC. Article 340 of the TCC, in essence, stipulates that the articles of association may deviate from the provisions of the TCC only if it is explicitly permitted to do so.

In the scope of private law, freedom of contract is dominant within the framework of the principle of freedom of will. This freedom is limited by the provisions of Articles 26 and 27 of the TCO. This freedom may be exercised, provided that it is not contrary to the mandatory provisions. In the same direction, the articles of association may include all kinds of regulations, provided that they are not contrary to the mandatory provisions of the law. However, the principle of mandatory provisions in Article 340

¹¹² Karasu, 34–35.

¹¹³ For further information about freedom of contract see Eren and Dönmez, *Eren Borçlar Hukuku Şerhi*, 1:24.

¹¹⁴ Karasu, *Anonim Şirketlerde Emredici Hükmeler İlkesi*, 25.

of TCC limitation on this freedom.¹¹⁵ A different provision may be included in the articles of association only if expressly permitted by the TCC.¹¹⁶

However, although it is not explicitly stipulated in the law, it should be possible to deviate from the provision in the law when the principle of equity and the balance of interests are taken into consideration, and it should be possible to determine a provision different from the legal rule in the articles of association "if it is deemed appropriate."¹¹⁷ Because mandatory provisions of the law interfered with the freedom of contract of the founders and shareholders¹¹⁸ of the company and eliminated the possibility of preparing articles of association according to the needs and structure of each company.¹¹⁹

2.7.2. Addition of Provisions to Articles of Association According to the TCC Relating to Joint-Stock Companies

It would be useful to explain the scope and meaning of Article 340 of TCC. The provisions of TCC regarding JSC may be deviated from only if expressly permitted by the provisions of TCC. This issue adds another dimension to the principle of mandatory provisions and limits the existing basic principle of freedom of contract in cases not expressly prohibited by mandatory provisions.¹²⁰ Unlike this principle, if the provisions of TCC do not explicitly authorise an optional provision, a provision different from the provisions of TCC may not be stated in the articles of association.¹²¹ To explain with an example; regulations regarding minority rights are mandatory in principle, and no contrary regulation may be made.¹²² In this context, Article 411 of TCC, which gives the right to the shareholders who hold at least one-tenth of the capital may request to board call the general assembly for a meeting and include an item on the agenda if a meeting is to be held, is mandatory. Since the provision "the right to call for a meeting may be entitled to shareholders who hold a lower capital

¹¹⁵ The reason for such strict rules regarding the matters to be included in the articles of association may be the desire to ensure and protect its publicity. For further information related freedom of articles of association see Veziroğlu, *Anonim Ortaklıklar Hukukunda Esas Sözleşme Özgürlüğü ve Sınırları*.

¹¹⁶ Akdağ Güney, *Anonim Şirketlerde Kuruluş*, 285.

¹¹⁷ Oruç Hami Şener, *Teorik ve Uygulamalı Ortaklıklar Hukuku*, 2nd ed. (Ankara: Seçkin Yayınevi, 2015), 304.

¹¹⁸ For the theoretical aspects of shareholder activism, see Ekrem Solak, 'The Evolving Role of Shareholders and the Future of Director Primacy Theory' (PhD, United Kingdom, The University of Edinburgh, 2018).

¹¹⁹ Akdağ Güney, *Anonim Şirketlerde Kuruluş*, 286.

¹²⁰ Karasu, *Anonim Şirketlerde Emredici Hükümler İlkesi*, 45.

¹²¹ Bahtiyar, *Ortaklıklar Hukuku*, 11th Ed., 128.

¹²² Akdağ Güney, *Anonim Şirketlerde Kuruluş*, 287.

proportion by the articles of association" added to this article explicitly allows deviation from the article, this rate may be reduced in the articles of association.

On the other hand, it is not possible to reduce the rate of the minority that may request dissolution for just cause as regulated in Article 531 of the TCC, which is another article on minority rights, by the articles of association. Although there is no provision explicitly prohibiting the reduction of this ratio, since there is no provision permitting the determination of a ratio different from this ratio in the articles of association within the scope of the principle of mandatory provisions under Article 340 of the TCC, the existing legal provision will prevail.¹²³

2.7.3. Supplementary Provisions in the Articles of Association

Contractual provisions that supplement the provisions of the law are those that concretize the existing provisions or fill the gaps in the provisions.¹²⁴

The authority to make supplementary arrangements is explicitly given in various provisions of TCC. In cases where the law does not explicitly regulate the authority to make regulations, supplementary provisions may be included in the articles of association, depending on whether the relevant provision regulates the subject in a restrictive manner.¹²⁵

2.7.4. Breach of Principle of Mandatory Provisions

There is no explicit provision in TCC regarding the sanctions to be applied to the articles of association provisions, contrary to the mandatory provisions.

The company, whose articles of association contain regulations contrary to the mandatory provisions, was not established in accordance with the law. If the breach of the law is not corrected, the registry officials shall reject the registration request based on the authorization granted to them by Article 32 of the TCC.¹²⁶ In the event that the articles of association are registered despite their deficiency, the company will gain a legal personality,¹²⁷ and the company cannot be dissolution after the expiration of the

¹²³ Akdağ Güney, 287.

¹²⁴ Karasu, *Anonim Şirketlerde Emredici Hükümler İlkesi*, 60; Akdağ Güney, *Anonim Şirketlerde Kuruluş*, 289.

¹²⁵ Akdağ Güney, *Anonim Şirketlerde Kuruluş*, 290.

¹²⁶ The concerned parties have the right to appeal the registry office's refusal to register. For further information, see Article 34 of the TCC.

¹²⁷ Veziroğlu, *Anonim Ortaklıklar Hukukunda Esas Sözleşme Özgürlüğü ve Sınırları*, 265.

three months due to the remedial effect of the registration under Article 353 of the TCC. However, provisions of the articles of association contrary to the principle of mandatory provisions shall not become valid upon registration. The remedial effect is only valid in terms of the legal personality of the company.¹²⁸ After the company gains a legal personality, there are various opinions on the status of the provisions of the articles of association contrary to the principle of mandatory provisions.¹²⁹ After the company, gains a legal personality, the nullity of the provisions of the articles of association contrary to the principle of mandatory provisions may be asserted at any time and by anyone, without being bound by any period, just like the general assembly resolutions contrary to the principle of mandatory provisions.¹³⁰

2.8. The Distinction Between Articles of Association Provisions in Terms of Their Subject Matter

Moroğlu divides the provisions of the articles of association in terms of their subject matter into two categories¹³¹: ‘the provisions that only constitute the legal personality and its basic order’ and ‘the provisions regulating the relations of the legal personality with the shareholders and third parties and the relations of the shareholders with each other’.¹³² While some of the provisions of the articles of association falling under this second group (e.g. provisions regarding the issuance of privileged shares in terms of voting rights and dividend rights) constitute shareholding rights, some other provisions (e.g. provisions regarding the acquisition of an existing business or certain assets by the corporation, the issuance of usufruct rights in favour of the founders and other persons related to the corporation, the granting of shares from the earnings of the corporation to the founders, members of the board of directors and other persons, the granting of priority rights to the shareholders for the purchase of the shares of the

¹²⁸ Akdağ Güney, *Anonim Şirketlerde Kuruluş*, 294.

¹²⁹ For further information, see Karasu, *Anonim Şirketlerde Emredici Hükmeler İlkesi*, 69–99.

¹³⁰ Akdağ Güney, *Anonim Şirketlerde Kuruluş*, 290–91.

¹³¹ In the preamble of Article 339 of the TCC, it is stated that the articles of association contain two types of provisions. It is stated that the ‘formal’ provisions are related to the formation of the organs, while the ‘substantive’ provisions regulate the relations between the founders and the future shareholders. For other distinctions in the doctrine, see Okutan, ‘Anonim Ortaklıklarda Paysahipleri Sözleşmeleri’, 114–234., for the distinction between ‘provisions concerning the organisation and functioning of the company’ and ‘provisions concerning shareholder rights’ in terms of shareholders’ agreements. For the opposite opinion, see Bahtiyar, *Anonim Ortaklık Anasözleşmesi*, 236–37., Bahtiyar, while dividing the provisions of the articles of association according to their nature and effects as well as their subject matter, has preferred the concept of ‘provisions specific/non-specific to the legal personality’.

¹³² Moroğlu, ‘Anonim Ortaklık Ana Sözleşmesi ve Hukuki Niteliği’, 435.

corporation offered for sale, etc.) are provisions that create a right of claim against the partnership or between the shareholders.¹³³

Similarly, *Veziroğlu* maintains *Moroğlu*'s two distinctions and categorizes provisions of the articles of association under two short headings: 'provisions specific to the legal personality' and 'provisions specific to the relations within the partnership' in terms of their subject matter.¹³⁴ Provisions specific to legal personality consist of the rules establishing the corporate structure and organisational order of the partnership. Regulations regarding the formation, identity, assets, characteristics, organs, and functioning of the legal personality fall within this scope. For example, the rules on the business name, registered office, field of activity, capital, type and transfer of shares, formation and functioning of the general assembly and the board of directors, representation of the company, or reasons for the termination of the company are among the provisions specific to the legal personality.¹³⁵ However, the provisions in the articles of association that are specific to the corporate structure may indirectly affect third parties due to the issues that benefit from the positive impact of the trade registry according to Article 354 paragraph 1 of the TCC.¹³⁶

The provisions of the articles of association specific to intra-corporate relations regulate the rights, authorities, debts, and obligations of shareholders, holders of usufruct certificates or debt instruments entitling them to acquire shares, members of the board of directors, employees, and creditors; in short, the rights, authorities, debts, and obligations of the company's stakeholders towards the corporation and/or each other. In this context, the corporate and organisational aspects of the articles of association remain in the background, and the relational and contractual dimension regulating relations within the company gains importance. The rules referred to herein are all of the provisions of the articles of association that regulate the relations of

¹³³ *Moroğlu*, 435–36.

¹³⁴ *Veziroğlu*, *Anonim Ortaklıklar Hukukunda Esas Sözleşme Özgürlüğü ve Sınırları*, 172.

¹³⁵ *Veziroğlu*, 172–73.

¹³⁶ The provisions regarding the company's field of activity, the manner of use of representation powers, and share transfer restrictions may affect third parties. According to Article 371 para. 2 of the TCC, a transaction that is outside the company's field of activity is not binding on the company if the third party knows or should know about this. Also, limitations on the representation authority that may be registered can be enforced against third parties under Article 371 para. 3 and para. 7 of the TCC. Furthermore, according to Article 494, para.1, Article 497, and Article 499 of the TCC, if the board of directors does not approve the share transfer in accordance with the TCC, the ownership of the shares does not transfer to the new owner, and therefore, shareholding rights cannot be asserted against the company.

the company's related parties with the company and among themselves, regardless of their legal nature.¹³⁷

The aforementioned provisions concern the individual interests of the interested parties of the company rather than the collective interests directly embodied in the organs of the company.¹³⁸ However, the provisions of the articles of association of a corporative nature do not address the reciprocal position of the individual interests of the company, but the situation of the community of persons (social structure). This is because such provisions regulate the rights and obligations of the interested parties depending on and limited to their position or status within the company. The characterization of the articles of association as a status contract' or social law contract' is precisely related to this aspect. For example, the provisions on how the shareholder's rights before the company will be affected in the event that the shareholder fails to fulfil his or her obligation arising from his or her capital commitment; the provisions on the issuance and utilisation of preference shares¹³⁹ can be counted within this scope. As a rule, the rights and obligations arising from the individual relations between the shareholders are subject to the shareholders' agreement, not the articles of association.¹⁴⁰

However, it is not possible to clearly distinguish between the corporate/organisational and relational/contractual aspects of the articles of association. The provisions of the articles of association regulating the rights and obligations of shareholders (shareholding status) indirectly determine the organisational structure. This is because the conditions regarding the exercise of shareholders' rights also affect the functioning of the company. In this respect, for example, shareholding rights of an indispensable nature also constitute a part of the basic organisation of a JSC within the meaning of Article 447 of TCC.¹⁴¹

¹³⁷ Veziroğlu, *Anonim Ortaklıklar Hukukunda Esas Sözleşme Özgürlüğü ve Sınırları*, 174–75.

¹³⁸ Bahtiyar, *Anonim Ortaklık Anasözleşmesi*, 235.

¹³⁹ Article 478 para. 1-2 TCC.

¹⁴⁰ Veziroğlu, *Anonim Ortaklıklar Hukukunda Esas Sözleşme Özgürlüğü ve Sınırları*, 175–76.

¹⁴¹ Veziroğlu, 176.

2.9. Key Subjects to Include in the Articles of Association

2.9.1. In General

The articles of association consist of mandatory, conditional¹⁴² and optional provisions.¹⁴³ The provisions that must be included in the articles of association are mandatory. Mandatory provisions consist of the provisions of the articles of association regarding the basic structure, organisation, assets, founders, and organs of the company. Failure to include one or more of these mandatory provisions in the articles of association will result in the nullity of the articles of association and the rejection of the registration request.¹⁴⁴

Conditional provisions must be specified in the articles of association if the conditions occur. The provisions of the articles of association with conditional content are the provisions that are not obligatory to be included in each article of association. However, the conditional content, which must be included in the articles of association, will lead to the rejection of the registration request, as it will also mean a deficiency of establishment.¹⁴⁵ Even if the registration is completed, since the remedial effect will be effective only in terms of the gain of legal personality, the defective or failure articles of association provision will not be validated. On the other hand, some conditional regulations whose validity both internally and externally depends on their inclusion in the articles of association are not considered a deficiency of establishment.¹⁴⁶ Defective to include them in the articles of association does not lead to the rejection of the registration request but only prevents the agreement from being binding.¹⁴⁷

The optional ones are the norms that contain legally binding norms even if they are regulated in another form, and the regulations that repeat the mandatory or regulatory norms of the law. In addition to these, restrictions are imposed on the other issue of the optional regulations to be made. To make optional regulation arrangements in line

¹⁴² Moroğlu categorises these provisions under the heading of "mandatory provisions provided that they are stipulated". For further information see Moroğlu, 'Anonim Ortaklık Ana Sözleşmesi ve Hukuki Niteliği', 430.

¹⁴³ Bahtiyar, *Ortaklıklar Hukuku*, 11th Ed., 125; Çebi, *Şirketler Hukuku*, 121.

¹⁴⁴ Akdağ Güney, *Anonim Şirketlerde Kuruluş*, 294; Tekinalp, *Tek Kişilik Ortaklık I - Tek Pay Sahipli Anonim Ortaklık*, 83.

¹⁴⁵ Article 339 para. 2, e-f TCC.

¹⁴⁶ Akdağ Güney, *Anonim Şirketlerde Kuruluş*, 294.

¹⁴⁷ Article 339 para. 2, d TCC.

with the principle of mandatory provisions, they must be expressly permitted by the law on the issue that is optionally regulated.¹⁴⁸

2.9.2. Content of Articles of Association under the TCC

The basic regulation on the content of the articles of association is outlined in Article 339, para. 2, of TCC. The matters to be included in the articles of association are listed in this article. Some of these matters are mandatory, and some are conditional. On the other hand, another regulation regarding the articles of association is included in Article 354 of TCC.

When the justifications of the above-mentioned articles of association are evaluated together, conflicting statements are encountered. In the justifications of both articles, it is stated that these articles indicate the minimum mandatory content to be included in the articles of association.¹⁴⁹ However, both articles contain both minimum mandatory content and conditional content. The statement that both articles only regulate the minimum content of the articles of association is incorrect.¹⁵⁰

In addition, the distinction between the matters to be registered with the trade registry (Article 354 of TCC) and the matters required to be included in the articles of association (Article 339 of TCC) is not fully understood. The fact that registration and announcement of a matter are mandatory does not mean that they must be included in the articles of association. In other words, not all matters subject to registration must be regulated in the articles of association.¹⁵¹

The most important consequence of the acceptance of the matters listed in Articles 339 para. 2 and 354, para. 1 of the TCC as mandatory content is that, pursuant to Article 340 of the TCC, all of the aforementioned matters must be included in each article of association, and their absence is deemed to be a deficiency of establishment, and the request for registration of the articles of association that do not contain these elements is rejected¹⁵² by the registry office that examines the articles of association in terms of illegality. However, both Article 339 para. 2 of the TCC and Article 354 para. 1 of the TCC are not mandatory elements to be included in the articles of association of each

¹⁴⁸ Çebi, *Şirketler Hukuku*, 123.

¹⁴⁹ Veziroğlu, *Anonim Ortaklıklar Hukukunda Esas Sözleşme Özgürlüğü ve Sınırları*, 265–66.

¹⁵⁰ Akdağ Güney, *Anonim Şirketlerde Kuruluş*, 295–96.

¹⁵¹ Akdağ Güney, 296.

¹⁵² Karasu, *Anonim Şirketlerde Emredici Hükümler İlkesi*, 31.

company to be established. In this respect, it should be evaluated individually whether each article, each paragraph, and each subparagraph are mandatory or contingent elements and whether they are considered deficiency of establishment.¹⁵³

The mandatory contents of the articles of association may not be limited to those listed in Art. 329 para. 2 of the TCC and Art. 354 para. 1 of the TCC. For example, according to Article 19, para. 2, of the Turkish Capital Market Law No. 6362, the presentation of the profit shares determined for the shareholders in the articles of association of publicly held JSC is also among the mandatory minimum contents for these companies. Moreover, the articles of association of JSC wishing to make a contingent capital increase must include the matters regulated as mandatory content under Article 465 of the TCC.

2.9.2.1. Business Name and Registered Office of the Company

Business name and registered office are among the minimum requirements elements of the articles of association. The absence of these elements in the articles of association shall be deemed a deficiency and shall lead to the rejection of the registration request. The registration made despite this deficiency ensures the gain of legal personality but does not eliminate the deficiency.¹⁵⁴ In addition, the business name in the articles of association and the registration and announcement of the registered office are within the scope of the positive effect of the registry pursuant to Article 354 para. 1 of TCC.

It is mandatory to state the business name of the company in the articles of association.¹⁵⁵ Because within the scope of Article 16 of the TCC, all commercial companies are deemed to be merchants, and every merchant is obliged to use a business name in accordance with Article 39 of the TCC.

Under Article 43 of TCC, the business name must consist of the field of activity of the company, or, in companies established to deal with more than one field of activity, at least one of the fields of activity with a phrase indicating the type of company. In

¹⁵³ Akdağ Güney, *Anonim Şirketlerde Kuruluş*, 296–97.

¹⁵⁴ Akdağ Güney, 298.

¹⁵⁵ Bahtiyar, *Ortaklıklar Hukuku*, 11th Ed., 128.

German and Swiss law, the field of activity of the company is not a mandatory element of the business name.¹⁵⁶

Furthermore, the business name must not include phrases that create a misleading impression about the company, size, relevance, financial situation, and field of activity to third parties or be contrary to the facts and public order.¹⁵⁷

As stated above, the registered office of the company must be included in the articles of association.¹⁵⁸ The registered office of the company may be any place, provided that there is a de facto or de jure connection with the company. It is not obligatory to state an address next to the registered office of the company in the articles of association. There is no such obligation since the acceptance of the contrary situation would mean that the articles of association would also be changed with each change of address. On the other hand, if the company does not have a workplace or business premises in the specified registered office of the company, it is necessary to notify the trade registry of an address where notifications can be made in the place where the registered office of the company is located. As a matter of fact, in practice in Turkey, trade registry authorities request an address in addition to the registered office of the company.¹⁵⁹ The registered office of the company stated in the articles of association is important¹⁶⁰ in terms of determining the authorized court, the registration, and the place of performance.

2.9.2.2. *Field of Activity of the Company*

The company's field of activity is also a mandatory minimum element of the articles of association. Failure to include the field of activity in the articles of association at all or as required shall be deemed a deficiency of establishment and shall lead to the rejection of the registration request. If a company registers despite the deficiency, it gains legal personality, but the registration's remedy effect is limited and does not cure the deficiencies. According to Article 354 of the TCC, which provides for the registration and announcement of the entire articles of association, the field of activity

¹⁵⁶ Akdağ Güney, *Anonim Şirketlerde Kuruluş*, 299.

¹⁵⁷ Article 46 para. 1 TCC. See other condition Article 46, 47, and 48 TCC.

¹⁵⁸ Bahtiyar, *Ortaklıklar Hukuku*, 11th Ed., 128.

¹⁵⁹ Soner Altaş, *Şirketler Hukukuna İlişkin Yüksek Yargı Kararları-Anonim Şirketler-Limited Şirketler*, 2nd ed. (Ankara: Seçkin Yayınevi, 2018), 387–92.

¹⁶⁰ Tamer Bozkurt, *Şirketler Hukuku*, 15th ed. (Ankara: Yetkin Yayınları, 2023), 236.

is not considered within the scope of the positive effect of the registry in the context of Article 36 of the TCC.¹⁶¹

Subject to legal restrictions, the company may choose the field of activity as it wishes. The legislator is not satisfied with the mere state of the field of activity but has sought to ensure that the basic points are outlined and defined. As it is generally accepted, the field of activity indicates the concrete activities to be engaged in within the purpose of the establishment of the company.¹⁶² In this case, for example, it will not be sufficient if only tourism activity is stated as the field of activity, and the basic points such as hotel and accommodation services will need to be outlined. The point to be taken into consideration when stating the field of activity in the articles of association is that neither very restrictive definitions nor expressions that can be understood too broadly should be included. If restrictive definitions are used, the articles of association will need to be amended for every expansion of the field activity¹⁶³, and if the field of activity is unclear, it will be difficult to determine the authority of those who have the authority to manage and represent. The field of activity of the company's business is important both in terms of determining the limits of management and representation authority and in terms of enabling third parties to obtain information about the company's field of activity.¹⁶⁴

2.9.2.3. Amount of the Capital, Nominal Value of Each Share

The capital of the company and the nominal value of each share are among the minimum requirement elements that must be included in the articles of association.¹⁶⁵ Mandatory provisions on the capital of the company and the nominal value of each share are stated in TCC and are mandatory elements of the articles of association.¹⁶⁶

The request for registration of the articles of association that do not contain capital of the company and the nominal value of each share shall be rejected by the registry office due to a deficiency of establishment. Despite the deficiency, registration does not

¹⁶¹ Akdağ Güney, *Anonim Şirketlerde Kuruluş*, 300.

¹⁶² Bahtiyar, *Ortaklıklar Hukuku*, 11th Ed., 128.

¹⁶³ Article 421 para. 3, a TCC.

¹⁶⁴ Akdağ Güney, *Anonim Şirketlerde Kuruluş*, 301.

¹⁶⁵ Article 339 para. 2, c TCC. As of 2024 the minimum capital required is 250,000 Turkish Liras, which may increase to at least 500,000 Turkish Liras for non-public JSCs accepting the registered capital system.

¹⁶⁶ Bahtiyar, *Ortaklıklar Hukuku*, 11th Ed., 129.

prevent the company from gaining a legal personality. However, registration does not eliminate the deficiency. The capital of the company and the nominal value of the shares are within the scope of the positive effect of the registry pursuant to Article 352 para. 1, d of TCC.¹⁶⁷

The amount of capital required for the establishment of JSC is stipulated in Article 332 of the TCC. This amount, which is referred to as the registered or nominal capital and which must be stated in the articles of association, must be made available to the company by the shareholders and must be included in the assets of the company as a minimum amount during the continuation of the company, but this is not always possible in practice. In a JSC, the share capital is divided into shares in the share certificates. In the articles of association, the capital must be divided into shares and the nominal value of each share must be specified.¹⁶⁸

The form and conditions of the payment of the capital are regulated in Article 354 para. 1 of TCC. The form and conditions of the payment of the capital are the minimum content required to be included in the articles of association.¹⁶⁹ In this case, the request for registration of the articles of association that do not include the terms and conditions of payment of the balance capital should be rejected by the registry officers due to the deficiency of the establishment. If a company is registered despite the deficiency, the company gains legal personality, but the deficiency is not cured.¹⁷⁰

2.9.2.4. Types of Shares

The fact that the share certificates are registered or bearer share issues is one of the mandatory elements that must be included in the articles of association.¹⁷¹ When the articles of association are examined by the registry offices, attention should be paid to whether share certificates are registered or bearer share issues in the articles of association. Failure to include this issue in the articles of association should be rejected, as it is a deficiency of establishment. Even if the company gains a legal personality despite this deficiency, the deficiency is not cured.¹⁷²

¹⁶⁷ Akdağ Güney, *Anonim Şirketlerde Kuruluş*, 302.

¹⁶⁸ Akdağ Güney, 302–3.

¹⁶⁹ Bozkurt, *Şirketler Hukuku*, 237.

¹⁷⁰ Akdağ Güney, *Anonim Şirketlerde Kuruluş*, 303.

¹⁷¹ Bahtiyar, *Ortaklıklar Hukuku*, 11th Ed., 129.

¹⁷² Akdağ Güney, *Anonim Şirketlerde Kuruluş*, 305.

Various privileges may be granted to shares or categories of shares by an arrangement to be made in the articles of association. For the granted privileges to be valid, there must be a provision in the Articles of Association, or they must be added a provision through a duly made amendment to the Articles of Association. Understandings between the founders regarding the granting of privileges, which are not included in the articles of association, are invalid. If the founders have not decided on any deal regarding the privilege shares among themselves, the absence of any provision in this issue in the articles of association will not lead to a deficiency in the establishment, as it will be normal. Therefore, it will not result in the rejection of the registration request.¹⁷³

The articles of association must contain provisions on transfer restrictions.¹⁷⁴ In the event that the founders do not decide on the transfer restriction, there is no obligation to include a provision on this issue in the articles of association. This is not an establishment deficiency and does not constitute a reason for the rejection of registration.¹⁷⁵ Article 490 para. 1 TCC states freedom of transfer for the transfer of registered shares of a JSC, provided that there is no restriction in the law or the articles of association. For this reason, if it is intended to impose restrictions on the transfer of registered shares, this issue should be stated in the articles of association of the company.

2.9.2.5. *Non-Cash Contribution and Contributions In-Kind*

All assets listed in Article 127 of TCC may be brought as capital to JSC.¹⁷⁶ Except for money, assets such as company shares, ownership rights of movable and immovable property, commercial enterprises, receivables, negotiable instruments, transferable assets, electronic media, environments, names and signs, and mining licences are accepted as capital in kind. In the event that a capital contribution is in kind, the capital must be valued by experts appointed by the commercial court of first instance in the company's domicile office and its collectability.¹⁷⁷ Moreover, this value determined

¹⁷³ Akdağ Güney, 306.

¹⁷⁴ Bozkurt, *Şirketler Hukuku*, 238.

¹⁷⁵ Akdağ Güney, *Anonim Şirketlerde Kuruluş*, 307.

¹⁷⁶ The exception to this provision is Article 342 para. 1 TCC. According to this article, a contribution in kind consists of any asset or right unless it is restricted by limited real rights or by an order of seizure or injunction. Performance of a particular service, personal effort, commercial reputation, and undue receivables may not be a contribution in kind.

¹⁷⁷ Article 343 TCC.

by the experts must be stated in the articles of association¹⁷⁸ These processes are in place to protect the interests of small savers and third parties, especially where non-monetary assets are contributed as capital to the company.¹⁷⁹ Although the purpose of the provision is appropriate, it is not realistic to impose an obligation on experts to give an opinion on collectability.¹⁸⁰

As indicated, in the event that rights and assets other than money are contributed to the company as capital, they must be stated in the articles of association. However, it is not a mandatory element of the articles of association; it is conditional. It should be noted that partial or full in-kind capital in the establishment of the company, an enterprise or real right is acquired during the establishment and interest to be allocated from the profit of the company for founders will make the establishment qualified.¹⁸¹ For this reason, and considering that it is one of the minimum requirement elements, in the case of capital in kind, not only the nature of the capital but also its value and the amount of share to be allocated in return should be stated in the articles of association.

In addition, in the event that an enterprise or real right is acquired during the establishment, the value of the same must also be stated in the articles of association, since the establishment will become qualified. Otherwise, it is a deficiency of establishment and will lead to the rejection of the registration.

In the same way, it is obligatory to include in the articles of association the amount of fees, allowances, or rewards payable to those who provided services for the establishment of the company; otherwise, the deficiency of establishment requires the rejection of the registration.

2.9.2.6. Interest to be Allocated from the Profit of the Company

Regulations on special interests are not among the minimum requirement contents that must be stated in the articles of association. However, if this issue is decided among the founders, it must be stated in the articles of association, since the establishment

¹⁷⁸ Çebi, *Şirketler Hukuku*, 116–17.

¹⁷⁹ Pulaşlı, *Şirketler Hukuku Genel Esaslar*, 310.

¹⁸⁰ Abuzer Kendigelen, *Yeni Türk Ticaret Kanunu Değişiklikler Yenilikler ve İlk Tespitler*, 2nd ed. (İstanbul: On İki Levha Yayıncılık, 2012), 231.

¹⁸¹ Pulaşlı, *Şirketler Hukuku Genel Esaslar*, 310; Tekinalp, Poroy, and Çamoğlu, *Ortaklıklar Hukuku I*, 306.

will become qualified; otherwise, it is not possible to request this interest. The purpose of this is to prevent the weakening of the company capital due to the interest granted to the founders, members of the board of directors, or third parties. This will prevent losses to creditors, the company, or shareholders.¹⁸²

2.9.2.7. Board Members and Signatory Authority

The number of members of the board of directors of a JSC is one of the minimum requirements elements that must be stated in the articles of association. The board of directors may consist of one or more than one member. Failure to specify this issue in the articles of association will result in the rejection of the registration request, as it will be a deficiency of the establishment.¹⁸³

Persons authorised to sign on behalf of the company must be specified in the articles of association.¹⁸⁴ In addition, under Article 354 para. 1-h and g of the TCC, the names and surnames, business names, residences and nationalities of the board members, and persons authorised to represent the company should also be stated in the articles of association. Failure to state these matters in the articles of association will result in the rejection of the registration request, as it will be a deficiency of establishment.

The obligation to state all of this information in the articles of association has been criticised on the grounds that a change in any of this information would lead to an amendment in the articles of association each time and harm commercial life.¹⁸⁵

2.9.2.8. Calling to the General Assembly Meeting: Voting Rights

Under Article 399 para. 2-h of the TCC, the provisions on how the general assembly will be called and voting rights are the minimum requirement content required to be stated in the articles of association. The absence of a provision on this matter in the articles of association shall be deemed a deficiency of establishment and shall lead to the rejection of the registration request. The details regarding the call are regulated in Article 414 of the TCC.

The voting rights of the shareholders are one of the minimum requirement contents that must be stated in the articles of association,¹⁸⁶ and in its absence, the request for

¹⁸² Akdağ Güney, *Anonim Şirketlerde Kuruluş*, 312.

¹⁸³ Akdağ Güney, 314.

¹⁸⁴ Bozkurt, *Şirketler Hukuku*, 242.

¹⁸⁵ Akdağ Güney, *Anonim Şirketlerde Kuruluş*, 320.

¹⁸⁶ Bozkurt, *Şirketler Hukuku*, 242–43.

registration of the articles of association will be rejected. In addition, according to Article 434, para. 2, of TCC No, the number of votes cast by the owners of multiple shares may be limited by a provision to be stated in the articles of association.

2.9.2.9. Duration of Company

The provision on the duration of the company in Article 339, para. 2-i of the TCC is not a mandatory element in the articles of association. If a specific term has not been agreed upon between the founders during the establishment of the company, the company may have an indefinite term. In this case, registration cannot be rejected due to the fact that this issue is not stated in the articles of association.

2.9.2.10. Announcement Procedure of Company

It is obligatory to regulate how the announcements will be made in the articles of association of the companies, and its absence is a reason for the rejection of the registration request.

2.9.2.11. Types and Amount the Shares Subscribed by the Shareholders

Each of the founders specifies in the articles of association how many of the shares constituting the share capital he or she will purchase. This transaction is called a share subscription.¹⁸⁷ The types and amounts of capital shares subscribed by the shareholders are among the mandatory contents of the articles of association. Failure to include these matters in the articles of association is a reason for the deficiency of establishment and the rejection of the registration request.

2.9.2.12. Fiscal Year of the Company

According to Article 174 of the Turkish Tax Procedure Code No. 213 regulating the accounting period, the accounting period of the company is normally a calendar year. However, a different accounting period can be determined for companies that are not suitable for this accounting period. It is an obligation to state the accounting period in the articles of association. Otherwise, it is a deficiency of the establishment and is a reason for the rejection of the registration request.

¹⁸⁷ Tekinalp, *Tek Kişilik Ortaklık I - Tek Pay Sahipli Anonim Ortaklık*, 84.

In addition, although not stipulated in the law, in JSC subject to audit, the name of the auditor or audit organisation that will audit the company's year-end accounts is also among the mandatory contents to be stated in the articles of association.¹⁸⁸

2.9.3. First Board Members

According to Article 393 para. 3 of the TCC, the first members of the board of directors are appointed by the articles of association. As a rule, the selection and dismissal of the members of the board of directors are the exclusive responsibility of the general meeting of shareholders¹⁸⁹. However, as the company has not yet acquired legal personality before registration, its organs are not yet formed. Therefore, a general meeting and its resolutions cannot take place.¹⁹⁰ The creation of the board of directors as an organ is only possible if it is stated in the articles of association and the articles of association are registered.¹⁹¹ Within the scope of these regulations, it is one of the mandatory elements that the members of the first board of directors should be stated in the articles of association.

2.9.4. Date of Articles of Association

The date of the articles of association is one of the minimum requirement contents to be stated in the articles of association under Article 354 para. 1-a TCC. Since, the signatures in the articles of association must be notarized, the date of the notary's transaction will be stated in the articles of association. Therefore, this date will be taken as the date of the article of association. However, the date of the articles of association is one of the issues of the positive effect of registration.

2.9.5. Rising Trend: Addition of Arbitration Clause to the Articles of Association

Arbitration, one of the most preferred methods in terms of speedy judicial proceedings, the expert arbitrator on dispute, confidentiality, enforceability, and easing the workload of the judiciary, can be regulated as a condition in the articles of association. This method is widely preferred in international law.¹⁹² In Turkish law, arbitration is

¹⁸⁸ Pulaşlı, *Şirketler Hukuku Genel Esaslar*, 320.

¹⁸⁹ Article 359, 364 TCC.

¹⁹⁰ Tekinalp, *Tek Kişilik Ortaklık I - Tek Pay Sahipli Anonim Ortaklık*, 88.

¹⁹¹ Akdağ Güney, *Anonim Şirketlerde Kuruluş*, 328.

¹⁹² Cem Veziroğlu, 'Arbitration of Corporate Law Disputes in Joint Stock Companies under Turkish Law: A Comparative Analysis', *European Company and Financial Law Review* 16, no. 6 (6 December 2019): 776–80, <https://doi.org/10.1515/ecfr-2019-0025>.

mostly preferred in shareholding agreements. This leads to the problem that arbitration and local court proceedings continue in parallel, and contradictions arise in the judgements. Although it is accepted that the arbitration clause may be regulated in the articles of association, the applicability of the arbitration clause on the basis of each dispute may vary in terms of arbitrability depending on the type of dispute.¹⁹³ Furthermore, the arbitration clause may be considered a supplementary provision of the articles of association.¹⁹⁴ Moreover, the arbitration clause added during the establishment phase of the company or through the amendment of the articles of association must be registered and announced in the trade registry. In this context, the inspection obligation of the trade registry office pursuant to TCC, article 32, para. 2, is limited to the mandatory provisions of TCC. There is no provision in the law permitting the arbitration clause, nor is there any provision preventing it. Therefore, in practice, there is no reason to refuse the registration of the articles of association containing an arbitration clause.¹⁹⁵

2.10. Amendment and Registration of Articles of Association

2.10.1. Amendment of Articles of Association

To change the content of the articles of association and add new provisions or remove existing provisions in whole or in part requires amendment of the articles of association. Article 452 of TCC grants the general assembly the right to amend the articles of association unless otherwise decided in the articles of association. The same article also stipulates certain limitations on the exercise of this right. In this context, amendments to the articles of association must comply with the conditions stipulated in the law and must not interfere with the vested and inalienable rights. However, another restriction is that, in accordance with Article 340 of the TCC, the general assembly may only amend issues that are not mandatory provisions and those aspects in which the law explicitly allows deviation from its provisions.¹⁹⁶

¹⁹³ Cem Veziroğlu, ‘Anonim Ortaklık Esas Sözleşmesinde Düzenlenen Tahkim Şartının Geçerliliği’, in *Tahkim Yargılaması Birinci Bölüm*, ed. Candan Yasan Tepetaş and Mustafa Erkan, vol. 2, Tahkim Okulu Paneller Serisi (İstanbul: On İki Levha Yayıncılık, 2021), 6–8, <https://www.lexpera.com.tr/literatur/derleme-makaleler/anonim-ortaklik-esas-sozlesmesinde-duzenlenen-tahkim-sartinin-gecerliliği-oz-3-3/1>.

¹⁹⁴ Veziroğlu, 11.

¹⁹⁵ See Cem Veziroğlu, “Anonim Ortaklık Esas Sözleşmesinde Düzenlenen Tahkim Şartının Geçerliliği,” in *Tahkim Yargılaması Birinci Bölüm*: (İstanbul: On İki Levha Yayıncılık, 2021), 3–23.

¹⁹⁶ Akdağ Güney, *Anonim Şirketlerde Kuruluş*, 329.

When the provisions to be amended are directly related to the legal personality and its existence and interests, it is only possible to amend the articles of association with the unilateral decision of the legal personality (general assembly) to amend the mandatory provisions that constitute the legal personality and its legal infrastructure and the optional provisions that complement these provisions.¹⁹⁷

On the other hand, it is not possible to remove or amend the provisions of the articles of association that create a shareholding right against the partnership or a right of claim against the partnership or between the shareholders by a unilateral decision of the legal personality (general assembly). For this purpose, the explicit or implicit consent of the creditors (i.e., shareholders or third parties) must be obtained. For example, in cases where privilege rights are to be abolished, restricted, or adversely affected, it is envisaged that this consent (in a way to balance the mutual interests of the legal personality and the shareholders) shall be obtained in the form of a majority decision of the board of preference shareholders. To abolish or restrict the rights that constitute a right of claim, such as usufruct rights granted to the founders and other persons related to the partnership, dividend rights granted to the founders and members of the board of directors and other persons, and the priority right granted to the shareholders for the purchase of partnership shares and share certificates put up for sale, it is obligatory to obtain the explicit or implicit consent of each person who owns these rights.¹⁹⁸ Therefore, when amending the articles of association, which directly impacts shareholders' rights and obligations, special quorums are required for the general assembly to convene and make decisions.¹⁹⁹ The amendment also involves specific procedures.²⁰⁰

In addition, in line with the authorization granted by the law, the establishment of certain companies and amendments to their articles of association are subject to authorization, depending on their field of activity, under the communiqué to be issued by the Turkey Ministry of Trade.²⁰¹

¹⁹⁷ Moroğlu, 'Anonim Ortaklık Ana Sözleşmesi ve Hukuki Niteliği', 436.

¹⁹⁸ Moroğlu, 436.

¹⁹⁹ Article 421 TCC.

²⁰⁰ Article 452-455 TCC.

²⁰¹ Official Gazette Date: 15.11.2012 Official Gazette Number: 28468.

2.10.2. Effects of the Amendment of the Articles of Association

The articles of association shall regulate and stipulate the organs of the company, their authority and limits of their authority, capital, shares, shareholders, and relations of shareholders with each other, with the company, and with third parties. For this reason, amendments to the articles of association have many effects in many respects. These effects can be categorised under three headings. The first is the changes limited to the internal relationship; these changes affect only the shareholders. The second is the changes that concern both shareholders and third parties, and the registration and announcement of such changes show the effects of both internal and external relations. Under the last heading, there are amendments to the articles of association that mainly concern third parties.²⁰²

2.10.3. Registration of Amendments to the Articles of Association

Pursuant to Article 445 of TCC, the resolutions of the general assembly regarding the amendment of the articles of association shall be registered by the board of directors in the trade registry of the place where the registered office and branches of the company are located. In addition, the matters subject to announcement must be announced, and the registered and announced resolution must be published on the website. This amendment to the articles of association made by the general assembly resolution shall not have any legal effect against third parties prior to registration.

2.10.4. Effects of the Registration of the Amendment of the Articles of Association

It is understood that the registration regulated in Article 455 of the TCC has a constitutive effect in terms of third parties for the amendments to the articles of association and a declarative effect in terms of shareholders in the internal relationship. In other words, in cases where the amendment of the articles of association is effective in both internal and external relations, this regulation will bring some problems.²⁰³ This is because the general assembly resolution regarding the amendment of the articles of association will have its effects and consequences even if it is not registered in the internal relationship, whereas in the external relationship, although the general

²⁰² Akdağ Güney, *Anonim Şirketlerde Kuruluş*, 330.

²⁰³ Akdağ Güney, 338.

assembly resolution is legally valid, it is null and void for third parties and will become valid upon registration.²⁰⁴

For example, while the decision on the change of the company's registered office will be effective from the date of the decision due to its declarative effect on the internal relationship, the decision will not be valid for third parties until it is registered and announced. During this period, the registered office of the company will have two different registered offices, one for the shareholders in the internal relationship and the other for third parties in the external relationship. During this interim period, the competent court will change in terms of third parties and shareholders in cases where the competent court is determined according to the centre of the company. This duality will continue as long as the registration is not completed. In another example, if the decisions taken by the general assembly resolutions are decisions related to the authorizations granted for a period of time, in this case, the periods will start with the adoption of the general assembly resolution due to its notification nature in the internal relationship, while in the external relationship, it will start with the announcement and registration since it will be constitutive in terms of third parties. Hence, as in the board resolutions determining the authorization period of the board of directors, the authorization period will differ in the internal and external relationships.²⁰⁵

2.11. Audit of the Articles of Association and Amendments to the Articles of Association

Under Turkish law, only the signatures on the articles of association are notarized. The audit of the articles of association or their amendments for illegality is carried out by the registry officers. Although various audit mechanisms are regulated by communiqués, the audit of the articles of association and amendments prior to registration is under the authority of the registry officers.

2.12. Consequences of the Breach of the Articles of Association

A breach of the articles of association may occur through a general assembly resolution. In this case, it is possible to request the cancellation of the decision taken pursuant to Article 445 TCC. However, the period stipulated in the law for this request is limited to 3 months, and after the completion of the three-month period, the general

²⁰⁴ Mehmet Bahtiyar, *Ortaklıklar Hukuku, 15th Ed.* (İstanbul: Beta, 2016), 334.

²⁰⁵ Akdağ Güney, *Anonim Şirketlerde Kuruluş*, 338–41.

assembly resolution contrary to the articles of association will become valid. Furthermore, in cases of breach of the articles of association by the board of directors, they may be held liable pursuant to Article 553 of TCC.

Moreover, the registry officials are not authorised to decline from the registration of the general assembly resolutions contrary to the articles of association, but they may reject the registration request only if the resolution is clearly contrary to the law.²⁰⁶

3. BLOCKCHAIN TECHNOLOGY AND ITS APPLICATION TO SMART CONTRACTS

3.1. In General

Before introducing smart contracts, a general overview of the underlying blockchain technology will provide a better understanding of smart contracts. Therefore, it is crucial to understand the functioning of the blockchain network to grasp how smart contracts are implemented using blockchain technology.²⁰⁷

3.2. Blockchain

There is no consensus definition of blockchain since each application may have different characteristics.²⁰⁸ Fundamentally, blockchain is a decentralised, public storage database that works based on the approval of transactions by each stakeholder in the network, grows with the blocks²⁰⁹ added in this way, and is accepted to be

²⁰⁶ Article 32 TCC.

²⁰⁷ Zaleha Fauziah et al., 'Application of Blockchain Technology in Smart Contracts: A Systematic Literature Review', *Aptisi Transactions on Technopreneurship (ATT)* 2 (7 August 2020): 161, <https://doi.org/10.34306/att.v2i2.97>.

²⁰⁸ Savelyev defines Blockchain as "a decentralized distributed database of all verified transactions that take place across a P2P-network system operating on cryptographic algorithms". According to Raskin; "a blockchain is a decentralized collection of data that is verified by members of a peer-to-peer network". Blockchain is a set of interconnected blocks, each of which has a list of all prior transactions between the blocks. This database created by collection of data in the interconnected blocks form a distributed ledger. Distributed ledgers require the contained data to be stored safely. For further information about different definition of blockchain see Argun Karamanlioğlu, 'Concept of Smart Contracts – A Legal Perspective1', *Kocaeli Üniversitesi Sosyal Bilimler Dergisi*, no. 35 (1 July 2018): 35, <https://dergipark.org.tr/en/pub/kosbed/issue/43237/525052>.; Osman Gazi Güçlütürk, 'Blockchain: A Trustless Network or a Technologically Disguised Shift of Trust?', *SSRN*, 21, accessed 9 March 2024, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3440044.

²⁰⁹ A block in the chain has a fixed-size data structure that contains a group of data, similar to a box. The size and type of data stored in each blockchain may vary, but there are typically two types of data stored in a block. The first type is content-related data, which is data related to the purpose for which the blockchain is created and used. The second type is logistical data that is required to establish inter-block connections. To give an analogy, the first type of data can be compared to the content of a cargo shipment, while the second type of data can be compared to the label on the cargo. A block in a blockchain consists of several components, which we will introduce in the following manner:

unchangeable.²¹⁰ A blockchain is a chain of transaction records, often referred to as a block, that grows autonomously and where all records are linked together to form a chain and secured by cryptographic techniques. A block may contain one or more records, and each block holds the hash function, transaction data and timestamp of the previous block. When the block is completed and committed, it is chronologically added to the blockchain and is considered unalterable due to its difficulty.²¹¹

Blockchain technology became a rising issue²¹² with the article "Bitcoin: Peer-to-Peer Electronic Cash System"²¹³ by Satoshi Nakamoto.²¹⁴ The main problem that

- A reference to a preceding block is present in the block, except for the genesis block. The hash of the previous block's header serves as this reference. The first block in the blockchain, which was hardcoded when it was first created, is known as a genesis block. The structure of a blockchain determines how a block is organised.

- A nonce is a randomly generated number that is only used once. In many cryptographic procedures, nonces are used extensively for replay protection, authentication, and encryption. Nonces are used in PoW consensus algorithms and blockchain transaction replay prevention. The block also includes the nonce value.

- The timestamp represents the exact moment when a block is created.

- The Merkle root is the hash of all the nodes in a Merkle tree. It is the combined hash of all the transactions present within a blockchain's block. Merkle trees are commonly used to efficiently and securely validate large data structures. In the blockchain world, Merkle trees are frequently used to speed up transaction verification. The hash of each transaction in a block is found in the block header section of a blockchain, along with the Merkle root. This means that instead of validating each transaction individually, verifying the Merkle root is sufficient to validate all transactions present in the Merkle tree. We will provide more details on these concepts.

- The block body of a blockchain contains transactions along with the block header. A transaction is a record of an event, such as the transfer of funds from one account to another. The size of a block, which contains these transactions, can vary based on the type and structure of the blockchain. For further information about block, see Zibin Zheng et al., 'Blockchain Challenges and Opportunities: A Survey', *International Journal of Web and Grid Services* 14, no. 4 (January 2018): 352–75, <https://doi.org/10.1504/IJWGS.2018.095647>; Imran Bashir, *Mastering Blockchain: A Deep Dive into Distributed Ledgers, Consensus Protocols, Smart Contracts, DApps, Cryptocurrencies, Ethereum, and More*, 3rd ed. (Birmingham Mumbai: Packt Publishing, 2020), 16–20.; Osman Gazi Güçlütürk, 'Hukukçular İçin Blokzincir Teknolojisinin Teknik İşleyişi: Bitcoin Örneği', 22–23, accessed 9 March 2024,

https://www.researchgate.net/publication/357646512_Hukukcular_icin_Blokzincir_Teknolojisinin_Teknik_Isleyisi_Bitcoin_Ornegi.

²¹⁰ Doğa Ekrem Doğancı, *Blokzincirine Dayalı Akıllı Sözleşmelerin Hukuki Nitelikleri, Kuruluşu, Yorumu, İfası ve Bazı Örnek Hukuki Uygulamalar* (İstanbul: On İki Levha Yayıncılık, 2021), 31.

²¹¹ Melanie Swan, *Blockchain* (United States of America: O'Reilly Media, 2015), <https://www.oreilly.com/library/view/blockchain/9781491920480/>.

²¹² For the early models of the concept, see Stuart Haber and W. Scott Stornetta, 'How to Time-Stamp a Digital Document', in *Advances in Cryptology-CRYPTO' 90*, ed. Alfred J. Menezes and Scott A. Vanstone (Berlin, Heidelberg: Springer, 1991), 437–55, https://doi.org/10.1007/3-540-38424-3_32.

²¹³ Satoshi Nakamoto, 'Bitcoin: A Peer-to-Peer Electronic Cash System', SSRN Scholarly Paper (Rochester, NY, 21 August 2008), <https://doi.org/10.2139/ssrn.3440802>.

²¹⁴ In this article, it is mentioned that the blockchain is part of an electronic payment system that allows parties to trust each other when making transactions and to make transactions directly between the parties with a cryptographic system without the need for a third party. An electronic coin is identified in the article as a series of digital signatures. With these systems, by digitally signing a hash of the preceding transaction and the subsequent owner's public key and adding them to the end of the coin,

Nakamoto tried to solve with blockchain is establishing trust within a decentralised system. For this purpose, the idea of a distributed repository has been put forward, which uniquely locks and time-stamps the identity of the parties and the contents of their data.²¹⁵

Blockchain technology, which has a decentralised structure, consists of an end-to-end peer-to-peer (P2P) network²¹⁶. Data is not stored in a centre. What is meant by decentralisation is to ensure the validity and security of a transaction without any centralised medium or unit by using distributed ledger technology (DLT).²¹⁷²¹⁸ As a concept, DLT is often intertwined with blockchain. However, DLT is an umbrella term that includes blockchains and different types of distributed ledgers.²¹⁹

each owner transfers ownership of the coin to the next. The chain of ownership can be verified by the payee by checking these signatures.

²¹⁵ Massimo Di Pierro, 'What Is the Blockchain?', *Computing in Science & Engineering* 19, no. 5 (2017): 92, <https://doi.org/10.1109/MCSE.2017.3421554>.

²¹⁶ A P2P network is, to put it simply, one that is formed when two or more connected devices typically computers share resources. The primary distinction is in the fact that P2P networks, in contrast to traditional network systems, provide an environment in which multiple computers are connected via a single server computer. It can also be thought of as a network in which several PCs are linked together by a single server to facilitate file transfers between the ends. Furthermore, in the traditional offline context, a P2P network can connect over a dozen computers in a small area, acting as a permanent infrastructure. For further information about P2P, see R. Schollmeier, "A definition of peer-to-peer networking for the classification of peer-to-peer architectures and applications," *Proceedings First International Conference on Peer-to-Peer Computing*, Linköping, Sweden, 2001, pp. 101-102, doi: 10.1109/P2P.2001.990434.; G. Fox, "Peer-to-peer networks," in *Computing in Science & Engineering*, vol. 3, no. 3, pp. 75-77, May-June 2001, doi: 10.1109/5992.919270. keywords: {Peer to peer computing; Web server; Collaborative work; Relays; Distributed computing; Internet; World Wide Web; Garnets; Network servers; Collaboration}.; rol, 'What Is Peer to Peer Network, and How Does It Work? [UPDATED]', 1 February 2022, <https://www.blockchain-council.org/blockchain/peer-to-peer-network/>.

²¹⁷ In the past few years, DLT has drawn a lot of interest from the government, business community, and academic community. It is believed to be one of the major technologies that will revolutionise the fields in which it finds application. The key component of DLT is the ledger itself. A distributed ledger is a linked ledger consisting of consecutive blocks joined by strict rules. A P2P network's nodes distribute and store the ledger, and each block is decentralised and constructed at a predetermined interval using a consensus mechanism. A transaction recording method called DLT enables the simultaneous recording of transactions and their details in multiple places. Unlike conventional databases, distributed ledgers do not have a central data repository or administrative functions. For further information about DLT, see Siraj Raval, *Decentralized Applications: Harnessing Bitcoin's Blockchain Technology* (O'Reilly Media, Inc., 2016).; *ingful Internet Systems. OTM 2018 Conferences*, ed. Hervé Panetto et al., vol. 11230, Lecture Notes in Computer Science (Cham: Springer International Publishing, 2018), 277–88, https://doi.org/10.1007/978-3-030-02671-4_16; Michel Rauchs et al., 'Distributed Ledger Technology Systems: A Conceptual Framework', SSRN Scholarly Paper (Rochester, NY, 13 August 2018), <https://doi.org/10.2139/ssrn.3230013>; 'Distributed Ledger Technology - an Overview | ScienceDirect Topics', accessed 12 March 2024, <https://www.sciencedirect.com/topics/computer-science/distributed-ledger-technology>.

²¹⁸ Doğancı, *Blokzincirine Dayalı Akıllı Sözleşmelerin Hukuki Nitelikleri, Kuruluşu, Yorumu, İfası ve Bazı Örnek Hukuki Uygulamalar*, 33–34.

²¹⁹ Bashir, *Mastering Blockchain*, 25; Jayasuriya Daluwathumullagamage and Sims, 'Blockchain-Enabled Corporate Governance and Regulation', 8.

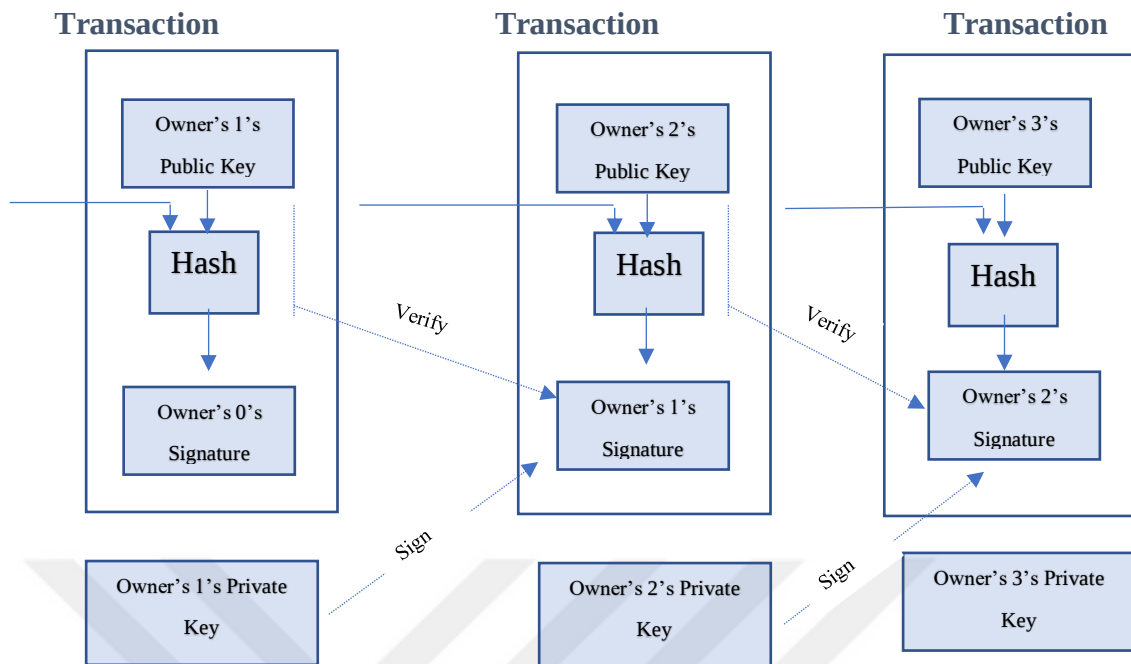


Figure 1. Form of transaction model²²⁰

If the system shown in Figure 1 is explained in more detail, each member of the system is assigned a private key. These keys are like passwords and are kept secret. The main function of a private key is to digitally sign transactions²²¹. However, one public key is also shared with all other members, and these are used to access the digitally signed transactions that are distributed throughout the whole network. When the public key is sent to the original owner, a transaction is initiated. The data containing the public key is hashed²²² and converted into a digital signature. Public keys are also cryptographic²²³ addresses stored in the blockchain. Each piece of data is mapped to an address (a public key). Therefore, every transaction in this system is

²²⁰ Nakamoto, 'Bitcoin', 2.

²²¹ The fundamental unit of a blockchain is a transaction. A transfer of value from one address to another is depicted as a transaction.

²²² A hash is the output that results from transforming an original piece of information into an input. A hash function is a mathematical algorithm that takes an input and converts it to an output. The defining characteristic of a cryptographic hash function is that it is impossible to reverse. It is exceedingly difficult to extract the original input data from the hash value, and this property is known as collision resistance.

²²³ Cryptographic algorithms are, in general, a set of principles that must be followed to guarantee that an activity is carried out securely. The goal of data management is to convey and store data in an encrypted manner. As a result, the data is typically encrypted using cryptographic algorithms, which take an input and change it into something else in accordance with predefined rules, rather than being saved and delivered in its original form.

basically data transferred from one address to another and unless a member possesses the public key, they cannot decipher and understand the transmitted data. The most important feature of this system is that public keys do not point to a person in the real world. This does not reveal the identity of individuals, but only makes it possible to track their transactions.²²⁴

In Figure 2, the concrete model illustrates the process of a digital signature example in the blockchain system. The process involves two stages: signing and verification. Alice, as a user, wants to sign the transaction. To do this, she generates a hash value from the transaction and encrypts it with her private key. After that, she sends both the encrypted hash value and the original data to Bob. Bob then verifies the transaction by comparing the decrypted hash value using Alice's public key and the hash value derived from the data received by applying the same hash function Alice used.²²⁵

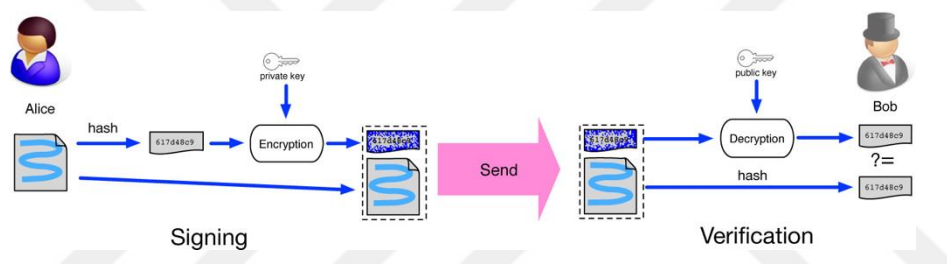


Figure 2. Digital signature used in blockchain²²⁶

The encryption stage shown in Figure 2 is similar to the Caesar Cypher text encryption algorithm. This algorithm is a widely recognised and basic example of an encryption algorithm that replaces each letter in the input with a different letter that is one step up or down in the alphabet. The shifting step in a Caesar cypher is exceptionally uncommon due to its ease of cracking; however, the algorithms employed in a blockchain are far more intricate and challenging.²²⁷

²²⁴ Marc Pilkington, 'Blockchain Technology: Principles and Applications', in *Research Handbook on Digital Transformations*, ed. F. Xavier Olleros and Majlinda Zhegu (Edward Elgar Publishing, 2016), 226, <https://www.elgaronline.com/edcollchap/edcoll/9781784717759/9781784717759.00019.xml>.

²²⁵ Zheng et al., 'Blockchain Challenges and Opportunities', 356.

²²⁶ Zheng et al., 356.

²²⁷ Osman Gazi Güçlütürk, 'Blockchain: A Trustless Network or a Technologically Disguised Shift of Trust?', SSRN, 5, accessed 9 March 2024, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3440044.

Blockchains are the visible results of actions taken by network users. The blockchain is essentially organised around an evolving network. It is a state transition function that specifies which state to enter after receiving a certain input in a certain state and maps this evolutionary process.²²⁸

3.2.1. Blockchain Key Features

3.2.1.1. Decentralized Structure

The fundamental characteristic of the blockchain is that information is recorded, saved, and updated in a distributable manner rather than being maintained in one location. There is no need for a centralised system because blockchain has a distributed structure and a consensus²²⁹ framework that allows every node²³⁰ to send data safely.²³¹

In traditional systems, transactions are executed in a centralized manner. For example, payment transactions are carried out by banks and verified by the central bank, which is the view of a centralized system. In the blockchain system, unlike all these, a transaction does not need to be verified by a central system. The transaction is done between two peers without authentication.²³²

²²⁸ Pilkington, 'Blockchain Technology', 230.

²²⁹ The core of any blockchain technology lies in its consensus algorithms. There are different consensus models, which are called 'proof of work', 'proof of stake', and 'closed consensus.'. In the context of blockchain technology, "proof of work" refers to the idea that any action taking place within the network - whether it's a chain of computers or data - must be approved by the majority before it can be recorded and accounted for. For further information see Rameez Yousuf et al., 'Consensus Algorithms in Blockchain-Based Cryptocurrencies | IEEE Conference Publication | IEEE Xplore' (Bhilai, India: 2021 International Conference on Advances in Electrical, Computing, Communication and Sustainable Technologies (ICAECT), 2021), 1–6, <https://doi.org/10.1109/ICAECT49130.2021.9392489>; Michel Rauchs et al., 'Distributed Ledger Technology Systems: A Conceptual Framework', SSRN Scholarly Paper (Rochester, NY, 13 August 2018), 61–62, <https://doi.org/10.2139/ssrn.3230013>.

²³⁰ Nodes are either block signers, who digitally sign and validate the transactions, or miners, who make new blocks. To facilitate consensus and secure the blockchain, a node can mine, propose, and validate transactions.

²³¹ Gökhan Ünal and Çelebi Uluyol, 'Blok Zinciri Teknolojisi', *Bilişim Teknolojileri Dergisi* 13, no. 2 (30 April 2020): 168, <https://doi.org/10.17671/gazibtd.516990>.

²³² Zheng et al., 'Blockchain Challenges and Opportunities', 357.

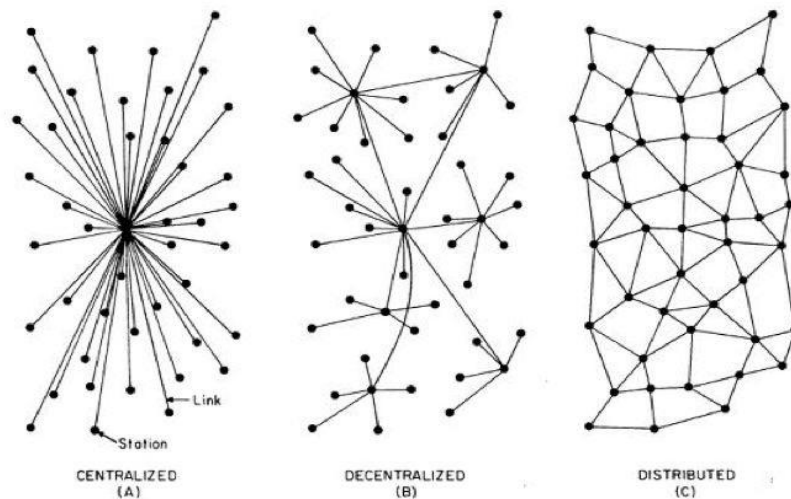


Figure 3. The three different types of software applications²³³

Currently, centralised systems are the most prevalent model for software applications. Centralised systems manage information flow and unit operations directly from a single centre. In such systems, every individual is dependent on the central authority for communication, receiving orders, and transferring information. On the other hand, distributed computing occurs across multiple nodes rather than a single one. In a decentralised system, no node provides instructions to another node.²³⁴

The blockchain is the time-stamped public ledger,²³⁵ spread across multiple computers, and is therefore dispersed. Additionally, it is decentralised since the network can continue to operate even if a node fails. This means any programme can be distributed and decentralised if it uses a blockchain in combination with other P2P technologies.²³⁶

3.2.1.2. Persistency

Before a transaction is shared with other nodes in a blockchain network, it must be validated by those nodes. This validation process is repeated until the transaction is propagated throughout the entire network.²³⁷ The transactions are recorded in

²³³ Raval, *Decentralized Applications*, 3.

²³⁴ Raval, 4.

²³⁵ Fauziah et al., 'Application of Blockchain Technology in Smart Contracts', 162.

²³⁶ Raval, *Decentralized Applications*, 4.

²³⁷ Zaheer Allam, 'On Smart Contracts and Organisational Performance: A Review of Smart Contracts Through the Blockchain Technology', *Review of Economic Business Studies* 11, no. 2 (2018): 143, <https://doi.org/10.1515/rebs-2018-0079>.

distributed blocks after being confirmed, making it extremely difficult to tamper with them in the blockchain system. This means, each block that is sent is subject to verification and control by other blocks, which makes any changes to the transaction easily detectable.²³⁸

3.2.1.3. Anonymity

All users can enter the blockchain network with an address, and data transfers can be carried out anonymously.²³⁹ In addition, a user can keep his identity confidential by generating more than one address at different times. With this system, there is no centre where the private information of the users can be kept, and the confidentiality of the transactions will be protected. However, this protection is not absolute.²⁴⁰

3.2.1.4. Immutability

It is nearly impossible to alter data once it has been written to the blockchain due to its complexity. Data is not completely unchangeable, but the difficulty of changing data makes it nearly impossible.²⁴¹ Blockchain technology often touts immutability. Immutability refers to the inability to alter or reverse data once it has been recorded on the blockchain. However, it's important to note that a truly immutable blockchain does not exist. Reversing the "truth" in a blockchain is theoretically possible if all participants in the consensus protocol agree, but it ultimately depends on the consensus method used. The best way to achieve immutability, a much-desired property in Ethereum or Bitcoin blockchains, is to create a consensus mechanism that makes altering the blockchain as difficult as possible.²⁴²

3.2.1.5. Auditability

Since all transactions on the blockchain are previously verified with a time stamp and then recorded, any user has the chance to check, trace, and verify previous records by accessing any distributed node in the network.²⁴³

²³⁸ Zheng et al., 'Blockchain Challenges and Opportunities', 357.

²³⁹ Nitin Tyagi et al., 'A Framework for Blockchain Technology Including Features', in *Emerging Technologies in Data Mining and Information Security*, ed. Aboul Ella Hassanien et al. (Singapore: Springer, 2021), 640, https://doi.org/10.1007/978-981-15-9927-9_62.

²⁴⁰ Zheng et al., 'Blockchain Challenges and Opportunities', 357.

²⁴¹ Bashir, *Mastering Blockchain*, 21.

²⁴² Güçlütürk, 'Blockchain: A Trustless Network or a Technologically Disguised Shift of Trust?', 21.

²⁴³ Zheng et al., 'Blockchain Challenges and Opportunities', 357.

3.2.1.6. Transparency

With the blockchain system, the recording of data is transparent at each node, and the data can be verified retrospectively.²⁴⁴ The successive data records are accessible to everyone.²⁴⁵ Blockchain technology creates a decentralized database that enables all parties involved to access and view transactions. It helps to ensure transparency and security in the transaction process.²⁴⁶

3.2.2. Blockchain Types

It can be generally accepted that there are three types of blockchain. These are divided into public blockchain, private blockchain, and consortium blockchain according to the permission mechanism.²⁴⁷

3.2.2.1. Public Blockchain

In this type of blockchain, all transactions can be read²⁴⁸. Ledgers are accessible to the entire public, allowing anyone to participate in the decision-making process as a node. They are known as "permissionless" or "un-permissioned" ledgers. Users create these ledgers by keeping a copy of the ledger on their local nodes. The ledger's final state is decided through a distributed consensus process.²⁴⁹ Anyone can participate in this transaction chain. This system is considered a completely independent blockchain system that does not require central authority. Structures such as Ethereum and Bitcoin, which enable the use of smart contracts and provide a platform and programming language that allow developers to publish distributed applications, are among these structures.²⁵⁰

3.2.2.2. Private Blockchain

Transactions are allowed to be read and sent by an entity within the private blockchain or by all subsidiaries within the same group.²⁵¹ Only authorised users will be able to

²⁴⁴ Ünal and Uluyol, 'Blok Zinciri Teknolojisi', 168.

²⁴⁵ Denis Philippe, 'Blockchain and Smart Contract: Lex Cryptographia?', *DAOR Legal Review*, 2, accessed 20 March 2024, <https://philippelaw.eu/wp-content/uploads/2018/12/BLOCKCHAIN-AND-SMART-CONTRACT.pdf>.

²⁴⁶ Almatarnch, 'Blockchain Technology and Corporate Governance', 97.

²⁴⁷ Zheng et al., 'Blockchain Challenges and Opportunities', 357.

²⁴⁸ Mahendra Kumar Shrivasa, 'The Disruptive Blockchain: Types, Platforms and Applications', *Texila International Journal of Academic Research*, 29 April 2019, 3, <https://doi.org/10.21522/TIJAR.2014.SE.19.01.Art003>.

²⁴⁹ Bashir, *Mastering Blockchain*, 26.

²⁵⁰ Ünal and Uluyol, 'Blok Zinciri Teknolojisi', 169.

²⁵¹ Shrivasa, 'The Disruptive Blockchain', 3.

participate in the network. In other words, they are only accessible to a consortium—a collection of people or entities—that has chosen to distribute the ledger among itself.

Participation in consensus within the network can be public or authorised. In a private blockchain system, if those who have permission and settle in the system enter the consensus structure without permission, these systems are called partially permission-requiring systems. In these networks, a central authority has the power to change rules and reverse transactions on an as-needed basis.²⁵²

3.2.2.3. Consortium Blockchain

A consortium blockchain can be defined as a mix of public and private blockchain networks. There is more than one organization and a consortium of these organizations. They are allowed to send and read transactions.²⁵³ It can also be thought of as an extended version of the private blockchain.²⁵⁴

It is a system in which the node can be pre-selected by the person or organisation with authorization. In the consortium blockchain, the read and write capability can be extended to a certain number of nodes.²⁵⁵

It is possible to increase the types of blockchain. For example, there is a type created by combining the hybrid blockchain and the three blockchain types listed above. Thus, the blockchain becomes available in multiple modes.²⁵⁶

3.2.2.4. Differences

The table below includes a comparison of the key features of the different blockchain types.

Property	Public Blockchain	Consortium Blockchain	Private Blockchain
<i>Consensus Determination</i>	All miners	Selected set of nodes	One organization

²⁵² Ünal and Uluyol, 'Blok Zinciri Teknolojisi', 169.

²⁵³ Shrivastava, 'The Disruptive Blockchain', 3.

²⁵⁴ Bashir, *Mastering Blockchain*, 26.

²⁵⁵ Ünal and Uluyol, 'Blok Zinciri Teknolojisi', 169.

²⁵⁶ Shrivastava, 'The Disruptive Blockchain', 3.

<i>Read Permission</i>	Public	Could be public or restricted	Could be public or restricted
<i>Immutability</i>	Nearly impossible to tamper	Could be tampered	Could be tampered
<i>Efficiency</i>	Low	High	High
<i>Centralised</i>	No	Partial	Yes
<i>Consensus process</i>	Permissionless	Permissioned	Permissioned

*Figure 4. Comparisons among public blockchain, consortium blockchain and private blockchain*²⁵⁷

To briefly explain the comparison made in the table;

By consensus determination, mean the verification processes of the nodes in the blockchain. As seen in Figure 3, every node in a public blockchain might participate in the consensus-building process. Additionally, in a consortium blockchain, the block validation is the responsibility of a predetermined group of nodes. Regarding the private chain, the ultimate consensus could be decided by a single organisation that controls the entire chain.

The fact that transactions made on public blockchains are visible to everyone indicates the existence of read permission. In private blockchains, this permission depends on the consortium blockchain. The consortium decides whether the information stored is public or restricted.

In the public blockchain, immutability is essential. It is almost impossible to tamper with the public blockchain because in the distributed network, transactions are stored on different nodes. However, if the majority of the consortium wishes to tamper with the blockchain, it is possible to reverse and tamper with the private blockchain and the consortium blockchain.

²⁵⁷ Zheng et al., 'Blockchain Challenges and Opportunities', 358.

3.2.2.5. Side Chain

The first concept of a sidechain was introduced in an academic paper on October 22, 2014, by Adam Back, the inventor of hashcash and current CEO of Blockstream.²⁵⁸

The ledger, which enables the transfer of key information from one chain to the other and is managed separately with its own software code 'pegged' to the main blockchain ledger, is called the side chain. Special programs used by a user of the main blockchain to decide whether a payment, status, or specific transaction should be allowed form the basis of smart contracts. The sidechain ledger fulfils two functions simultaneously. It uses the authentication power of the main blockchain on the one hand and a flexible software platform on the other.²⁵⁹

A sidechain is a separate blockchain network that connects to another blockchain, called a parent blockchain or main net, via a two-way peg. These secondary blockchains have their own consensus protocols, which improve the privacy and security of the network. This also minimizes the additional trust required to maintain a network. In simple terms, a person using the Bitcoin main net needs to send bitcoin to an output address, which could be a hard wallet, a hot wallet, or a sidechain. Once the transaction is confirmed, a notice of the completed transaction is broadcasted across Bitcoin's network. Following a brief security check, the sent bitcoin is transferred onto the sidechain, allowing users to freely move their assets across the new network.²⁶⁰

Sidechains have great potential to expand the scope, scale, and dynamics of blockchain technology, allowing previously secluded blockchain networks to become integrated into one common ecosystem. The cross-chain interoperability facilitated by sidechains would allow users to seamlessly navigate across various projects, creating a universal blockchain network consisting of numerous blockchains, each with its own consensus mechanism, governance rules, and vision, yet they all remain independent from one another. This is the fundamental value proposition of sidechains.²⁶¹

²⁵⁸ Stephan Roth, 'An Introduction to Sidechains', CoinDesk, 7 March 2022, <https://www.coindesk.com/learn/an-introduction-to-sidechains/>.

²⁵⁹ Pilkington, 'Blockchain Technology', 237–40.

²⁶⁰ Roth, 'An Introduction to Sidechains'.

²⁶¹ Roth.

3.3. Smart Contracts on Blockchain

3.3.1. Background

Although the concept of smart contracts has become popular in recent years, it has existed as an idea²⁶² for more than 20 years.²⁶³ The concept was first used in 1996 by Nick Szabo in his article "Smart Contracts: Building Blocks for Digital Markets".²⁶⁴ In these years, the high risks and transaction costs of the technologies that enable the use of smart contracts made it difficult to put the theoretical existence of smart contracts into practice. For this reason, the concept could be realised with the emergence of the blockchain.²⁶⁵

3.3.2. Definition and Scope

Smart contracts can be seen as one of the applications that use blockchain technology.²⁶⁶ Smart contracts are an example of the second-generation distributed ledger technology that incorporates the standardised rules feature, which is one of the main features of blockchain technology after Bitcoin.²⁶⁷ Like blockchain, there is no agreed definition of the smart contract.²⁶⁸²⁶⁹ A smart contract can be defined as the

²⁶² Nick Szabo, 'The Idea of Smart Contracts', 320, accessed 20 March 2024, https://www.fon.hum.uva.nl/rob/Courses/InformationInSpeech/CDROM/Literature/LOTwinterschool2006/szabo.best.vwh.net/smart_contracts_idea.html.

²⁶³ Argun Karamanlioğlu, 'Concept of Smart Contracts – A Legal Perspective', *Kocaeli Üniversitesi Sosyal Bilimler Dergisi*, no. 35 (1 July 2018): 31, <https://dergipark.org.tr/en/pub/kosbed/issue/43237/525052>.

²⁶⁴ Szabo, 'The Idea of Smart Contracts'.

²⁶⁵ Philippe, 'Blockchain and Smart Contract: Lex Cryptographia?', 31; Szabo, 'The Idea of Smart Contracts', 321.

²⁶⁶ Pilkington, 'Blockchain Technology', 237.

²⁶⁷ Avdza, 'The Coming Age of Blockchain Technology in Corporate Governance', 33.

²⁶⁸ Eliza Mik, 'Smart Contracts: Terminology, Technical Limitations and Real World Complexity', SSRN Scholarly Paper (Rochester, NY, 17 August 2017), 3, <https://doi.org/10.2139/ssrn.3038406>.

²⁶⁹ According to definition of smart contracts by "inventor" of the term Szabo; "A smart contract is a set of promises, specified in digital form, including protocols within which the parties perform on these promises". Mik states that "smart contracts can be regarded as self-executing ledger-modification instructions, eg 'if X occurs, send Y amount of token from public address A to public address B'". Another definition by Greenspan that is also mainly shared by Savalyev is as follows; "A smart contract is a piece of code which is stored on a Blockchain, triggered by Blockchain transactions, and which reads and writes data in that Blockchain's database". Raskin defines the concept as; "a smart contract is an agreement whose execution is automated". According to Meyer/Schuppli, smart contracts are digital programs which are "based on Blockchain, that execute themselves when certain conditions occur and self-executive and tamper-proof due to decentralized and cryptographic design of Blockchain". Kaulartz/Heckmann defines smart contract as "a software, which uses, controls or documents legally relevant actions (in particular an actual exchange of performances) depending upon digitally verifiable events, under certain circumstances with the help of which real or promissory contracts can be concluded".; For further information about different definition of smart contracts see Argun Karamanlioğlu, 'Concept of Smart Contracts – A Legal Perspective1', *Kocaeli Üniversitesi Sosyal Bilimler Dergisi*, no. 35 (1 July 2018): 32-33, <https://dergipark.org.tr/en/pub/kosbed/issue/43237/525052>; Max Raskin, 'The Law and Legality of

transfer of a traditional contract²⁷⁰ to codes, which are created from codes that will automatically ensure the operationalization of the acts agreed upon by the parties and executed through computer software.²⁷¹ Smart contracts run on a blockchain platform, allowing programme code storage. This code enables the self-execution of contract terms upon the fulfilment of specific conditions.²⁷² In short, a smart contract is a body of codes that uses blockchain technology to syntactically enter, execute and enforce a contract (some or all of its terms).²⁷³ Smart contracts are specifically created to guarantee that contract terms are fulfilled without the need for legal intervention. They aim to provide a reliable, efficient, and automated way of enforcing agreements between parties.²⁷⁴

3.3.2.1. Off-Chain and On-Chain Smart Contracts

Smart contracts are computer codes that automatically enforce the terms of a contract that the parties have agreed upon. They are commonly used to convert traditional legal agreements into a digital format that can be easily executed and enforced on a blockchain network.²⁷⁵

There are two types of smart contracts: on-chain and off-chain. On-chain smart contracts are entirely self-executing and are stored on the blockchain. Off-chain smart contracts, on the other hand, are established in the traditional sense outside of the blockchain. However, the parties agree to use software to execute or perform the contract. In this case, the smart contract only controls, supervises, and documents the exchange of mutual performances agreed upon by the parties.²⁷⁶

On off-chain smart contract, when parties transfer an existing legal contract to a smart contract, there are two scenarios that may arise. The first scenario is when the smart

Smart Contracts', 1 *Georgetown Law Technology Review* 304, 22 September 2016, 310, <https://doi.org/10.2139/ssrn.2842258>.

²⁷⁰ A contract that records all terms in natural language, whether spoken or written.

²⁷¹ Almatrneh, 'Blockchain Technology and Corporate Governance', 98–99; Max Raskin, 'The Law and Legality of Smart Contracts', 1 *Georgetown Law Technology Review* 304, 22 September 2016, 306, <https://doi.org/10.2139/ssrn.2842258>.

²⁷² Avdzhia, 'The Coming Age of Blockchain Technology in Corporate Governance', 34.

²⁷³ Lafarre and Van der Elst, 'Blockchain Technology for Corporate Governance and Shareholder Activism', 5.

²⁷⁴ Raskin, 'The Law and Legality of Smart Contracts', 306.

²⁷⁵ Pınar Aksoy Çağlayan, *Akıllı Sözleşmelerin Kuruluşu ve Geçerlilik Şartları*, 2nd ed. (İstanbul: On İki Levha Yayıncılık, 2021), 78.

²⁷⁶ Aksoy Çağlayan, 79.

contract only enforces some parts of the original contract. In this case, only the relevant parts to be executed by the smart contract need to be coded into the computer program. The second scenario is when the smart contract enforces the entire original contract. In this case, the entire contract needs to be converted into computer code.²⁷⁷

On the other hand on-chain smart contract establishes contractual rights and obligations between parties using a programming language, without the need for prior agreement. The terms of the contract are set out entirely in computer code, rather than in natural language. Anything that is not included in the code is not part of the agreement.²⁷⁸

In on-chain smart contracts, the offer and acceptance take place on the blockchain. The program code can be considered a contract when the exchange of mutual and compatible declarations of will occurs on the blockchain. This means that the content of the contract is determined by the smart contract, not just the means of performance.²⁷⁹

To create an on-chain smart contract on the Ethereum blockchain, the user must download the Ethereum software and become part of the network. They can then write the contract in the coding language.²⁸⁰

3.3.2.2. The Process of Creating

The following explains that only the creation process of an off-chain smart contract will be described. The creation process of an on-chain smart contract requires the cooperation of software developers and lawyers, as it needs to be created completely in the form of computer code with the if-then concept.²⁸¹ Similar to studies in different fields²⁸², it will be possible to create a preliminary model for an on-chain contract with

²⁷⁷ Aksoy Çağlayan, 80.

²⁷⁸ Aaron Wright and Primavera De Filippi, 'Decentralized Blockchain Technology and the Rise of Lex Cryptographia', SSRN Scholarly Paper (Rochester, NY, 10 March 2015), 11, <https://doi.org/10.2139/ssrn.2580664>.

²⁷⁹ Aksoy Çağlayan, *Akıllı Sözleşmelerin Kuruluşu ve Geçerlilik Şartları*, 81.

²⁸⁰ Aksoy Çağlayan, 81.

²⁸¹ For further information on how to create a smart contract step-by-step with if-then concepts via coding, see *Solidity Tutorial For Developers - Let's Create a Smart Contract (Hands-On Project)*, 2022, <https://www.youtube.com/watch?v=s9MVkHKV2Vw>.

²⁸² Archana Sahai and Rajiv Pandey, 'Smart Contract Definition for Land Registry in Blockchain', in *2020 IEEE 9th International Conference on Communication Systems and Network Technologies (CSNT)*, 2020, 230–35, <https://doi.org/10.1109/CSNT48778.2020.9115752>; Xin Sun, Piotr Kulicki, and Mirek Sopek, 'Logic Programming with Post-Quantum Cryptographic Primitives for Smart Contract on Quantum-Secured Blockchain', *Entropy* 23 (28 August 2021): 1120,

joint work that can be put forward in the future. In this section, "smart contracts" refer only to off-chain smart contracts.

The initial phase of a contractual agreement remains largely similar between smart and traditional contracts. This is because, for any contract software to function effectively, both parties must mutually consent to a predetermined set of terms that initialize the program.²⁸³

Smart contracts are created by converting the agreements made between the parties into computer codes and storing them on the blockchain.²⁸⁴ The primary purpose of these computer codes on the blockchain platform is to confirm and validate whether the terms of the contract have been fulfilled for the performance of a contractual obligation. If the terms of the contract are met, the obligations under the contract will be automatically enforced by the computer code itself, without the need for human intervention. Car leases serve as a fundamental example of smart contracts. In this scenario, the smart contract stipulates that a leased car is programmed into a card computer, and the smart contract drives itself by blocking the ignition system based on the determination of whether the rental payments have been made. The code in this type of smart contract is "Check the company account on the first day of each month, and if no payment is made, block the vehicles."²⁸⁵

A smart contract is an autonomous, event-driven function that operates based on a strict and formal programming language. The software developer who creates it need not actively maintain, monitor or keep in touch with it while it is running. The contract is based on an algorithm and not on the trust of the person fulfilling the contract. The performance of the contract can be fed with data from the blockchain. Before

<https://doi.org/10.3390/e23091120>; Mohammad Nabiluzzaman Neloy et al., 'A Remote and Cost-Optimized Voting System Using Blockchain and Smart Contract', *IET Blockchain* 3, no. 1 (2023): 1–17, <https://doi.org/10.1049/bic2.12021>; Çalık, 'A New Approach: Using Smart Contract to Ensure the Security of the Shared Electronic Health Records'; Yiğit, 'Improving Supply Chain Management Using Smart Contracts'.

²⁸³ Raskin, 'The Law and Legality of Smart Contracts', 322.

²⁸⁴ Raskin, 309.

²⁸⁵ Karamanlioğlu, 'Concept of Smart Contracts – A Legal Perspective', 35–36.

implementing the smart contract, a protocol is established to define the terms of its functioning.²⁸⁶

If a law or regulation is placed on a blockchain as a smart contract, then violating the law is equivalent to breaking the code. This means that the only way to break the law is to "crack" the computer code. Such a tool has immense potential not only for automating contractual transactions but also for automating legal oversight and enforcement.²⁸⁷

Smart contracts have a life cycle that consists of four phases: creation, freezing, execution, and finalisation. During the creation phase, the parties involved agree on the contract terms and provisions. After the negotiation process, the provisions are converted into computer code and sent to the blockchain.²⁸⁸ The continuity of the majority of nodes belonging to the participants is called freezing. All transfers to the wallet address of the smart contract are frozen, and the nodes act as a board of directors to ensure that the necessary requirements for contract execution are met. Next, the contract is verified and executed. After it is executed, stored, and confirmed, the final stage of the contract's life cycle is reached, which is finalisation.²⁸⁹

The agreement is converted into binary format.

The binary code is then written into a software program that runs on a blockchain.

The code is hashed, ensuring that it cannot be tampered with.

The hashed code is submitted to the blockchain for execution.

The blockchain then triggers events according to the agreement, which are automatically recorded and executed.

²⁸⁶ Philippe, 'Blockchain and Smart Contract: Lex Cryptographia?', 10.

²⁸⁷ 'Blockchain Technology and Corporate Governance Technology, Markets, Regulation and Corporate Governance', 9.

²⁸⁸ For technical background on creating smart contracts, see Kevin Delmolino et al., 'Step by Step Towards Creating a Safe Smart Contract: Lessons and Insights from a Cryptocurrency Lab', in *Financial Cryptography and Data Security*, ed. Jeremy Clark et al. (Berlin, Heidelberg: Springer, 2016), 79–94, https://doi.org/10.1007/978-3-662-53357-4_6.

²⁸⁹ Karamanlioğlu, 'Concept of Smart Contracts – A Legal Perspective', 36.

Figure 5. An overview of the process that takes place when parties reach an agreement that needs to be recorded and executed accurately.²⁹⁰

3.3.2.3. Ethereum

Blockchain technology is being used by multiple new platforms to carry out smart contracts that are dependent on either complex possibility, like future financial outcomes, or simple events, like time passing.²⁹¹ Among those multiple platforms that provide the facility of smart contracts, the most popular of these is Ethereum²⁹²²⁹³, which is a decentralised platform used to execute smart contracts.²⁹⁴

Ethereum is an innovative blockchain-based virtual machine and cloud 2.0 platform containing digital contracts created by stateful users.²⁹⁵ It was developed and made available by Gavin Wood²⁹⁶ and Vitalik Buterin.²⁹⁷ The developers aim to create a system where complex contracts can be exchanged. This complex communication between users will allow the conclusion of digital contracts within the framework of the distributed ledger model.²⁹⁸ As expressed by the developers of Ethereum, the programming language, which makes it possible for people to create anything that works thanks to this technology, is built into the blockchain, which can be considered featureless. Therefore, the basis of Ethereum is smart contracts, and it is a virtual machine and an autonomous program that can be controlled by any party in the

²⁹⁰ Philippe, 'Blockchain and Smart Contract: Lex Cryptographia?', 7-8-9.

²⁹¹ Yermack, 'Corporate Governance and Blockchains', 26.

²⁹² Nick Oberheiden, 'Lawyers for Smart Contracts - Federal Lawyer', *Oberheiden Blockchain Law Firm* (blog), 16 November 2021, <https://federal-lawyer.com/blockchain/smart-contracts-lawyers/>.

²⁹³ For an example of a portal that provides a guide to Ethereum, see 'Ethereum', [ethereum.org](https://ethereum.org/en/), accessed 24 March 2024, <https://ethereum.org/en/>.

²⁹⁴ Lafarre and Van der Elst, 'Blockchain Technology for Corporate Governance and Shareholder Activism', 5.

²⁹⁵ To explain the term "stateful," it should be noted that, as far as core functionality and smart contract support are concerned, blockchain can be categorised into the following:

Stateless Blockchain: Stateless Blockchain systems only focus on transaction optimisation and chain functionality, which involves verifying the transaction by computing hashes. It is independent of the smart contract logic layer, thus unaffected by smart contract code bugs and vulnerabilities.

Stateful Blockchain: This type of blockchain provides smart contract and transaction computing capabilities. It also supports multifaceted business logic, its optimisation, and preserving logic states. For further information, see Shrivastava, 'The Disruptive Blockchain', 4.

²⁹⁶ Mete Tevetoglu, *Hukuki Yöneliyle Kripto Varlıklar ve Kripto Varlıkların İlk Arzı*, 2nd ed. (İstanbul: Aristo Yayınevi, 2021), 26.

²⁹⁷ Fauziah et al., 'Application of Blockchain Technology in Smart Contracts', 162.

²⁹⁸ Pilkington, 'Blockchain Technology', 240.

network. The contract can be customised for a purpose, and it can be seen how this contract is the basis for new applications on the Internet.²⁹⁹

Ethereum users can create their transactions and run applications through programmed smart contract coding. By using the Ethereum Wallet, users can access decentralised applications on the Ethereum blockchain, create their own digital tokens, and write and use smart contracts.³⁰⁰ The purpose of these smart contracts is varied. Ethereum will facilitate the establishment of a digital contract network not only in virtual money and the crypto economy but also in all areas of life (such as wage payment and marriage) with the legal basis it has acquired thanks to a strong technological infrastructure.³⁰¹ They can be used to determine shares or membership in an organization too, among other things.³⁰²

3.3.3. Features of Smart Contracts

The existing literature lacks identification of the key characteristics of smart contracts in technical and legal discussions. Each discipline emphasises a different feature of smart contracts.³⁰³ It has already been explained that smart contracts are one of the blockchain applications.³⁰⁴ For this reason, several basic features define smart contracts, in addition to maintaining the features of the blockchain.³⁰⁵

3.3.3.1. Sole Digital Structure

Smart contracts are fully digitalized, meaning that they exist only in digital form and are stored on a blockchain. Unlike traditional contracts, smart contracts cannot be established verbally, in writing, or by implication.³⁰⁶

3.3.3.2. Trustless

Smart contracts operate on a blockchain network that is often referred to as "trustless". However, this doesn't mean that the participants in the network can't be trusted. Rather,

²⁹⁹ Pilkington, 241.

³⁰⁰ Lafarre and Van der Elst, 'Blockchain Technology for Corporate Governance and Shareholder Activism', 5.

³⁰¹ Pilkington, 'Blockchain Technology', 240.

³⁰² Lafarre and Van der Elst, 'Blockchain Technology for Corporate Governance and Shareholder Activism', 5.

³⁰³ Raskin, 'The Law and Legality of Smart Contracts', 307.

³⁰⁴ See *supra* Part 3.3.2.

³⁰⁵ Karamanlioğlu, 'Concept of Smart Contracts – A Legal Perspective', 36.

³⁰⁶ Karamanlioğlu, 36.

it means that there is no need for a trusted third party to oversee the transactions.³⁰⁷ Smart contracts are designed to modify and verify transactions and data automatically, without intermediaries such as lawyers, banks, or other third parties.³⁰⁸ Since there is no trusted third party, transactions must be transparent. This is achieved through a system that allows participants to agree on a single history of the order in which transactions are received. This system ensures that evidence is provided that, at the time of each trade, the majority of nodes agree that it was the first trade received.³⁰⁹

3.3.3.3. *Automatic Execution*

Smart contracts offer an important feature where the obligations under the contract can be performed without any intervention or action by the parties involved. The performance of the obligation is not dependent on the will of the contracting parties or a third party, making it commercially, legally, and technically guaranteed. Smart contracts have the capability of self-enforcement. However, the achievement of the desired result may not always be possible, depending on the type of performance that needs to be carried out. For instance, transferring money from one account to another can only be successful if there is enough money in the account. Otherwise, the desired result cannot be achieved.³¹⁰

3.3.3.4. *Security*

To address security, the blockchain provides a distributed trust mechanism: multiple parties keep a record of transactions, and every party can verify that the order and timestamps of the transactions haven't been tampered with.³¹¹

3.3.3.5. *Precision*

Smart contracts also have a level of precision, as they reduce human error and can verify the transaction to be distributed to all users.³¹²

³⁰⁷ Philippa Ryan, 'Smart Contract Relations in E-Commerce: Legal Implications of Exchanges Conducted on the Blockchain', *Technology Innovation Management Review* 7, no. 10 (2017): 18, <https://doi.org/10.22215/timreview/1110>.

³⁰⁸ Karamanlioğlu, 'Concept of Smart Contracts – A Legal Perspective', 36–37.

³⁰⁹ Ryan, 'Smart Contract Relations in E-Commerce: Legal Implications of Exchanges Conducted on the Blockchain', 18.

³¹⁰ Karamanlioğlu, 'Concept of Smart Contracts – A Legal Perspective', 37.

³¹¹ Di Pierro, 'What Is the Blockchain?', 93.

³¹² Almatrneh, 'Blockchain Technology and Corporate Governance', 102.

3.3.3.6. Time Saving and Speed

Smart contracts are computerized agreements that enable fast execution of transactions, unlike traditional paper-based contracts. The latter are often expensive, time-consuming, and require extensive negotiation to finalize. In contrast, smart contracts are cost-effective and easy to create, implement, deploy, and use.³¹³

3.3.3.7. Third Party Interventions

Once a smart contract is established on the blockchain, it becomes immutable and cannot be interfered with from outside. However, some information may require manual verification, despite the blockchain being closed to outside intervention.³¹⁴ For instance, in a transport contract, it is possible to link the transported food to an information index like temperature to ensure it does not spoil during transportation. This can be done by using a reliable third-party resource known as an Oracle.³¹⁵ An Oracle is an individual programme that stores and transmits information from the outside world.³¹⁶ It provides a means for blockchain-based systems to interact with real-world personnel or external events, allowing the contract to be adapted to changing circumstances in real-time.³¹⁷ Parties can change payment streams or adapt contracts to receive new information due to Oracles.³¹⁸ This data transfer, enabled by Oracles, can also be bilateral, from the real world to the blockchain and vice versa.

3.3.4. Differences Between Smart Contracts and Traditional Contracts

A smart contract is a highly efficient computer program that utilizes coded logic to process specific inputs and carry out a set of instructions, resulting in one of numerous pre-determined outcomes. The code operates independently of any promises or considerations that may or may not exist between the parties involved, as well as any representations made regarding the subject matter of the instructions. Furthermore, the

³¹³ Almatarneh, 102.

³¹⁴ Bashir, *Mastering Blockchain*, 652.

³¹⁵ Primavera De Filippi, Chris Wray, and Giovanni Sileno, 'Smart Contracts', *Internet Policy Review* 10, no. 2 (20 April 2021): 6, <https://policyreview.info/glossary/smart-contracts>.

³¹⁶ When data is provided by a third party, it can be categorized as simple or complex. If the data is simple, such as a notification of a price change, the third party is referred to as a "trusted third party." However, if the data is complex and requires expertise or judgment, the third party is known as an "evaluator oracle." Moreover, devices like sensors that can be connected to the internet are also called "automated oracles."

³¹⁷ Andreas Sherborne, 'Blockchain, Smart Contracts and Lawyers', *International Bar Association*, 2017, 4, <https://theblockchaintest.com/uploads/resources/International%20Bar%20Association%20-%20Blockchain%20smart%20contracts%20and%20lawyers%20-%202017%20-%20Dec.pdf>.

³¹⁸ Philippe, 'Blockchain and Smart Contract: Lex Cryptographia?', 11.

legality or intentionality of the instructions is of no consequence. The primary function of a smart contract is to ensure the successful execution of a predetermined code base.³¹⁹

A non-smart contract is a legally binding agreement between two or more parties, which is characterized by mutual promises or obligations. It can serve multiple and interdependent goals, some of which include:

- Creating a database of the parties' obligations: The contract serves as a record of mutual obligations and promises between the parties. It collects negotiated points relating to a specific agreement between the parties and is expressed in a language that the parties can refer to and understand. However, sometimes courts need to determine what the parties agreed to or intended to agree to in their contract.
- Regulating the relationship between the contracting parties: The legal framework within which the contract exists gives it legal effect so that the parties fulfill their obligations. The law of the relevant jurisdiction may compel the performance of the obligation (as in a specific performance order or injunction) and may incentivize performance by penalizing breaches. Alternatively, the legal framework may authorize the modification of obligations in the contract, for example, if an additional term needs to be added. The legal framework may also allow the contract to be completely invalidated, for example, in the event of illegality or a complete failure to take this into account.
- Providing an enforcement mechanism: A contract may contain elements of a mechanism by which contractual obligations can be fulfilled. The contextualization of an obligation gives rise to a 'norm of performance' by creating an expectation of performance that is supported by an external legal framework. Unlike a moral obligation, the prospect of legal sanctions attached to a contract increases confidence that the obligation will be fulfilled.³²⁰

³¹⁹ Cheng Lim, TJ Saw, and Calum Sargeant, 'Smart Contracts: Bridging the Gap Between Expectation and Reality | Oxford Law Blogs', Faculty of Law Blogs / University of Oxford Law Faculty website, Oxford Business Law Blog, 11 July 2016, <https://blogs.law.ox.ac.uk/business-law-blog/blog/2016/07/smart-contracts-bridging-gap-between-expectation-and-reality>.

³²⁰ Lim, Saw, and Sargeant.

In the context of all this explained, traditional contracts will soon be obsolete, as they are being substituted by smart contracts. Thus, smart contracts eliminate the need for additional negotiations that are deemed open but unnecessary.³²¹ Smart contracts offer several advantages over traditional contracts. They help to reduce transaction risk, lower administration and service costs, and improve the efficiency of corporate processes. Since smart contracts are usually placed on and secured by blockchain, they provide an enhanced and secure mechanism for transactions.³²²

In addition, with smart contracts, acceptance is based on performance, which is different from traditional contracts. A person can express their intention to initiate a smart contract. However, the smart contract is not established until the program starts. However, a smart contract code can be offered to a ledger. Once an action is taken to initiate acceptance, such as transferring a certain amount of money to the code, the contract is formed. Instead of going to court and seeking state intervention to enforce the contract, the parties can agree on a cheaper enforcement mechanism.³²³

As a result, smart contracts are expected to offer a more efficient and effective solution in various industries.

3.3.5. Legal Approach to Smart Contracts

It is controversial whether smart contracts are contracts in the legal sense. A contract is an agreement that is legally binding and gives rise to obligations recognised or enforced by law. There are two different opinions on this issue. One of them doesn't recognise smart contracts as legally binding contracts. In other words, they are of the opinion that it does not have the quality of a contract in the legal sense. According to this opinion, smart contracts are a tool for the conclusion or automatic enforcement of legally binding contracts, a channel, and are not agreements in their own right.

On the other hand, contradicts this opinion and argues that smart contracts are also legally binding contracts. Another approach, on the other hand, accepts that smart contracts are contracts at the conceptual level and recognises smart contracts as agreements that aim to change the rights and duties of the parties. In this context, it is

³²¹ Almatarneh, 'Blockchain Technology and Corporate Governance', 97.

³²² Taherdoost, 'Smart Contracts in Blockchain Technology', 3.

³²³ Raskin, 'The Law and Legality of Smart Contracts', 322.

argued that not all contracts are enforceable and can be considered contracts even if they have nothing to be done or performed in line with the obligations.³²⁴

Similarly, in Turkey, some opinions support the idea that smart contracts cannot be considered contracts in the legal sense but rather as instruments consisting of computer codes that enable transactions to be carried out securely and the parties to fulfil their obligations.³²⁵

In addition to this, according to the other opinion, which we also agree with, the fact that smart contracts are expressed in programming languages does not create a problem in itself in terms of the applicability of the rules of the law of obligations,³²⁶ provided that the necessary conditions are met. Since it is possible to conclude a contract in a foreign language, a dead language, or a language in which the parties are not competent, a contract may also be concluded in a coding language.³²⁷

In this context, the legal recognition of smart contracts differs across various regions. For instance, some countries like Belarus have explicitly legislated to allow smart contracts to be legally binding and enforceable. In contrast, other regions such as Australia and the UK have allowed smart contracts to function but have not addressed smart contracts and blockchain in their legislation or case law, except in industry guidelines. In Australia, smart contracts are legally binding and enforceable as long as they adhere to traditional contract law principles such as consideration, and the agreement was not created under duress. However, some countries like Bangladesh have not accepted the idea that smart contracts are legally binding and have even banned certain types of smart contracts like Ethereum.³²⁸

³²⁴ Karamanlioğlu, 'Concept of Smart Contracts – A Legal Perspective', 38–39.

³²⁵ Karamanlioğlu, 39.

³²⁶ Fikriye Ceren Sadioğlu, 'Borçlar Hukuku Çerçevesinde Akıllı Sözleşmenin İşlevleri ve İşlevlerin Yerine Getirilmesi Sırasında Karşılaşılan Sorunlar', *Ankara Hacı Bayram Veli Üniversitesi Hukuk Fakültesi Dergisi* 25, no. 4 (31 October 2021): 183, <https://doi.org/10.34246/ahbvuhfd.1018674>.

³²⁷ Aksoy Çağlayan, *Akıllı Sözleşmelerin Kuruluşu ve Geçerlilik Şartları*, 305.

³²⁸ Wendy Zheng, 'Smart Contracts: What Lawyers Need to Know', *Law Society Journal*, 11 November 2022, <https://lsj.com.au/articles/smart-contracts-what-lawyers-need-to-know/>.

3.3.6. Usage Areas of Smart Contracts in Corporate Governance

Smart contracts have emerged as a powerful tool in various areas of corporate governance.³²⁹ They offer automation of governance functions, such as audit processes,³³⁰ which can enhance transparency and efficiency.³³¹ By utilizing logic programming, smart contracts can be designed to execute predefined actions based on specific conditions, providing a secure and reliable framework for corporate transactions.³³² Some big corporations use self-executing contracts in their operations, like automated order systems. These systems currently account for over 60% of the trading volume of US-listed stocks.³³³ The use of smart contracts in corporate governance can lead to more sophisticated and secure transactions, ultimately benefiting businesses.³³⁴

Furthermore, smart contracts have the potential to revolutionize traditional governance structures by reducing bureaucracy, lowering transaction costs, and addressing principal-agent issues through auto-enforceable mechanisms.³³⁵ They offer a trustless environment for managing corporate decisions and can be particularly useful in scenarios where flexibility in contract management is required.³³⁶ Additionally, smart contracts can facilitate cross-organizational collaboration and streamline business processes, thereby promoting cooperative business structures.³³⁷

³²⁹ Abdelkader Derbali et al., 'How Will Blockchain Change Corporate Governance?', *International Journal of Business and Risk Management* 2, no. 1 (4 October 2019): 16–18, <https://doi.org/10.12691/ijbrm-2-1-3>.

³³⁰ Rosa Lombardi et al., 'The Disruption of Blockchain in Auditing – a Systematic Literature Review and an Agenda for Future Research', *Accounting, Auditing & Accountability Journal* 35, no. 7 (1 January 2021): 1534–65, <https://doi.org/10.1108/AAAJ-10-2020-4992>.

³³¹ Ilya Ivaninskiy, 'The Impact of the Digital Transformation of Business on Corporate Governance. An Overview of Recent Studies', *Корпоративные Финансы* 13 (22 December 2019): 35–47, <https://doi.org/10.17323/j.jcfr.2073-0438.13.3.2019.35-47>.

³³² Sun, Kulicki, and Sopek, 'Logic Programming with Post-Quantum Cryptographic Primitives for Smart Contract on Quantum-Secured Blockchain'.

³³³ Zheng, 'Smart Contracts'.

³³⁴ Alex Murray et al., 'Contracting in the Smart Era: The Implications of Blockchain and Decentralized Autonomous Organizations for Contracting and Corporate Governance', 17 April 2019, <https://doi.org/10.5465/amp.2018.0066>.

³³⁵ Voshmgir Shermin, 'Disrupting Governance with Blockchains and Smart Contracts', *Strategic Change* 26, no. 5 (2017): 499–509, <https://doi.org/10.1002/jsc.2150>.

³³⁶ G. R. De En Goh, 'Smart Contract Disputes and Public Policy in the ASEAN+6 Region', *Digital Law Journal* 3, no. 4 (30 December 2022): 32–70, <https://doi.org/10.38044/2686-9136-2022-3-4-32-70>.

³³⁷ Prause Gunnar and Hoffmann Thomas, 'Innovative Management of Common-Pool Resources by Smart Contracts', *Marketing and Management of Innovations*, no. 1 (2020): 265–73, <https://doi.org/10.21272/mmi.2020.1-22>; Philipp, Prause, and Gerlitz, 'Blockchain and Smart Contracts for Entrepreneurial Collaboration in Maritime Supply Chains'.

The immutability and transparency of smart contracts, enabled by blockchain technology, ensure that agreements are enforced as intended, reducing the need for intermediaries and enhancing the security of transactions.³³⁸ This feature makes smart contracts particularly valuable in scenarios where precise execution of agreements is crucial, such as in corporate governance settings.³³⁹

In conclusion, the integration of smart contracts in corporate governance holds significant promise for improving transparency, efficiency, and security in business transactions. By leveraging the capabilities of blockchain technology and logic programming, smart contracts can streamline governance processes, reduce costs, and foster collaboration among stakeholders.

4. PREPARATION OF ARTICLES OF ASSOCIATION THROUGH SMART CONTRACTS IN JOINT-STOCK COMPANY

4.1. Exploring the Benefits of Employing Smart Contracts for the Preparation of Articles of Association

Smart contracts, a key innovation enabled by blockchain technology, have gained significant attention across various industries due to their potential to revolutionize traditional contracting processes.³⁴⁰ In the context of company governance, the use of smart contracts can streamline the creation and execution of articles of association, offering benefits such as increased transparency, automation of company management tasks, and enhanced security through distributed ledger technology.³⁴¹ When considering the legal implications of smart contracts in company governance, it is essential to ensure that these digital agreements align with existing corporate laws and regulations.³⁴² Parties involved in creating smart contracts for articles of association must carefully draft the content to ensure compliance with mandatory corporate laws,

³³⁸ Xiaoqi Li et al., 'A Survey on the Security of Blockchain Systems', *Future Generation Computer Systems* 107 (1 August 2017), <https://doi.org/10.1016/j.future.2017.08.020>.

³³⁹ Tyurin Alexey Valerievitch et al., 'Overview of the Languages for Safe Smart Contract Programming', *Труды Института Системного Программирования РАН* 31, no. 3 (2019): 157–76, <https://cyberleninka.ru/article/n/overview-of-the-languages-for-safe-smart-contract-programming>.

³⁴⁰ Elena Kirillova et al., 'Legal Status of Smart Contracts: Features, Role, Significance', *JURÍDICAS CUC* 15 (11 October 2019): 286, <https://doi.org/10.17981/juridcuc.15.1.2019.11>.

³⁴¹ Kirillova et al., 290.

³⁴² Mihaela Braut Filipović, 'How Can Shareholders' Agreements Shape Corporate Governance and Directors' Liability?', *InterEULawEast: Journal for the International and European Law, Economics and Market Integrations* 9, no. 2 (2022): 193–222, <https://doi.org/10.22598/iele.2022.9.2.7>.

especially concerning the functioning of the company's bodies.³⁴³ Moreover, the application of smart contracts in business settings has been linked to enhancing trust between parties involved in transactions, particularly in scenarios where individuals may not have prior relationships.³⁴⁴ This aspect is crucial when implementing smart contracts for creating and managing articles of association, as it can facilitate smoother interactions and transactions among company stakeholders.³⁴⁵ Furthermore, the use of smart contracts in the context of company governance aligns with broader trends in digital transformation and technological advancements in various industries.³⁴⁶ Smart contracts can store, update³⁴⁷, and verify information securely on a blockchain, offering a reliable and tamper-proof method for managing contractual agreements, including the articles of association.³⁴⁸

Since the articles of association are open to the participation of one or more persons³⁴⁹, it is a multilateral agreement³⁵⁰ and a contract that also binds future shareholders.³⁵¹ In this context, smart contracts, due to their nature, are favourable to contracts continued in the form of subsequent participation.

In conclusion, leveraging smart contracts for the preparation of articles of association in companies presents a promising opportunity to enhance efficiency, transparency, and compliance in governance processes. By carefully considering legal requirements, ensuring alignment with corporate laws, and leveraging the trust-enhancing capabilities of smart contracts, companies can modernize their governance structures and streamline their operations effectively.

³⁴³ Braut Filipović, 15–22.

³⁴⁴ Francesca Dal Mas et al., 'Smart Contracts to Enable Sustainable Business Models. A Case Study', *Management Decision*, 10 July 2020, <https://doi.org/10.1108/MD-09-2019-1266>.

³⁴⁵ Dal Mas et al.

³⁴⁶ Nelay et al., 'A Remote and Cost-Optimized Voting System Using Blockchain and Smart Contract'.

³⁴⁷ It is possible to programme the smart contract to perform transactions based on external information provided by the oracle. See *supra* Part 3.3.3.7., for explanations of oracles.

³⁴⁸ Nelay et al., 'A Remote and Cost-Optimized Voting System Using Blockchain and Smart Contract'.

³⁴⁹ See *supra* Part 2.2.1, 2.2.2 for explanations of founder members of company.

³⁵⁰ Moroğlu, 'Anonim Ortaklık Ana Sözleşmesi ve Hukuki Niteliği', 429–30.

³⁵¹ Although it is considered that the articles of association for future shareholders will be deemed to be standardised terms of contract within the meaning of the TCO, it should be kept in mind that the provisions of the TCO will have limited application after the registration, and the articles of association are a contract within the meaning of TCC.

4.2. Choosing a suitable Smart Contract Platform

As explained before³⁵², a smart contract is an agreement where some or all of the terms are defined and/or executed by a computer program. Although smart contracts are classified into three types³⁵³ in a report prepared by the Law Commission in the UK,³⁵⁴ since the execution of the articles of association over the smart contract can be done off-chain or on-chain³⁵⁵, depending on how the code is involved, it would be more understandable explained on these two types.³⁵⁶ The first is to integrate the traditional contract prepared and signed by the parties into the smart contract through codes by making the first preparation phase of the articles of association in the traditional way. Here, it may be preferred to integrate the entire articles of association into the smart contract, or only the executive provisions such as the amount of capital, types and values of shares, interest, voting rights, and similar provisions can be integrated. In terms of these provisions, execution can be achieved automatically at points such as the automatic transfer of the subscribed capital to the company and the use of the voting rights of the shareholders.

Secondly, the content of the articles of association is prepared through the smart contract with the joint participation of the founders and expressed in codes. In this case, it is possible for the parties who have the intention to establish a company to participate in the articles of association as founders and create its content with their declarations of intention over the blockchain. In such circumstances, all provisions of

³⁵² See *supra* Part 3.3.

³⁵³ Natural language contract with automated performance, hybrid contract, solely code contract.

- Natural language contract is a computer program code performs some or all of the contractual obligations automatically. The code itself does not define any contractual obligations, but is just a tool used by one or both parties to fulfill those obligations. This type of contract is also known as an "external" contract because the code is outside the scope of the parties' legally binding agreement.

- Hybrid contract has some contractual obligations defined in natural language and others defined in the code of a computer program. Some or all of the contractual obligations are performed automatically by the code. The terms of a hybrid contract could vary from primarily written in code with a few natural language terms setting out, for example, the governing law and jurisdiction to primarily written in natural language and include just one or two terms written in code. The same contractual term(s) can be written in both natural language and code. The natural language terms can be incorporated in an accompanying natural language agreement or in natural language comments included in the code.

- Code-only contract is all of the contractual terms are defined in and performed automatically by the code of a computer program. There is no natural language version of the agreement.

³⁵⁴ The Law Commission, 'Smart Legal Contracts Advice to Government', UK Jurisdiction Taskforce (United Kingdom, November 2021), <https://lawcom.gov.uk/project/smart-contracts/>.

³⁵⁵ See *supra* Part 3.3.2.2 for explanations of on-chain and off-chain smart contracts.

³⁵⁶ Ryan, 'Smart Contract Relations in E-Commerce: Legal Implications of Exchanges Conducted on the Blockchain', 19.

the articles of association will be included in the smart contract. In line with the ongoing technological developments, it is important to prepare or integrate all provisions of the articles of association through the smart contract in order to ensure integration between all these organs, since there are attempts to regulate notaries, land registry systems, and all other similar materials³⁵⁷ with blockchain. Although it is difficult to prepare all provisions of the articles of association through a smart contract or integrate all provisions in the first stage, it is preferable to start and develop this practice in a controlled manner with provisions by administrative authorities.

In addition, since the articles of association created according to any of the two mentioned cases will have the status of a contract open to participation after registration, the automatic participation of other shareholders in the articles of association through the chain may continue if they meet the necessary conditions.

4.3. Execution and Registration of the Articles of Association

4.3.1. Legal Framework

Firstly, it would be useful to reiterate the legal nature of the articles of association and, in this context, to evaluate the execution of the articles of association through a smart contract in line with the provisions governing smart contracts.

There has been intensive debate about the legal nature of the articles of association in the past. However, at the point reached today, the discussions have largely come to an end, and it is accepted that the articles of association are a unique, dual-character contract of obligation and organisation.³⁵⁸ Until the registration of the company, the provisions of part one titled General Provisions of TCO regarding formation, nullity, defective declarations of intention, and interpretations shall be applicable.³⁵⁹ After the registration, the provisions of the TCO will have a limited application area, and it is a contract within the meaning of TCC, and the provisions of the law to be applied before

³⁵⁷ Governments in Dubai, the US, Korea, China, and India plan to launch public services using blockchain for fraud prevention and improved data management. For further information see Shrivastava, 'The Disruptive Blockchain', 11.

³⁵⁸ Akdağ Güney, *Anonim Şirketlerde Kuruluş*, 281; Pulaşlı, *Şirketler Hukuku Genel Esaslar*, 315. See *supra* Part 2.2 for explanations of legal nature of articles of association.

³⁵⁹ Akdağ Güney, *Anonim Şirketlerde Kuruluş*, 280.

and after the registration with the if-then concept should be integrated into the smart contract.³⁶⁰

Moreover, in cases where there is only one founder, it may be referred to as an agreement or letter of undertaking³⁶¹ binding the future shareholders as well. This situation may also be integrated into the articles of association with the if-then concept.³⁶²

On the other hand, although there are different opinions³⁶³, there is no objection to the legislators adopting the wait-and-see principle³⁶⁴ instead of making new regulations in the face of technological developments and the complexity of technology and applying the rules of contract law and general principles of law in force to the disputes arising regarding smart contracts to the extent appropriate. In this context, the rules of the law of obligations will continue to apply³⁶⁵ to the legal relationship between the parties to the smart contract.³⁶⁶

4.3.2. Declaration of the intention

The articles of association arise from the declarations of the intention of the founders of the company (if there are more than one) directed to each other.

Article 335 of TCC, stipulates that the formation of a JSC is subject to the shareholders' declaration of their intention in the articles of association in compliance with the formal rules regulated in law.

If the smart contract is off-chain at the initial preparation stage of the article of association and the traditional contract already prepared by the parties is entered into

³⁶⁰ See *supra* Part 2.2.

³⁶¹ For the opposite opinion see Bahtiyar, *Anonim Ortaklık Anasözleşmesi*, 27.

³⁶² Tekinalp, *Tek Kişilik Ortaklık I - Tek Pay Sahipli Anonim Ortaklık*, 83.

³⁶³ See *supra* Part 3.3.5 for explanations of legal approach to smart contracts.

³⁶⁴ In law, a "wait and see" approach typically refers to a strategy or principle where a decision or action is delayed until further information or developments occur. This approach is often used when there is uncertainty or ambiguity surrounding a legal issue, and it involves observing the situation or waiting for specific events to unfold before making a definitive decision or taking action. Overall, the "wait and see" approach allows flexibility and the opportunity to make more informed decisions based on evolving circumstances.

³⁶⁵ In terms of Turkish law, there is a regulation that may contrast from drafting the contract in a programming language: According to Article 1 of Code No. 805 on the Compulsory Use of Turkish in Economic Enterprises, "All kinds of companies and enterprises of Turkish nationality are obliged to keep all kinds of transactions, contracts, correspondence, accounts, and books within Turkey in Turkish." Accordingly, documents and instruments issued in violation of the law shall not be interpreted in favour of the party claiming rights based on them.

³⁶⁶ Aksoy Çağlayan, *Akıllı Sözleşmelerin Kuruluşu ve Geçerlilik Şartları*, 312.

the smart contract in the form of codes, the declarations will be made traditionally during the execution of the first written contract.

On the other hand, in cases where articles of association are concluded completely with smart contracts, the intention expressed by the smart contract does not meet the definition of a classical declaration of intention; it is considered an automated declaration of intention.³⁶⁷

In this context, the transactions sent to the blockchain may be characterised as an offer, acceptance, or invitation to offer, depending on the situation, if the founders conclude the articles of association with the declaration of will in the smart articles of association created through codes on the blockchain. When a person initiates a smart contract on the blockchain, it usually indicates that the person has the will to make a binding proposal. It is also possible that the smart contract, although it contains the essential elements of a contract, does not qualify as a proposal because there is no binding intention. Therefore, whether a smart contract constitutes a proposal or an invitation to a proposal should be examined separately in each concrete case. The addressee usually manifests its will to accept by bringing the data specified in the smart contract (this may be some amount of cryptocurrency) as capital and sending it to the address shown in the smart contract. Then, the smart contract is established at the moment when the data block in which the act that reveals the will to accept is added to the chain.³⁶⁸

4.3.3. Capacity to Enter into a Contract

Smart contracts raise an important issue concerning the involvement of individuals who lack the legal capacity to enter into a contract.³⁶⁹ Such individuals may conceal their identities and still participate in a smart contract. This poses a problem, as it would be difficult, if not impossible, to declare the contract invalid after it is executed if one of the parties is a limited incapacitated person.³⁷⁰ However, in a private blockchain,³⁷¹ only authorised users will be able to participate in the network. In this context, giving permission could depend on the identities of the users. It is possible to

³⁶⁷ Aksoy Çağlayan, 306.

³⁶⁸ Aksoy Çağlayan, 306.

³⁶⁹ Philippe, 'Blockchain and Smart Contract: Lex Cryptographia?', 12.

³⁷⁰ Aksoy Çağlayan, *Akıllı Sözleşmelerin Kuruluşu ve Geçerlilik Şartları*, 305–6.

³⁷¹ See *supra* Part 3.2.2.2.

request identity information³⁷² from participants and determine whether they can participate in the blockchain according to this information.³⁷³ For example is Uport, an application that offers users a blockchain-based alternative for validating their identity autonomously from governmental entities (e.g., a driver's license) or centralized third parties (e.g., "log in with your Facebook account").³⁷⁴ Also, when signing an article of association for a company, it needs to present the identity of the founder. Articles of association of a company are signed in the Trade Registry Offices under Article 5 of the Communiqué on Signing the Company Incorporation Agreement at the Trade Registry Offices. This requires the presentation of identity cards or passports to the officers in charge.³⁷⁵

Additionally, the identity information of the founders and their settlement and contact information are included in the articles of association created through MERSIS.³⁷⁶ This makes it impossible to hide identity in the articles of association. Therefore, to prevent any complications arising from legal capacity, a smart contract can be concluded through a side chain³⁷⁷ or oracle³⁷⁸ from integrated systems, with the information extracted from the existing population registration system.

4.3.4. Automatic Execution

One of the main reasons for the emergence of a smart contract is the automatic execution³⁷⁹ of the performance to be realised if the necessary conditions are met within the scope of the contract. According to *Raskin*, whether it is private contracts, statutes, or the Constitution, the process used by courts to interpret them is fundamentally the same with smart contracts. They take into account various inputs related to the dispute they are handling, apply a series of conditional statements, and

³⁷² For example, the Estonian LHV Group's Cuber wallet app enables various activities such as ID authentication and voting. For further information see 'LHV Bank Develops Wallet App Built on Bitcoin's Blockchain', accessed 14 May 2024, <https://www.coindesk.com/business/2015/06/08/lhv-bank-develops-wallet-app-built-on-bitcoins-blockchain/>.

³⁷³ Aksoy Çağlayan, *Akıllı Sözleşmelerin Kuruluşu ve Geçerlilik Şartları*, 106.

³⁷⁴ Murray et al., 'Contracting in the Smart Era', 14.

³⁷⁵ Article 5, para. 6-7-8 Communiqué on Signing the Company Incorporation Agreement at the Trade Registry Offices No. 29910.

³⁷⁶ 'MERSİS - T.C. Ticaret Bakanlığı', accessed 12 April 2024, <https://mersis.ticaret.gov.tr/Portal/Home/Index>.

³⁷⁷ See *supra* Part 3.2.2.5.

³⁷⁸ An external data source is a means of transmitting information to a computer program. See *supra* Part 3.3.3.7.

³⁷⁹ See *supra* Part 3.3.3.3.

then arrive at a conclusion. However, once they reach a conclusion, there needs to be someone who ensures that the decision is enforced. In the case of smart contracts, the code itself performs the role of the enforcer, converting inputs into code that can be executed.³⁸⁰

The programme code underlying the smart contract contains a conditional agreement formulated as "if... then".³⁸¹ This agreement provides for the exchange of digital goods or values between the parties to the smart contract, provided that the conditions predetermined by the parties are met.³⁸² In this context, it is necessary to determine the performances that can be executed automatically in the article of association. Therefore, the question that needs to be answered is whether the articles of association are suitable for automatic execution.

During the establishment of a JSC, it is necessary to fulfil the obligation of capital contribution and to include the nominal value of the shares in the articles of association.³⁸³ The obligation of capital contribution consists of the founders' all-share subscription. The commitment here is an obligation under the law of obligations, which also has consequences in commercial law; it is the assumption of a debt.³⁸⁴ A share subscription is a borrowing transaction regarding the purchase of the shares to be formed upon the registration of the JSC by the founders.

In this context, with the registration of the company, the shares will both be legally constituted and will arise in the assets of the person who undertakes the share commitment. In this case, there will be no transfer of shares by the company to the founders. Therefore, the shares acquired by the share subscribers in this way will be referred to as the original acquisition.³⁸⁵

Accordingly, an obligation to make a capital contribution may be subject to automatic execution. For example, entering a smart contract code that provides automatic execution from the bank to the company account will achieve the desired result at the point of capital contribution. Moreover, since a smart contract can interact with other

³⁸⁰ Raskin, 'The Law and Legality of Smart Contracts', 312–13.

³⁸¹ Aksoy Çağlayan, *Akıllı Sözleşmelerin Kuruluşu ve Geçerlilik Şartları*, 90.

³⁸² Werbach and Cornell, 'Contracts Ex Machina', 338.

³⁸³ See *supra* Part 2.7.2.3, 2.7.2.5.

³⁸⁴ Tekinalp, *Tek Kişilik Ortaklık I - Tek Pay Sahipli Anonim Ortaklık*, 84.

³⁸⁵ Tekinalp, 84.

smart contracts,³⁸⁶ when the necessary conditions are fulfilled for an immovable property planned to be brought in as capital, it will be possible to automatically annotate and, after that transfer the immovable property through systems such as the integrated land registry system.³⁸⁷ Furthermore, if what is planned to be brought in as capital is in kind pursuant to article 342 of TCC, this capital must be valued by experts³⁸⁸ in accordance with article 343 of TCC, and this system can also be subject to automatic execution. This situation will both speed up the process³⁸⁹ and eliminate the process of applying to the court, thanks to the automatically appointed experts.

In addition to all these, pursuant to Article 352 of the TCC, the transfer of the share subscription, i.e., the transfer of the subscribed share to someone else before the registration of the company, is null and void against the JSC. This provision is aimed at preventing the subscriber from being released from the obligation to pay the share price and to ensure that the capital is formed without any deficiency. Therefore, the principle of capital protection³⁹⁰ is served. This article does not prohibit the transfer of the subscribed share but does not want to lead to a loss of transparency by allowing the transfer of the subscribed share between the parties to the articles of association.³⁹¹ In this provision, the transfer of shares can be subject to automatic execution with the if-then concept by making a distinction between before and after the registration.

In this way, there are transactions such as signature, registration, entry in the share ledger and notification to third parties that may be subject to automatic execution, and these issues are analysed under different headings below.

³⁸⁶ Philippe, ‘Blockchain and Smart Contract: Lex Cryptographia?’, 11.

³⁸⁷ For further information see Sai Apurva Gollapalli et al., ‘Land Registration System Using Blockchain’, in *2020 International Conference on Smart Innovations in Design, Environment, Management, Planning and Computing (ICSIDEMPC)*, 2020, 242–47, <https://doi.org/10.1109/ICSIDEMPC49020.2020.9299606>; Sahai and Pandey, ‘Smart Contract Definition for Land Registry in Blockchain’; M. Laxmaiah and B. Kumara Swamy, ‘A Secured Land Registration System Using Smart Contracts’, in *Advances in Cognitive Science and Communications*, ed. Amit Kumar, Stefan Mozar, and Jan Haase (Singapore: Springer Nature, 2023), 633–43, https://doi.org/10.1007/978-981-19-8086-2_61.

³⁸⁸ See *supra* Part 2.7.2.5.

³⁸⁹ Philippe, ‘Blockchain and Smart Contract: Lex Cryptographia?’, 11.

³⁹⁰ Since the JSC is a capital company and is liable to creditors only with the assets of the legal entity of the company in accordance with article 329 para. 1 of TCC, various regulations have been included in TCC to protect the assets of the company. For further information see Harun Eryiğit, *6102 Sayılı Türk Ticaret Kanunu Çerçevesinde Anonim Ortaklıklarda Sermayenin Korunması İlkesi* (İstanbul: On İki Levha Yayıncılık, 2020).

³⁹¹ Tekinalp, *Tek Kişilik Ortaklık I - Tek Pay Sahipli Anonim Ortaklık*, 85–86.

4.3.5. Signing and Witnessing Requirements

First of all, it is useful to recall the form requirement stipulated in the law for the articles of association. Under Article 339 para. 1 of the TCC, it is required that the articles of association be documented in written form, and the signatures within the agreement must either bear notary public approval or be signed in the presence of the manager or deputy manager at the trade registry.³⁹²

Within the framework of freedom of form, contracts can also be established in non-natural languages and with computer programs that can only be read by machines. In this framework, the parties can establish a smart contract on-chain or off-chain in the blockchain and make declarations of intention within the scope of the smart contract.³⁹³

For a smart contract established as an off-chain, the form requirement can be fulfilled as in traditional contracts due to the fact that it is subsequently uploaded to the smart contract or the execution provisions are executed through the smart contract. On the other hand, there are some problems with a smart contract established as an on-chain.

When analysed in this context, the written form has two elements: text and signature. Smart contract codes can generate text. When smart contracts are established, these contracts remain permanently on the blockchain. Due to the nature of the blockchain, smart contracts are constantly recorded in the system because they are very difficult to retrieve³⁹⁴. Therefore, it is possible to accept the codes as text.³⁹⁵ Even if it is accepted that smart contracts meet the text condition in the ordinary written form requirement, it is sceptical that the private key used in the blockchain meets the ordinary written form requirement. By making some technical and legal arrangements on this issue, it will be possible to make progress in equating a cryptographic signature with a secure electronic signature.³⁹⁶

In the same direction, the Law Commission Report prepared for the related legalising of smart contracts recognises that source code may constitute "writing" under UK

³⁹² See *supra* Part 2.3.

³⁹³ Aksoy Çağlayan, *Akıllı Sözleşmelerin Kuruluşu ve Geçerlilik Şartları*, 307.

³⁹⁴ See *supra* Part 3.2.1.4.

³⁹⁵ Onur Sarı, *NFT'ler Açısından Mali Hakların Devri Sözleşmesi* (Ankara: Seçkin Yayınevi, 2022), 196.

³⁹⁶ Aksoy Çağlayan, *Akıllı Sözleşmelerin Kuruluşu ve Geçerlilik Şartları*, 307.

regulations. On the other hand, a digital signature is generally accepted to meet the legal requirements for a signature and is considered valid unless otherwise stipulated in the relevant legislation or contractual arrangements or unless the case law specific to the document in question leads to a contrary conclusion.³⁹⁷

The signature of the articles of association is required to fulfil one of the two conditions. These are the signatures within the agreement that must either bear notary public approval or be signed in the presence of the manager or deputy manager at the trade registry. Since the articles of association contain requirements for witnessing signatures, it seems nearly impossible to fulfil this requirement.³⁹⁸ In the official form requirement context, how the smart contract will be executed causes a problem. To solve this problem, the parties can transfer their declarations of intention to the blockchain with the smart contract mechanism by providing the signature requirement per the witnessing requirement stipulated for this transaction outside the blockchain with the off-chain smart contract. The notary public condition is examined in the following heading.

4.3.6. Notarization and Authentication

The notary annotation declares that all of the shares constituting the capital are subscribed to by the founders in the articles of association. This annotation gains importance, especially when capital in kind is subscribed to. This is because, pursuant to Article 581 of TCC, the annotation states that there are no limited real rights, seizures, or injunctions on the subscribed shares, that the immovables are registered in the title deed as capital of the JSC being established, that the other shares are registered in the relevant registries, and that the movables are entrusted to a trustworthy person. This is due to the fact that the capital in kind is not only written in the articles of association, and the capital is to be secured in line with the principle of capital protection. The duty of the notary here is to ask the founders to officially certify that these conditions have been fulfilled while issuing the commitment annotation.³⁹⁹ It is possible to obtain this annotation from the notary public and to provide these queries to be made on in-kind records automatically through the smart contract, and academic

³⁹⁷ The Law Commission, 'Smart Legal Contracts Advice to Government', 57–65.

³⁹⁸ Sarı, *NFT'ler Açısından Mali Hakların Devri Sözleşmesi*, 206.

³⁹⁹ Tekinalp, *Tek Kişilik Ortaklık I - Tek Pay Sahipli Anonim Ortaklık*, 89.

studies⁴⁰⁰ are being carried out to carry out the notary system through the smart contract.

On the other hand, carrying out the transactions in the presence of a notary will also mean that the founder will verify his or her identity and that the signature belongs to him or her, which will be possible thanks to the cryptographic private keys⁴⁰¹ defined specifically for each user through the smart contract. Since this key is only held by the relevant person, the digital signature will directly point to the relevant founder. As mentioned above in the "Capacity to Enter into a Contract" section⁴⁰², the notarial process and authentication requirements can be provided through the smart contract since it will be possible to control the identity of the users to enter the system.

4.4. Determining the Company's Objectives

Considering that the articles of association are the constitution of a company, the main obligation of the articles of association is to ensure the establishment of the company through registration. Therefore, all other provisions regulated in the articles of association, such as the company's field of activity,⁴⁰³ the capital of the company, the nominal value of each share, the form and conditions of the payment of the capital,⁴⁰⁴ first board members,⁴⁰⁵ consist of an explanatory-regulatory side and protection obligations. Since these provisions are generally not enforceable but explanatory in nature, it is useful to first assess the applicability of smart contracts in terms of such provisions.

It is considered that explanatory-regulatory ancillary obligations and protection obligations are not suitable to be integrated into a smart contract. The fact that these obligations are very comprehensive and vary according to the concrete case undermines the integration process. Although it is stated that smart contracts can be

⁴⁰⁰ Leonardo Dias Menezes, Luciano Vieira de Araújo, and Marislei Nishijima, 'Blockchain and Smart Contract Architecture for Notaries Services under Civil Law: A Brazilian Experience', *International Journal of Information Security* 22, no. 4 (1 August 2023): 869–80, <https://doi.org/10.1007/s10207-023-00673-3>; Shinya Haga and Kazumasa Omote, 'Blockchain-Based Autonomous Notarization System Using National eID Card', *IEEE Access* 10 (2022): 87477–89, <https://doi.org/10.1109/ACCESS.2022.3199744>; Barış Kunduracılar, 'Comparison of Smart Contracts with the Notary System' (Master, Tilburg University, 2022), <https://tez.yok.gov.tr/UlusalTezMerkezi/>.

⁴⁰¹ See Figure 2.

⁴⁰² See *supra* Part 4.3.3.

⁴⁰³ See *supra* Part 2.7.2.2.

⁴⁰⁴ See *supra* Part 2.7.2.3.

⁴⁰⁵ See *supra* Part 2.7.3.

applied only to the exchange of assets that can be represented in the digital world, there are also opinions to the opposite.⁴⁰⁶

However, it is possible to integrate these provisions into the contract as an oracle or side chain or to execute only these provisions off-chain. Because these provisions play a significant role in defining the boundaries of management and representation authority, as well as providing third parties with knowledge about the company. For this reason, these provisions can be included in the smart contract as an oracle to be consulted at the point of suitability when performing any transaction, or they can be coded into the smart contract as one of the questions to be asked in the process of performing a transaction with the if-then concept. However, in line with technological developments, as smart contract integration is embodied in other related areas, all of the provisions will be executed through the blockchain.

The benefits of including these provisions in the chain can be explained with a few examples. For example, in a company where signature authorization is made possible up to a certain amount in business and transactions subject to the company's field of activity, the presence of the company's field of activity in the smart contract, side chain, or oracle will be an authority to be applied for the approval of the transaction. Moreover, in line with the principle of capital protection, if the company's capital falls below a certain amount, the smart contract will be able to detect this through oracles and automatically stop existing transactions such as dividend distribution or evaluate offers that bring income to the company account. Such situations show that the smart contract can also automatically operate according to the basic principles of JSCs.

4.5. Defining Shareholders' Rights and Obligations

Basic elements such as the types and amounts of capital shares subscribed by the shareholders and whether they are registered or bearer shares⁴⁰⁷ should be clearly stated in the articles of association. In addition, provisions regarding the allocation of interest from the company's profits are also indispensable elements that must be included in the articles of association.

⁴⁰⁶ Aksoy Çağlayan, *Akıllı Sözleşmelerin Kuruluşu ve Geçerlilik Şartları*, 304.

⁴⁰⁷ See *supra* Part 2.7.2.4.

It has already been explained⁴⁰⁸ that the smart contract and the integration of contract terms into programming languages represent a paradigm shift that enables these provisions to be executed by machines. With this innovation, it was concluded that the execution and implementation of the contract could be transformed into conditional statements similar to the logical structures used in computers.⁴⁰⁹ In this context, for example, non-payment of amounts of capital shares subscribed by the shareholders by a certain deadline can trigger actions such as property seizure, demonstrating the concrete effect of such programmable contracts. With these and similar examples, smart contract advocates argue for the revolutionary potential of smart contracting in corporate governance.

In the context of corporate governance, proposals to improve monitoring mechanisms for debt and equity issuances, as well as initiatives such as triple-entry accounting facilitated by the capabilities of smart contracts, are being actively discussed.⁴¹⁰ These mechanisms would serve the principle of capital protection while contributing to the elimination of problems such as disguised dividend distribution.⁴¹¹

Yermack suggested that blockchain technology has the potential to establish distributed ledgers, enabling all participants in a network, such as shareholders and stakeholders, to access and modify ownership records.⁴¹² This heightened transparency in ownership is a key benefit of distributed ledgers. Furthermore, the utilization of blockchain technology could lead to decreased time and cost associated with processing numerous data transactions within a set timeframe. For example,

⁴⁰⁸ See *supra* Part 3.3.2.

⁴⁰⁹ Raskin, 'The Law and Legality of Smart Contracts', 312.

⁴¹⁰ Lafarre and Van der Elst, 'Blockchain Technology for Corporate Governance and Shareholder Activism'; Cynthia Cai, 'Triple-entry Accounting with Blockchain: How Far Have We Come?', *Accounting & Finance* 61 (18 October 2019), <https://doi.org/10.1111/acfi.12556>; 'Blockchain Technology and Corporate Governance Technology, Markets, Regulation and Corporate Governance'; Pythagoras Petratos, 'Triple-Entry Accounting and System Integration', *Journal of Risk and Financial Management* 17, no. 2 (February 2024): 45, <https://doi.org/10.3390/jrfm17020045>; 'Distributed Ledger Technology (DLT) and Blockchain' (World Bank Group FinTech Note No.1, 2017), <https://documents1.worldbank.org/curated/en/177911513714062215/pdf/122140-WP-PUBLIC-Distributed-Ledger-Technology-and-Blockchain-Fintech-Notes.pdf>.

⁴¹¹ For a comprehensive comparative review of the financial legislation and commercial law on disguised dividend distribution in JSC, see Hasan Karşioğlu, *Anonim Şirketlerde Örtülü Kar Dağıtımı* (Ankara: Adalet Yayınevi, 2015).

⁴¹² Yermack, 'Corporate Governance and Blockchains'.

employing blockchain distributed ledgers as a platform for stock registration and exchange could improve liquidity compared to alternative database platforms.⁴¹³

The improved transparency and liquidity in blockchain-distributed platforms could bring advantages to corporate governance. Yermack explained that investors are keen on adopting blockchain technology as they seek greater access to information and involvement in corporate governance. The utilization of blockchain-distributed ledgers would bolster the transparency of stock transactions, allowing investors and shareholders to access insider stock trade information. Specific insider stock trades by managers can serve as incentives for them to enhance business performance. Yermack proposed that with increased transparency on insider trades, managers would be restricted from benefiting from such transactions. Blockchain-distributed ledgers will revolutionize market structures by enhancing the transparency of traders' identities and prohibiting insider trades, among other changes.⁴¹⁴

On the other hand, the inclusion of the company's capital, shares, and shareholders in the smart contract will facilitate the determination of issues such as transnational companies, minority rights,⁴¹⁵ and competition law with an internationally integrated system in the future. The fact that cryptology has an international dimension and its control is monitored and protected with an integrated platform will perhaps reveal a mechanism that can prevent monopolisation and unfair competition in companies and enable the tracking of company shares around the world.

4.6. Establishing Decision-Making Processes

The articles of association of a company must include provisions on how the general assembly will be called and voting rights.⁴¹⁶ Academic studies, discuss the use of blockchain and smart contracts to improve remote voting systems. This technology can be applied to a company's governance framework to enhance shareholder engagement and decision-making by enabling secure and transparent voting processes,

⁴¹³ Xing Yin, 'Blockchain Technology in Corporate Governance: Advantages and Limitations', *Academic Journal of Business & Management* 5, no. 11 (1 June 2023): 94, <https://doi.org/10.25236/AJBM.2023.051115>.

⁴¹⁴ Yin, 94.

⁴¹⁵ For theoretical frameworks of corporate governance and minority shareholder protection see Meltem Karatepe Kaya, 'Notion of Protection of Minority Shareholders; Theoretical Framework', *İstanbul Medeniyet Üniversitesi Hukuk Fakültesi Dergisi* 5, no. 9 (30 September 2020): 195–219, <https://dergipark.org.tr/en/pub/imhfd/issue/65257/1003983>.

⁴¹⁶ See *supra* Part 2.7.2.8.

as specified in the articles of association.⁴¹⁷ Various proposals are being discussed to improve shareholder voting systems, and smart contract technology can be utilized to enforce corporate governance rules, as demonstrated by a decentralized autonomous organization (DAO) example. A DAO is an organization where predetermined governance rules are executed by computers.⁴¹⁸ In 2016, a DAO was created as an investment entity that was not controlled by any individual. Instead, shareholders voted according to their shares on a blockchain, eliminating the need for a management team and reducing transaction costs.⁴¹⁹

Piazza also shown the practicality of blockchain technology in the context of corporate voting. In practice, allocating eligible voters tokens (also called "vote coins") in a number that represents their voting power would enable blockchain voting. Voters would then transmit their votes to blockchain addresses for registration on the ledger.⁴²⁰ As a result, voting via blockchain would effectively solve ambiguities about election outcomes and reduce opportunities to manipulate such results, making it an advisable corporate governance tool.⁴²¹

4.7. Filing and Recording with Relevant Authorities

Business name and registered Office of the company⁴²² are among the minimum requirements elements of the articles of association. This requirement is very important for the notification provisions to be followed within the scope of various legal obligations and subsequent legal proceedings. For this reason, there is a significant benefit in keeping an automatic registration of the address registration system through a system integrated into the smart contract.⁴²³ In fact, within the scope of the contracts concluded before international companies, keeping their registered

⁴¹⁷ Neloy et al., 'A Remote and Cost-Optimized Voting System Using Blockchain and Smart Contract'; Kirillova et al., 'Legal Status of Smart Contracts'.

⁴¹⁸ 'Decentralized Autonomous Organization', in *Wikipedia*, 21 April 2024, https://en.wikipedia.org/w/index.php?title=Decentralized_autonomous_organization&oldid=1220087195.

⁴¹⁹ Peter Coy and Olga Kharif, 'This Is Your Company on Blockchain', *Bloomberg Law*, 2016, <https://news.bloomberglaw.com/tech-and-telecom-law/this-is-your-company-on-blockchain>.

⁴²⁰ Joan MacLeod Heminway and Adam J. Sulkowski, 'Blockchains, Corporate Governance, and the Lawyer's Role', SSRN Scholarly Paper (Rochester, NY, 16 July 2019), 24–30, <https://papers.ssrn.com/abstract=3473577>.

⁴²¹ Piazza, 'Bitcoin and the Blockchain as Possible Corporate Governance Tools', 293–94.

⁴²² See *supra* Part 2.7.2.1.

⁴²³ For example, the e-Residency programme in Estonia offers a digital identity and remote access framework. See 'E-Residency of Estonia | Apply & Start an EU Company Online', e-Residency, accessed 14 May 2024, <https://www.e-resident.gov.ee/>.

addresses in different countries through a common system will make a great contribution to the execution of legal processes.

Furthermore, it is obligatory to regulate how the announcements⁴²⁴ will be made in the articles of association of the companies, and its absence is a reason for the rejection of the registration request. In this context, determining how the announcement will be made is a procedure related to company management and ensures that the authorities and third parties who need to be informed about the subject to be announced are informed about the subject. This procedure can be included off-chain in the smart contract, or it can be made part of the automatic announcement⁴²⁵ way embedded in the smart contract by an oracle whose knowledge is relied upon or by the if-then concept.

Integrating the fiscal year of a company⁴²⁶ into a smart contract can be done by including specific clauses and conditions related to the accounting period within the smart contract code. It can use a logic that automatically renews the contract at the end of each fiscal year. This could include updating relevant information such as financial data, reporting requirements, and compliance with tax regulations. By integrating this function into a smart contract, it can streamline the management of the company's fiscal year and operational efficiency.

In this context, examined the use of blockchain to improve financial reporting and corporate governance. The research is centred on the potential advantages of blockchain technology in corporate governance, namely from the accounting standpoint.⁴²⁷ Integrating smart contracts with blockchain technology will significantly reduce human involvement in the revenue recognition reporting process. The corporate managers could determine how they will recognize the revenue and then write the governance rules into the smart contract. Therefore, there will be no human interaction in revenue recognition once the governance has been written into the smart contract.⁴²⁸ Implementing blockchain technology in corporate governance has the

⁴²⁴ See *supra* Part 2.7.2.10.

⁴²⁵ Aybüke Keskin, *The Impact of Digitalisation on Company* (Ankara: Adalet Yayınevi, 2024), 93.

⁴²⁶ See *supra* Part 2.7.2.12.

⁴²⁷ Jacob Lewtan, Joseph McManus, and Saeed Roohani, 'Blockchain: Opportunity to Improve Financial Reporting and Corporate Governance', 1 September 2018, <http://hdl.handle.net/10125/59363>.

⁴²⁸ Lewtan, McManus, and Roohani, 8.

potential to enhance the operational efficiency and overall effectiveness of the organisation.⁴²⁹ For instance, auditors have the option to focus on the standards set by corporate governance rather than scrutinising individual transactions to detect fraud or errors in the recording or maintenance of financial data, as this eliminates the need for direct human involvement in the business cycle.⁴³⁰ It is useful to use how blockchain will be helpful to corporate governance in different financial reporting cycles as well.

The use of blockchain technology enables businesses to monitor and adjust their costs and profits in ways that traditional corporate governance methods cannot. *Avdzha* conducted a comprehensive analysis of a company case study to assess the benefits of implementing blockchain technology, ultimately confirming its positive impact on corporate governance, transparency, and accountability.⁴³¹ Deloitte developed an accounting system that leverages blockchain technology to record single transaction entries on a unified ledger within a blockchain framework, rather than on separate ledgers for different corporations. This allows for on-site visits and simultaneous scrutiny of transactions by companies, banks, tax authorities, and auditors. Furthermore, judges, banks, and tax authorities can oversee ongoing transactions, leading to reduced operational expenses and enhanced transaction security in this blockchain-based distributed ledger system.

Another study utilized the DAO "hack" of 2016 as a case study to analyse the accountability and dependability of blockchain corporate governance.⁴³² The DAO, an investment firm, employed smart contracts on the Ethereum network to oversee operations and execute business decisions. The resolution of the "hack" case involved consensus among network users, highlighting the reliability of decentralized corporate governance through blockchain. The authors posit that the DAO case serves as a pivotal moment, marking the emergence of a new theory in corporate governance deserving of additional investigation.

⁴²⁹ Jayasuriya Daluwathumullagamage and Sims, 'Blockchain-Enabled Corporate Governance and Regulation'.

⁴³⁰ Lewtan, McManus, and Roohani, 'Blockchain', 6.

⁴³¹ Avdzha, 'The Coming Age of Blockchain Technology in Corporate Governance'.

⁴³² Robbie Morrison, Natasha C. H. L. Mazey, and Stephen C. Wingreen, 'The DAO Controversy: The Case for a New Species of Corporate Governance?', *Frontiers in Blockchain* 3 (27 May 2020), <https://doi.org/10.3389/fbloc.2020.00025>.

4.8. Modifying Smart Contracts

Deficiencies in articles of association can lead to nullity, with different effects before and after a company gains legal personality. Before registration, such deficiencies can be challenged without limit, but registration cures many defects. Nullity pre-registration may nullify the entire contract, while post-registration legal recourse is available within a three-month window. After this period, challenges based on deficiencies are precluded. For this reason, a distinction should be made between before and after registration upon enforcement provisions of the smart contract in terms of unlawful provisions.⁴³³

The provisions set forth in the law regarding nullity and partial nullity shall apply to smart contracts.⁴³⁴ However, the application of nullity to smart contracts remains uncertain. Since, upon appending to the chain upon majority⁴³⁵ user approval of the transaction, smart contracts automatically fulfil the contract terms. Once data is added to the blockchain, it is not completely unchangeable, but the difficulty of changing data makes it nearly impossible.⁴³⁶ Reversing the "truth" in a blockchain is theoretically possible if all participants in the consensus protocol agree, but it ultimately depends on the consensus method used. As a consequence, the smart contract code on the blockchain will still be executed, irrespective of its legal invalidity.⁴³⁷ Moreover, the nullity of the smart contract itself, as a programme code, is not possible for technical reasons.⁴³⁸

In this context, situations can arise where modifications to smart contracts are required due to changes in the legal environment, deficiencies per law, or the existence of provisions in the articles of association contrary to the law. If a contract or its provisions become illegal or there are existing deficiencies per law, this will present a problem for smart contracts.⁴³⁹ It causes a significant apprehension surrounding smart contracts that their results could potentially contradict legal mandates. In such situations, the technical consequences generated by smart contracts may not be

⁴³³ See *supra* Part 2.4.

⁴³⁴ Aksoy Çağlayan, *Akıllı Sözleşmelerin Kuruluşu ve Geçerlilik Şartları*, 308.

⁴³⁵ See *supra* Part 3.2.1.1.

⁴³⁶ See *supra* Part 3.2.1.4.

⁴³⁷ Aksoy Çağlayan, *Akıllı Sözleşmelerin Kuruluşu ve Geçerlilik Şartları*, 219.

⁴³⁸ Aksoy Çağlayan, 309.

⁴³⁹ Raskin, 'The Law and Legality of Smart Contracts', 326–27.

acknowledged by a court due to the infringement of established laws. This occurs when smart contracts yield outcomes that violate current legal statutes. To surmount this challenge, one solution is to design smart contracts that adhere to existing laws. Given that these technologies have not yet advanced to a level necessitating government intervention, it remains challenging to anticipate how governments will respond to smart contracts.⁴⁴⁰

4.9. Managing Amendments and Updates

Raskin has classified smart contracts into two categories according to the differences in the difficulties associated with cancelling or modifying the contracts: strong and weak contracts.⁴⁴¹ According to this distinction, strong smart contracts have prohibitive cancellation and modification costs, while weak smart contracts have no such costs. This means that if a court can modify a contract relatively easily after it has been executed, then this contract will be defined as a weak smart contract. On the other hand, if there is a large cost attached to modify the contract in such a way that it would not make sense for a court to do so, then it is classified as a strong smart contract.⁴⁴² This difficulty, apart from the cost, can also be seen as certain procedures that make it difficult to change the contract, such as votes that require a qualified majority.

In this context, articles of association can be changed by amending them. Article 452 of TCC gives the general assembly the right to make amendments unless the articles of association say otherwise. Amendments must comply with the law and not interfere with inalienable rights. The general assembly can only amend non-mandatory provisions and aspects where the law allows deviation.⁴⁴³ Therefore, since the amendment of the articles of association depends on certain procedures, if it is prepared through a smart contract, it should be one of the strong smart contracts. Computer programs are often designed with the ability to add code at a later time. However, contracts that lack any form of irrevocability can create legal issues.⁴⁴⁴

⁴⁴⁰ Raskin, 328–29.

⁴⁴¹ Raskin, 310.

⁴⁴² Raskin, 310.

⁴⁴³ See *supra* Part 2.8.

⁴⁴⁴ Raskin, ‘The Law and Legality of Smart Contracts’, 327–28.

As explained before,⁴⁴⁵ blockchain already has the difficulty of changing, which is nearly impossible.

There needs to be a method by which smart contracts can be updated to incorporate changes required by the evolving legal environment. For instance, when the articles of association were drafted, the amount of the paid attendance fee, salary, premium, or share of the annual profit to be paid to the members of the board of directors was determined pursuant to Article 394 of the TCC. However, suppose that the amount payable under this provision in the articles of association is to be changed after one year. The methods used to handle this situation could be the burden of updating the code on the parties or their agents. However, the disadvantage is that parties can potentially unilaterally change the terms of the contract, which is one of the problems that smart contracts seek to correct. This issue can be avoided by leaving certain terms of the contract modifiable while restricting the modification of others. For example, the requirement of payment may be an immutable condition, whereas the amount of payment may be modifiable.⁴⁴⁶

In addition, as per Article 445 of TCC, any amendments to a company's articles of association made by the general assembly must be registered by the board of directors in the trade registry where the company's offices and branches are located. Any relevant announcements must also be made and published on the company's website. The amendment is not legally valid for third parties until it is registered, but it is still valid for internal relationships. Once registered, the amendment will become valid for all parties involved. For this reason, some regulations will be effective at different times in terms of internal and external relations. Another benefit of the smart contract is that this problem will be eliminated as the decision of the general assembly regarding the amendment of the articles of association and the registration and announcement will be made consecutively without any time difference.

4.9.1. Obtaining Shareholders' Approval

Amendments to the articles of association may be made with different quorums depending on the subject to be amended. There are cases where the approval of all shareholders is required, such as the relocation of the company's registered office

⁴⁴⁵ See *supra* Part 3.2.1.4.

⁴⁴⁶ Raskin, 'The Law and Legality of Smart Contracts', 327.

abroad, and there are cases where the approval of shareholders constituting at least 75 percent of the capital is required for the creation of privileged shares. Moreover, it is possible to include provisions consisting of more approval processes. For example, the articles of association may add a provision to stipulate that registered shares may be transferred only with the approval of the company.⁴⁴⁷

As long as these provisions are regulated in the articles of association and are not enforceable, they will be included in the chain as a side chain or an oracle whose knowledge is consulted. However, academic studies on remote voting are being conducted on how to realise this feature of provisions regulated by the smart contract that has automatic enforcement capability.⁴⁴⁸

For example, pursuant to Article 454 of the TCC, if the decision of the general assembly regarding the amendment of the articles of association is of a nature to violate the rights of the privileged shareholders, this decision cannot be implemented unless it is approved by a resolution to be taken by the privileged shareholders in a special meeting.⁴⁴⁹ When including this provision in the chain under the smart contract, assuming that an amendment will be made to an article of association provision, this amendment will need to be adapted to the if-then concept in accordance with Article 454 of the TCC, without prejudice to the explanations regarding the difficulty of the amendment to be made in the chain⁴⁵⁰ and how it will be made. After the general assembly completes the necessary procedures and takes the decision to amend the articles of association, two different paths will emerge that must be added to the chain for the smart contract to fulfil its execution function:

1. If the amendment to the articles of association violates the rights of the privilege shareholders, then send it to vote.
2. If the amendment to the articles of association does not affect the rights of the privileged shareholders and there is no other action to be taken, then send it to registration.

⁴⁴⁷ Article 492 para. 1, TCC.

⁴⁴⁸ Christoph Van der Elst, 'Shareholder Engagement and Shareholder Voting Modes: Two of a Different Kind', SSRN Scholarly Paper (Rochester, NY, 27 January 2019), <https://doi.org/10.2139/ssrn.3323848>.

⁴⁴⁹ Kendigelen, *Yeni Türk Ticaret Kanunu Değişiklikler Yenilikler ve İlk Tespitler*, 353–57.

⁴⁵⁰ See *supra* Part 4.8.

4.10. Limitations and Addressing Potential Challenges

4.10.1. Interpretation

There is no consensus as to the interpretation criteria according to which the provisions of the articles of association shall be interpreted.⁴⁵¹ However, challenges arise when smart contracts are implemented as legally binding contracts due to code interpretability, contractual errors, and translation of legal concepts.⁴⁵²

Smart contracts may not always include a complete list of all obligations, especially if the obligations are complex. This is because some terms may require human judgment rather than algorithmic determination. Additionally, some obligations may include vague notions of reasonableness or appropriateness that cannot be determined algorithmically. The code representing the obligations may not accurately reflect the agreement between the parties, and the contract itself may contain a mechanism for modifying the contract that is not algorithmically deterministic. While smart contracts are part of the enforcement mechanism, they do not always provide a comprehensive catalogue of all contractual obligations.⁴⁵³

For example, pursuant to Article 405 of the TCC, in the event of a difference of opinion between the company and the auditor on the interpretation and application of the provisions of the articles of association, the court shall render a final decision on this matter. The meaning of such provisions in the context of the smart contract is even more complex. First of all, since it is possible to make a smart contract off-chain and on-chain, it is possible to have a written version of the contract in natural language and to encode it into a smart contract. In this case, just like the interpretation difference mentioned in Article 405 of the TCC, a difference may arise between the declaration of the founders in the articles of association and the declaration reflected in the code. This is because the software developer interprets a provision written in natural language in an off-chain smart contract and encodes it in software language. This will cause the smart contract to draw an incorrect conclusion regarding the relevant provision. The same situation may also be possible in contract provisions written directly in code in an on-chain smart contract, and the declaration of the founders may be misrepresented. In addition, if the article of association is a side chain, the same

⁴⁵¹ See *supra* Part 2.5.

⁴⁵² Nicolas Six and Claudia Negri-Ribalta, 'A Blockchain-Based Pattern for Confidential and Pseudo-Anonymous Contract Enforcement', 2021, <https://doi.org/10.1109/TrustCom50675.2020.00268>.

⁴⁵³ Lim, Saw, and Sargeant, 'Smart Contracts'.

situation may be encountered. Furthermore, if the articles of association are an oracle, the same problems may arise in reflecting the relevant information on the chain. Therefore, smart contracts still face problems that have existed for many years in the traditional world. For example, if the codebase does not reflect what the parties understand from their agreement or if one party misrepresents the effect of the codebase, this can create problems.⁴⁵⁴

In the event that the provisions of the articles of association give rise to incorrect results arising from the difference of interpretation on the smart contract, it would be beneficial to establish a different resolution authority, just as in the provision of Article 405 of the TCC. In this context, it would be beneficial to stipulate an arbitration clause⁴⁵⁵ in the articles of association in order to prevent chaos arising from such differences of interpretation. Arbitration will be an effective decision-making authority for revealing the real will of the founders.

In another example, pursuant to Article 421 of the TCC, unless otherwise provided by law or the articles of association, resolutions amending the articles of association are subject to a certain ratio. In order for a transaction to become enforceable, it must be regulated in the articles of association. Therefore, a smart contract will not apply to a transaction that is not included in its code. The modifiability of the articles of association and its conditions must be included in the code of the articles of association itself so that this transaction can be realised afterwards. Therefore, it is very difficult to find the applicability of the rate and article determined in this article on the smart contract. As a result, the smart contract cannot fill in the concepts in contracts where the gaps in the contract need to be filled. Although the smart contract accesses external data not included in the blockchain by utilising oracles, there is no guarantee that the oracles are correct or that they will be interpreted correctly and reflected in the code and chain.⁴⁵⁶

4.10.2. Data Protections Issues

The individuals who are authorized to sign on behalf of the company must be clearly specified in the articles of association. Additionally, according to Article 354 para. 1-

⁴⁵⁴ Almatarnah, 'Blockchain Technology and Corporate Governance', 105–6; Lim, Saw, and Sargeant, 'Smart Contracts'.

⁴⁵⁵ See *supra* Part 2.7.5.

⁴⁵⁶ Aksoy Çağlayan, *Akıllı Sözleşmelerin Kuruluşu ve Geçerlilik Şartları*, 304.

h and g of the TCC, the names and surnames, business names, residences, and nationalities of the board members and persons authorized to represent the company should also be stated in the articles of association. It is important to note that if these matters are not clearly stated in the articles of association, it may result in the rejection of the registration request, as it will be considered a deficiency of establishment.⁴⁵⁷

These and similar provisions that should be included in the articles of association contain personal data⁴⁵⁸. Although it may be seen as positive in terms of the provisions of Turkish Personal Data Protection Law No. 6698 (PDPL),⁴⁵⁹ since the personal data contained in these provisions cannot be analysed due to the cryptographic form of the articles of association, if the articles of association are made with a smart contract, the main purpose of regulating these provisions will be lost. These provisions regulated in the articles of association aim to inform third parties about the company upon registration and to protect against unauthorised representation. In other words, there is publicity in the registry.

In this context, to comply with the provisions of PDPL No. 6688, the masking method is used for private data such as the identification numbers of the authorities and founders in the announcement texts following registration in the Turkish Trade Registry Gazette. Residential address information is not included explicitly and is limited to district and city names. In this regard, there is the decision of the Personal Data Protection Board dated April 22, 2020, and numbered 2020/307 of the Personal Data Protection Authority, in which the information kept in the trade registry is accepted as data and that these data should be connected, limited, and measured for the purpose for which they are processed, taking into account the principle of publicity in the registry.⁴⁶⁰

⁴⁵⁷ See *supra* Part 2.7.2.7.

⁴⁵⁸ Personal data is defined as ‘any information relating to an identified or identifiable natural person’ according to Article 3 para 1-d of the Turkish Personal Data Protection Law No. 6698.

⁴⁵⁹ For a detailed review on data law, see Mesut Serdar Çekin, Ahmet Esad Berktaş, and Muhammed Furkan Akıncı, *Veri Hukuku* (İstanbul: On İki Levha Yayıncılık, 2023).

⁴⁶⁰ ‘Kişisel Verileri Koruma Kurumu | KVKK | “Türkiye Ticaret Sicili Gazetesinde Açık Bir Şekilde İlan Edilmeyen Kişisel Verilerin, Talepleri Üzerine Kamu Kurum ve Kuruluşlarıyla Paylaşılması” Hususuna İlişkin Kişisel Verileri Koruma Kurulunun 22/04/2020 Tarihli ve 2020/307 Sayılı Karar Özeti’, Kişisel Verileri Koruma Kurumu, accessed 4 May 2024, <https://kvkk.gov.tr/Icerik/6895/2020-307>.

If both the execution of the article of association with a smart contract and the keeping of trade registries through a smart contract are evaluated in terms of data protection, the DLT technology on which the smart contract, which is a type of blockchain application, is based poses problems in accordance with the regulations on personal data.⁴⁶¹

Smart contracts are transactions between blockchain network participants using contract ware protocols.⁴⁶² A blockchain network is essentially a database that contains various transactions made by different participants. However, this technology can take on different forms. The most basic distinction is whether the blockchain network is public or private. In a public network, anyone can participate without any restrictions, while in a private network, participation is limited and determined by a person or organization with specific conditions. For instance, public services such as population and land registry can be implemented through a blockchain network.⁴⁶³ When the blockchain network is not open to the public, the natural or legal person who controls the participation in the network or manages the network will have the title of the data controller. For this reason, if the trade registry, civil registry office, land registry or other registry transactions are kept by the state through the blockchain network or a payment system is introduced by banks through the blockchain network, the state or banks may be qualified as data controllers.⁴⁶⁴ Although these authorities are characterised as data controllers, they do not have any influence on the blockchain. Since the data in blockchains is stored in multiple units on a distributed system, unlike centralised systems, it is not possible to prevent the access of other units by deleting data from a single unit. Because each unit can optionally keep its own copy of the data on the entire blockchain. The copies to be kept by the units are subject to the rules determined by the software underlying the blockchain, and since the selection of new data to be added is not the monopoly of a single person or institution, that is, a decentralised structure is in question, it will not be possible to prevent access to

⁴⁶¹ Michèle Finck, 'Blockchains and Data Protection in the European Union', *Max Planck Institute for Innovation & Competition Research Paper No. 18-01*, 30 November 2017, 22–23, <https://doi.org/10.2139/ssrn.3080322>.

⁴⁶² Mesut Serdar Çekin, 'Borçlar Hukuku ile Veri Koruma Hukuku Açısından Blockchain Teknolojisi ve Akıllı Sözleşmeler: Hukuk Düzenimizde Bir Paradigma Değişimine Gerek Var Mı?', *İstanbul Hukuk Mecmuası* 77, no. 1 (19 June 2019): 323, <https://dergipark.org.tr/tr/pub/ihm/issue/47190/594111>.

⁴⁶³ Çekin, 320.

⁴⁶⁴ Çekin, 334.

personal data through an order or instruction. Therefore, it will not be possible to identify a data controller⁴⁶⁵ for the data contained in the smart contract, which is one of the application forms of the blockchain.⁴⁶⁶ For this reason, there is currently no clarity in Turkish law regarding the determination of the data controller in public blockchain networks.⁴⁶⁷

Furthermore, although the data stored on the blockchain is not completely unchangeable, the fact that it is very difficult to delete, change, and destroy cannot comply with the PDPL No. 6688 regulations.⁴⁶⁸ Since the concealment of identity through the use of public keys cannot prevent the association of public keys with a real person by matching them with other data, anonymization⁴⁶⁹ cannot be achieved.⁴⁷⁰

It has been observed that real people can be identified by examining public keys and tracking their transactions.⁴⁷¹ Therefore, it is essential to understand that public keys are also considered personal data under the PDPL No. 6688 regulations.⁴⁷² Another method of data storage in a block is to encrypt the data instead of storing it in plain text. Encryption is reversible, and decryption is possible. In this case, personal data is still considered personal data because it can be accessed by decryption.⁴⁷³

As a conclusion, since the purpose of the distributed data system is to remain anonymous on the internet, it seems impossible to access information such as who

⁴⁶⁵ Data Controller is defined as ‘the natural or legal person who determines the purposes and means of processing personal data and is responsible for the establishment and management of the data filing system’ according to Article 3 para 1-ı of the Turkish Personal Data Protection Law No. 6698.

⁴⁶⁶ Osman Gazi Güçlütürk, ‘Blokzincir Üzerinde Depolanan Verilerin Kişisel Veri Niteliği ve Silinemezlik, Yok Edilemezlik Sorunu’, *Kişisel Verileri Koruma Dergisi* 1, no. 2 (27 December 2019): 37, <https://dergipark.org.tr/tr/pub/kvkd/issue/50609/638359>.

⁴⁶⁷ Çekin, ‘Borçlar Hukuku ile Veri Koruma Hukuku Açısından Blockchain Teknolojisi ve Akıllı Sözleşmeler’, 334.

⁴⁶⁸ Güçlütürk, ‘Blokzincir Üzerinde Depolanan Verilerin Kişisel Veri Niteliği ve Silinemezlik, Yok Edilemezlik Sorunu’, 27 December 2019, 37.

⁴⁶⁹ Anonymization is defined as “the process of rendering personal data impossible to link with an identified or identifiable natural person, even though matching them with other data.” Article 10 para. 1 of the By-Law on Erasure, Destruction, or Anonymization of Personal Data published in the Official Gazette dated October 28, 2017 and numbered 30224.

⁴⁷⁰ Çekin, ‘Borçlar Hukuku ile Veri Koruma Hukuku Açısından Blockchain Teknolojisi ve Akıllı Sözleşmeler’, 332.

⁴⁷¹ Finck, ‘Blockchains and Data Protection in the European Union’, 12–15.

⁴⁷² Osman Gazi Güçlütürk, ‘Blokzincir Üzerinde Depolanan Verilerin Kişisel Veri Niteliği ve Silinemezlik, Yok Edilemezlik Sorunu’, *Kişisel Verileri Koruma Dergisi* 1, no. 2 (27 December 2019): 35, <https://dergipark.org.tr/tr/pub/kvkd/issue/50609/638359>.

⁴⁷³ Finck, ‘Blockchains and Data Protection in the European Union’, 10.

processes the data and to whom it will be transferred in the blockchain network. In addition, the future participants in the network are also uncertain, and it is possible that the participants may be subject to different legal orders. Moreover, in light of all these uncertainties, it is argued that explicit consent on a specific subject based on information will not be possible in the blockchain network or even if explicit consent is revoked, it is impossible to delete the personal data available on the entire network.⁴⁷⁴

4.10.3. Technical Challenges

Although preparing the articles of association through smart contracts provides many advantages, it may also cause many technical problems due to the structure of the smart contract.⁴⁷⁵ No consensus has yet been reached on the answers to below questions;

- How will vague concepts such as ‘outlined and defined basic points’⁴⁷⁶ that do not imply automatic enforcement be measured and integrated into the smart contract?

Smart contracts have limitations in terms of the contractual obligations that can be fully integrated with them. While smart contracts can handle imperative instructions and positive duties, they do not have explicit directives regarding prohibitions or institutional power. This becomes problematic when legal contracts refer to obligations and rights that are outside the blockchain infrastructure, as smart contracts cannot administer them.⁴⁷⁷

- Which party should be liable for losses caused by errors in the code?

In the case of the self-performance of a smart contract, there is no need for a court or an authorised authority to order the fulfilment of the performance. This is because, with self-execution, third-party enforcement institutions are eliminated. On the other hand, while it is possible to resort to legal remedies regarding performance in various cases in classical contract law, this will not be possible in smart contract law. Although self-performance seems to be an advantage, it may also constitute a disadvantage, because any problem in traditional performance in the classical

⁴⁷⁴ Çekin, ‘Borçlar Hukuku ile Veri Koruma Hukuku Açısından Blockchain Teknolojisi ve Akıllı Sözleşmeler’, 335.

⁴⁷⁵ Almatarneh, ‘Blockchain Technology and Corporate Governance’, 102.

⁴⁷⁶ Article 339 para. 1-b, TCC.

⁴⁷⁷ Filippi, Wray, and Sileno, ‘Smart Contracts’, 7.

contract means that the parties who can access legal protection in case of any problem in traditional performance, such as incorrect, inadequate, poor realisation, or failure to achieve the desired result as a result of incorrect coding,⁴⁷⁸ will not be able to access it in the smart contract. While it eliminates many human activities (and costs), its reliability still depends on the right human design and input.⁴⁷⁹

Since the smart contract is written in code, which makes it different from traditional written agreements, the code cannot be made public and human-readable in established languages. In this case, the articles of association must either be organised off-chain and have a readable version in an established language, or it must be transformed so that other institutions with which it comes into contact can read this coding language. For example, companies that need to comply with Capital Market Legislation No. 6362 or notify the municipality and other institutions within the scope of their activity can use the automatic performance of the articles of association to make these notifications and obtain approvals in return if a coding language integrated with these institutions is available.

- How to solve the problem of inflexibility of smart legal contracts?

In a volatile world where companies' fields of activity, capital, shares, and the internal dynamics of the companies themselves are constantly changing, the static structure of a smart contract may perhaps not be preferable for many companies, as it may not be able to adapt to certain situations requiring amendments to the articles of association due to the difficulty, characterised as impossible, of amending them. Thus, the lack of flexibility⁴⁸⁰ due to this structure of the smart contract may turn out to be a disadvantage.⁴⁸¹

- Who should bear the risks in the blockchain network?

There are obvious problems that may arise if a smart contract fails to fulfil its promise or does not behave in the way the parties expect. These include, for example, the

⁴⁷⁸ Almatarnah, 'Blockchain Technology and Corporate Governance', 102; 'The Lawyer's Practical Guide to: Smart Contracts - Thread', Thread, accessed 4 April 2024, <https://www.threadsoftware.com/the-lawyers-practical-guide-to-smart-contracts/>.

⁴⁷⁹ Karamanlioğlu, 'Concept of Smart Contracts – A Legal Perspective', 38.

⁴⁸⁰ Filippi, Wray, and Sileno, 'Smart Contracts', 5.

⁴⁸¹ Almatarnah, 'Blockchain Technology and Corporate Governance', 103; 'The Lawyer's Practical Guide to: Smart Contracts - Thread'.

identification of technically pseudonymous parties, the determination of jurisdiction, and options for out-of-court dispute resolution. These issues vary in magnitude and volume depending on the types of blockchain networks and environments underlying the smart contract. The issues that arise when users are known only by pseudonyms and jurisdiction is contested are more relevant and pervasive in the public chain environment.⁴⁸²

The blockchain technology poses challenges to maintaining shareholder anonymity, potentially disrupting the equilibrium of corporate governance among managers, institutional investors, small shareholders, and other stakeholders involved in corporate governance.⁴⁸³ Nevertheless, to ensure the smooth operation of the blockchain, it needs to be of considerable size. This may lead to increased transaction costs and slower processing times, which can be inefficient for business transactions.⁴⁸⁴

In conclusions, smart contracts and associated technologies necessitate that parties consider a broader range of factors prior to entering into an agreement than they would for a traditional contract. This includes taking into account the use and regulation of oracles. It is prudent for parties to allocate risk and accommodate the potential for a malfunctioning oracle or inaccurate data inputs in their smart legal contract.⁴⁸⁵

5. CONCLUSION

5.1. Significance and Contribution

The articles of association represent the constitutional document of a company, regulating all internal and external relations of the company. The digitalisation of the articles of association is of significant importance as a preliminary step towards the digitalisation of companies in recent years. Smart contracts, powered by blockchain technology, automate and enforce contractual agreements. They have the potential to revolutionize corporate governance and operations. By embedding smart contract clauses into articles of association, companies can enhance transparency, efficiency,

⁴⁸² Ryan, 'Smart Contract Relations in E-Commerce: Legal Implications of Exchanges Conducted on the Blockchain', 20.

⁴⁸³ Véronique Magnier and Patrick Barban, 'The Potential Impact of Blockchains on Corporate Governance: A Survey on Shareholders' Rights in the Digital Era', SSRN Scholarly Paper (Rochester, NY, 28 December 2018), 28–30, <https://doi.org/10.2139/ssrn.3307521>.

⁴⁸⁴ Brennan, 'Corporate Governance Implications of Disruptive Technology', 4.

⁴⁸⁵ The Law Commission, 'Smart Legal Contracts Advice to Government', 22.

and compliance while reducing administrative overhead. In this context, the first part of the study focuses on the purpose, legal nature, content and the issue that may be regulated by the articles of association on the basis of Turkish legislation.

Preparation of articles of association is a crucial step in the company's establishment process, and it must be notarized and registered in the trade registry for the company to become a legal personality. They are regulated by Articles 339 and 340 of the TCC and can be amended with a qualified majority, ensuring stability and trust in company transactions. The articles of association are crucial in establishing a company. The articles of association are based on the intentions of the company's founders and have a contractual nature until they are officially registered. They also serve as an organizational agreement once the company is registered, becoming a binding document for the company and its shareholders. Before registration, the TCO may be applied in the case of formation, nullity, defective declarations of intention, and interpretations.

In the second part, blockchain and smart contracts are analysed. Explanations on the legal nature, functions, and usage areas of smart contracts are given. Smart contracts are gaining greater significance in the legal field, with the industry poised for substantial expansion. Projections indicate that the global market for smart contracts could soar to USD\$345.4 million by 2026. Nevertheless, comprehending smart contracts can present challenges. These contracts are implemented on blockchains and frequently necessitate a reliable third-party technical specialist to effectively convert the agreement particulars into code.

The evolution of smart contracts has been shaped by the introduction of Decentralized Ledger Technology ('DLT'). Smart contracts are typically established and maintained online with the support of blockchain, a type of DLT. Blockchain is a decentralized public ledger composed of networks of cooperating computer nodes. Access to this ledger is facilitated through digital identities known as 'keys'. Parties can use these keys to input and update records into the ledger, creating a new 'block' that is then added to the 'chain'. The cryptography used aims to prevent any unauthorized alterations that could compromise the entire register. To build the register, users known as 'miners' work to develop consensus algorithms that store and validate the blocks

and nodes. As part of this process, proof of work and proof of stake are created, and miners also receive a complete copy of the blockchain.

Smart contracts are constructed using blockchain technology, transforming agreed-upon contractual terms, similar to those found in traditional contracts, into computer programs capable of execution. Operating on an 'if/then' basis, smart contracts automatically enforce Clause B on the distributed ledger technology (DLT) if Event A occurs. Although smart contracts differ in complexity, they are typically described as contracts expressed in code and carried out by computers.

Incorporating smart contracts into corporate governance has the potential to streamline and automate various business processes, resulting in more efficient, transparent, and secure corporate practices. Smart contracts, which make use of blockchain technology, have the ability to execute and enforce agreement terms without the need for human intervention, ultimately reducing the reliance on intermediaries.

This integration would involve encoding different aspects of corporate governance into smart contracts, such as shareholder voting, compliance, and enforcement of fiduciary duties, stock registration, and auditing. It could also enable the automatic execution of certain operations, such as dividend payments and the implementation of regulatory requirements.

Although the legal status of smart contracts is a matter of debate, it is accepted that the provisions of the TCO can be applied to smart contracts if they meet the necessary conditions. In the world, although the legal recognition of smart contracts varies by region, many countries, such as Australia, accept smart contracts as legally binding if they comply with the principles of traditional contract law. As stated in the first section, the articles of association shall be subject to the provisions of the TCO before registration. In this context, although it seems possible to integrate the articles of association into the smart contract, there are some technical problems. Not all provisions regulated in the article of association are enforceable. Since it is not possible to code each of them with the if-then concept, it does not seem possible to integrate the entire contract into the smart contract at the first stage. In addition, since the integration of the entire article of association into the smart contract will require integration with other institutions and organisations, it will not be possible to complete these processes at once. Since it is a new technology and the legal and technical

problems arising from its use will be understood in practice, we believe that a gradual transition would be more appropriate. In this context, it may be considered an option to arrange the articles of association as off-chain and to perform the performance when the conditions are fulfilled by coding only in terms of the provisions that are capable of enforcement. In this way, it will be possible to ensure a gradual and controlled transition. With the digitalization of other connected official institutions, organisations, and company bodies, it will be possible to regulate the articles of association fully on-chain. It will also be possible to organise the articles of association as a side chain, and sidechains have the potential to greatly enhance the scope, scale, and functionality of blockchain technology. By enabling previously isolated blockchain networks to integrate into a unified ecosystem, sidechains pave the way for cross-chain interoperability. This seamless navigation across diverse projects creates a universal blockchain network comprising numerous independent blockchains, each with its own unique consensus mechanism, governance rules, and vision.

On the other hand, the articles of association serve to set forth the fundamental guidelines for the company's functioning and to provide insight to external parties about the company and its activities. It may be advantageous to incorporate the enforceable clauses of the articles of association into the parameters of the smart contract while utilizing the remaining informative clauses as a consultative oracle. This approach will facilitate the seamless integration of amendments to the articles of association and legal mandates into the smart contract through Oracle.

In addition to the points mentioned above, while smart contracts may enhance speed and cost efficiency, their incorporation into corporate governance should be approached with caution. This emerging technology still requires careful legal and regulatory considerations to ensure effective operation within existing frameworks of corporate law and governance structures. To accomplish this, collaboration between software developers and is necessary. Enforceability and security concerns surround the use of smart contracts, and lawyers should keep these concerns in mind when utilising smart contracts. While smart contracts can simplify and reduce costs when everyone agrees and the terms of the contract work as planned, their strength becomes a weakness when issues arise. Therefore, even with the adoption of smart contracts, lawyers may still find it necessary to negotiate additional agreements and workarounds

for situations where smart contracts do not suffice for the parties involved. An arbitration clause in the articles of association may provide for these negotiations to be resolved before an authority.

5.2. Future of Research

The future of research on preparing articles of association through smart contracts is likely to focus on several key areas:

Legal and Regulatory Frameworks: Research will explore the evolving legal and regulatory frameworks governing smart contracts in the context of articles of association. This includes examining how existing laws accommodate or need adaptation for smart contract-based governance structures.

Efficiency and Automation: Studies will assess the efficiency gains and automation benefits of using smart contracts for preparing articles of association. This involves comparing traditional methods with smart contract-based approaches in terms of time, cost, accuracy, and ease of updates.

Security and Trust: Future research will delve into enhancing the security and trust aspects of smart contracts used in preparing articles of association. This includes exploring cryptographic techniques, auditing mechanisms, and dispute resolution protocols to ensure trustworthiness and reduce vulnerabilities.

Interoperability and Standardization: There will be efforts to develop interoperable smart contract standards for articles of association across different jurisdictions and industries. This includes addressing issues related to data privacy, cross-border transactions, and compatibility with existing legal frameworks.

Governance and Decision-making: Research will focus on the governance models enabled by smart contracts in the context of articles of association. This involves studying mechanisms for voting, decision-making processes, shareholder rights enforcement, and transparency in smart contract-based governance structures.

User Experience and Adoption: Studies will explore the user experience aspects of using smart contracts for articles of association, including user interfaces, accessibility, and education for stakeholders. Research will also investigate factors influencing the adoption and acceptance of smart contract-based governance solutions.

Overall, the future of research in this area will aim to address legal, technical, and socio-economic challenges while maximizing the benefits of smart contracts for preparing articles of association in a digital economy.



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