

Research Article

Amendments to Cloud Computing Contracts

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Submitted: 19 August 2025 | Revised: 17 October 2025 | Accepted: 01 December 2025 | Published: 30 December 2025

Abstract: The globalization era has brought about drastic changes to the world, with people's daily lives increasingly centred around their dependency on technology. Cloud computing has gained substantial interest from scholars, owing to the emergence of legal challenges facing the use of various electronic contracts. Cloud computing contracts, arisen recently, are among the most significant novel electronic contracts used globally nowadays for providing substantial services, and because of their novelty, Jordanian lawmakers, like many others, have not yet regulated them with special provisions even after the Electronic Transactions Law was issued. Cloud computing contract primarily creates reciprocal obligations for both parties to the contract necessitating the establishment of a legal framework governing this contractual relationship, using the relevant general rules in Jordanian legislation and comparative legislation. The implementation phase of a cloud computing contract is among the most serious phases since it involves the implementation of the rights and obligations agreed upon by the parties or one of them and its performance impacts the contract's legal effect. Commonly, the implementation phase is the riskiest phase, whether in traditional contracts or cloud computing contracts. However, in the former, the risk has been controlled to some extent by resorting to the general rules of civil laws, and in the latter, we are dealing with a contract that must be performed once the contractual conditions are met, as the cloud program typically undertakes its execution. Here we raise the following questions: To what extent can the cloud computing program address contractual obligation risks and adapt to them in a way that does not inflict harm on either of the contracting parties or disrupt contractual balance? In this research, we will discuss the legal provisions regulating the amendment of contracts, the extent of their applicability to cloud computing contracts and the extent of their suitability for them to try to answer the questions raised.

Keywords: Contracts, Cloud Computing.

1. Introduction

The world is experiencing a massive and rapid digital revolution that is producing helpful applications, such as cloud computing, which has become increasingly important, particularly in the economic sector, due to its technological benefits, speedy data access, and ability to create international contracts. This has made it a reality, but regrettably, because of its independence and ability to transcend spatial bounds, legislation has not been able to keep up with its speed or regulate it.

Cloud computing contracts are typically concluded via smart digital platforms supported by special features enabling the conclusion of these contractual models. The origin of the general rules in civil law prohibits any amendment or alteration to the contract once it has become legally binding, except with the consent of the contracting parties or provided by the law. Cloud computing contracts are typically regulated by three principal legal means. The first means are national laws and comparative laws, the second is international agreements, which are still in the process of formation, and the third is the contract itself, which provides a mechanism for addressing anticipated and unforeseen situations that may arise during the contract's performance, incorporating into the terms and conditions of the contract. Then the conditions and contract can be processed by a computing cloud program. In this paper, we are only going to address the laws governing the amendment of contractual obligations based on general principles aiming to demonstrate how applicable these laws are to cloud computing contracts, which are not specifically regulated by national or international law [1].

This research aims to shed light on the most prominent problems associated with amending the contractual obligations of cloud computing contracts. It is worth noting that the novelty of cloud computing contracts has made it difficult to define a specific cloud computing contract or the nature of its amendments. Generally, the primary goal of conducting a cloud computing contract is to ensure its continuity and enforceability, however, granting its content, or part of it, the ability to influence as much as possible can lead to achieving the agreed-upon goal.

No doubt amending a cloud computing contract relates to the

execution of contractual obligations, which means that it applies to an existing and valid contract and is the result of an imbalance that necessitates the amendment. Assuming that the amendment be partial since it arises during the performance of the contract. The amendment of a cloud computing contract cannot be unrestricted; rather, it must be constrained by conditions, such as ensuring that the amendment is feasible, not impossible and that its purpose is to achieve a legitimate interest. Nevertheless, the problem that arises in this context lies in whether this is applicable considering the technical and technological aspects of such contracts. We argue, if it is possible to apply the traditional rules in Jordanian civil law regulating the provisions of amending contractual obligations to cloud computing contracts. To answer this question, we reviewed the national and comparative legal texts to examine if they provide the necessary legal protection to cloud computing contracts in case of amendments. It is noteworthy that prior studies on cloud computing primarily addressed technical and technological elements, with a dearth of specialised legal studies that concentrated on the legal implications of electronic contracts in general.

In this research, we used the analytical and comparative approach of national laws. This research was divided into an introductory section that dealt with the nature of cloud computing. In the first section, we dealt with the personal scope of cloud computing contracts, and in the second section, the objective scope of amending cloud computing contracts. We concluded our research by coming up with a set of results and recommendations, considering the special nature of such contracts, and identifying the controls that must be considered when considering amending cloud computing contracts.

1.1 The Nature of Cloud Computing

The swift advancement of network technology has prompted numerous companies to release their applications online for usage, a practice known as cloud computing. Better advantages have been provided to consumers of this technology, including cost savings and increased service accessibility. At its simplest, cloud computing is a method

of providing computing resources as a service delivered via a network, which is typically the Internet. It is flexibly expandable according to the user's demands and needs, such as networks, servers, storage, applications, and services. These resources can be provided and deployed quickly with minimal effort and interaction with the service provider. These contracts can range from simple standardized click-wrap agreements to framework and multilayered sets of terms and conditions [1].

The term "cloud computing" has been one of the most ambiguous and widespread terms. Is a method of delivering computing services—such as servers, storage, databases, networking, software, analytics, and intelligence—over the Internet. Cloud computing is a highly specialized technical concept, and its legal definition can only be reached through its related technical and operational characteristics. We will discuss cloud computing models and types, leading to the definition of cloud computing contracts, and then the definition of amendments to cloud computing contracts in light of the concept of cloud computing contracts as follows:

1.2 Cloud computing service models:

The cloud computing service includes three basic models namely [2]: Infrastructure as a service (IaaS): it provides users with processing systems, storage spaces, networks connecting servers and other software sources and control systems.

Platform as a service (PaaS): This service enables the user to access and use the infrastructure through language programs, library services and other services that represent a type of tools necessary to benefit from the infrastructure.

Software as a service (SaaS): It is provided by the service provider to operate his infrastructure.

1.3 Types of cloud computing:

There are many forms of cloud computing. We will mention the three most important forms below [2]:

The Public cloud: where resources are provided based on accurate self-service via the Internet for free and everyone can access and use them, they can be paid in what is called the auxiliary cloud and are available upon payment of the required fees.

Community Cloud: where the cloud infrastructure is shared between several individuals or organizations such as government agencies with common interests or needs and the cloud is managed by the institutions providing the service or by an external party located at the company's headquarters or outside it.

Private Cloud: where its computing resources are used and managed by a private institution, and the private cloud can only be accessed by specific customers recognized by the institution, company or service provider while maintaining privacy and preventing violations.

Hybrid Cloud: It is a combination of public, community and private clouds, where specific individuals and entities can communicate while benefiting from the possibility of multi-cloud deployment, some resources are managed internally while other resources are outsourced (a group of applications such as (google: Gmail, google app, google drive) and office 365: MS office one the web and one drive).

1.4 Definition of cloud computing:

The definitions of cloud computing have varied due to the diversity of its applications. It was defined as the on-demand availability of computer system resources, especially data storage (cloud storage) and computing power, without direct active management by the user [3]. It also includes software processing capabilities and scheduling tasks, and when connected to the network, the user can control these resources through a simple programming interface that simplifies and ignores many details and internal operations [1].

The National Institute of Standards and Technology (NIST) has defined cloud computing as "a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction" [4]. According to Amazon Web Services (AWS), cloud computing "is the on-demand delivery of IT resources over the Internet with pay-as-you-go pricing. Instead of buying, owning, and maintaining physical data centres and servers, you can access technology services, such as computing power, storage, and databases, on an as-needed basis from a cloud provider like Amazon Web Services (AWS)".

Software applications can be rented from third parties when needed instead of purchasing these applications, the user no longer needs to search for large funding to purchase equipment for the infrastructure, cloud computing can be defined as providing information technology resources such as computing capabilities, storage, databases, and access to the

Internet of Things and machine learning on demand via a network usually the Internet with cost pricing based on use, as it has become a wide range of services and applications that depend on remote servers and the Internet, including service programs (SaaS, PaaS), through the term cloud to indicate the technical signal it makes and is a metaphor for the invisible network of computers that form the Internet, similar to the cloud that transports rain from one place to another by lifting, storing, then publishing, so that it allows an operating system and multiple applications to work on the same devices.

Cloud computing contract was defined by the European Directive, as any contract related to goods and services between a supplier and a consumer through the regulatory framework for distance vending or providing services organized by the supplier, which is done using one or more electronic means of communication until the contract is completed [5]. However, we can define a cloud computing contract as a legal act that is done over an open network for remote communication using electronic processing and creates contractual obligations to use the computer resources and systems owned by the service provider in return for a material payment to which the beneficiary is committed.

1.5 Definition of amending the cloud computing contract:

Given the novelty of the cloud computing contracts, we will try to define what is meant by amending the cloud computing contract considering its uses and purpose.

1.5.1 Cloud Computing Contract in Language:

Linguistically, the amendment of a contract is described as an assessment of contractual obligations due to changes that occurred in contractual circumstances. Amendment in Latin "modification" comes from "modus" method, "fiacre" frequency, and "facere" making, doing, (concerning a legal act) partial change: For example, the amendment of the contract reached with the parties, and the partial modification is a change in the financial and economic status, and a change in the situations [6].

1.5.2 Cloud Computing Contract in Law

The amendment of the cloud computing contract is typically an intermediate stage between the contract formation stage and the conclusion stage. The main aim of amending the cloud computing contract is primarily to protect the contract, as the original goal of the contract is its execution and continuity, not its termination. However, this procedure is carried out directly through legislation or indirectly by resorting to the judge or through an agreement between the contracting parties to make the required contractual amendment. In the case of amendment, the contract is created valid, and its implementation is binding. The purpose of using an amendment is to assist the debtor in fulfilling his obligation to uphold the contract's terms; the amendment is typically used as a means of insisting on the implementation of the terms of the contract.

Cloud computing contracts provide computing resources as a supplementary service provided over a network, usually the Internet, and it is flexibly expandable according to the user's requirements and needs. Accordingly, the only ways to define the cloud contract modification are through its purpose, forms, and applications. Based on this, we contend that the amendment of the cloud contract is focused on the implementation of the contractual obligations of an existing and valid contract and that the existence of a defect is the main reason for the amendment of the cloud contract. Accordingly, the amendment must be partial to the contractual obligations if it occurred during the implementation of the contract. Any definition of the amendment must consider the characteristics of the amendment, the types of amendment, the implementation period, and the purpose of this amendment.

In short, cloud computing contracts are technical contracts that are predominantly technical in nature and are carried out over cyberspace. The definition must consider the legal and technical aspects. We propose a comprehensive definition of the concept of amendment of a cloud computing contract: It is the legal act by which the contractual obligations of a cloud computing contract that is carried out over an open remote network using electronic processing are amended, by the consent of the contracting parties, or by the legislator's stipulation, or by granting the judge the power to do so, during the period of implementation of these obligations, by amending one or more conditions of the contract that binds them, to address the imbalance in contractual obligations to maintain the continuity of the use of computer resources and systems owned by the service provider in return for a material obligation that the beneficiary undertakes to maintain the contractual relationship.

2. Scope of Modification of Contractual Obligations in Cloud Computing Contracts

Each cloud computing contract principally has two components, the first is the signatories. They are typically the two parties to the contract who agree on the terms of the contract, which is called the personal scope. The second component is the agreement (the contract and its content), which includes the rules, the conditions and the obligations that parties to the contract accepted, and it is referred to as the objective scope of the contract.

2.1 Scope of Modification of Contractual Obligations in Cloud Computing Contracts

As cited in Notes on the Main Issues of Cloud Computing Contracts issued by the Secretariat of the [7], the correct identification of contracting parties may have a direct impact on the formation and enforceability of the contract. Nevertheless, personal consideration in the contract does not constitute an essential element of the contract, but in some contracts, it may be essential. Legally, the contract shall not be concluded if it is based on personal consideration. A mistake in the identity of the contracting party when concluding the contract is considered a fundamental error that prejudices against the intent and renders the concluded contract non-binding and rescindable. Article 152 of the Jordanian Civil Code stipulates that "If there is a mistake as to the identity of the contract or as to one of the conditions upon which it is made or as to the subject matter of the contract, the contract shall be void." However, we argue that if the personal scope of the contract is not essential, then the modification of the contracting party may be considered contractually effective.

Identifying the controller of data stored on the cloud and distinguishing him from the data processor could be sometimes challenging, as the data stored on the servers is generally transferred and shared between different data storage centres. The user's data in the cloud is stored on the technical infrastructure of the service provider and is available through processing programs. Considering this, who is the controller and the person in charge of the data who is meant to be held legally accountable for any information on the cloud that violates the law or infringes upon the rights of third parties or other parties?

2.1.1 Cloud computing controller (user)

A cloud computing user can engage in one of two types of cloud computing activities: either they are negative, in which case their negative role is restricted to using the cloud's content, or they can play a positive role by producing and supplying the information available through the cloud. From a technical standpoint, this is because the user downloads content to the cloud, which is then stored on the service provider's infrastructure. The user who uploaded this content is the owner of it and has the authority to edit or remove it. The European Data Protection Directive defines the controller as the natural or legal person, public authority, agency or any other body which alone or jointly with others determines the purposes and means of the processing of personal data.

To be a user, an individual must acknowledge joining and reviewing the usage policy and declare his agreement to all of its provisions after registering his mandatory personal data specified by the cloud service provider. As stated by French Law 575 of June 21, 2004, for confidence in the digital economy, the cloud service provider is typically responsible for storing this data to allow identifying the person who created the content to be reviewed when required by judicial authorities, noting that including incorrect data grants the cloud service provider the right to remove the account of the user who provides incorrect data or includes illegal content [8; 9]. However, the difficulty lies in applying this to all cloud computing applications, as the user is the one who controls the provision of data to the cloud, as in the website Alibaba, and the processor is considered a provider of soft support services - Saas - and the secondary processor is considered a provider of infrastructure services - IaaS - in the cloud. The data processor may not be able to view in advance the personal data published on the infrastructure, so how can he be held liable for the uploaded personal data? This requires distinguishing between the user of cloud computing as an author of the content or a publisher of the content, we will discuss this issue below.

2.1.2 Cloud computing user as an author:

The Egyptian lawmaker defined the user in Article 1 of the Law on Combating Information Technology Crimes No. 175 of 2018, as any natural or legal person who uses information technology services or benefits from them in any way. Where some jurisprudence went on to define the user as the person who uploads the device or system with the information he has

composed or collected on a specific subject and has full control over the content he uploads to the cloud, so he has a major role in bearing responsibility for it as he has the authority to monitor the legitimacy of the content and control it [10].

2.1.3 The user of cloud computing as a publisher:

The content provider (user) enjoys great freedom in publishing content on the cloud. Jurisprudence has defined publishing as the process of making mental and cognitive content available on the Internet [8], and French law defines it as publishing that uses technologies and services that require information media to be combined with communication media [11]. The report issued by the French National Association "Publishers" in 2004, has defined it as the persons who formulate, edit, publish, republish or place information on cloud computing sites [12]. He is the one with actual authority over the information content and substance and is responsible for providing legitimate and real information content [13], so he bears responsibility for unreal and illegitimate content and substance.

2.2 Provider (Data Processor) of Cloud Computing Service

There are no clear and concise legal provisions pertaining to the service provider (data processor) in cloud computing under Jordanian legislation. Despite the significance of this matter, the legislation did not define the service provider or outline the obligations placed upon him. We urge Jordanian legislators to consider intervening with a legal text that defines what is meant by the service provider and addresses any issues regarding the service provider's responsibility under the general guidelines found in the Civil Code, as Jordanian legislation was unable to address this in a comprehensive legal manner. It is worth noting that the Jordanian legislator has established the criminal responsibility of the service provider, as stated in Article 75-B of the Jordanian Telecommunications Law No. 13 of 1995, considering it a telecommunications service.

A service provider is typically the one who stores, processes, evaluates and manages the contents on its original cloud infrastructure, by technically processing personal data under the user's instructions. To understand the role assigned to the data processor, the cloud service provider, it is necessary to distinguish between the technical role he performs. This role has varied with considering the service provider a hosting contractor and a publisher, who entails a set of legal obligations as follows:

2.2.1 The criterion of the role assigned to the service provider as a publisher (a limited liability hosting contractor):

Article 6-1/2 of the French Digital Economy Trust Act No. 2004-575 dated 6/21/2004, amended by Law 444-2016 issued on April 13, 2016, defines service providers as: "Natural or legal persons who provide, even free of charge, storage of signals, writings, images, sounds, or messages of any kind, supplied by the users of these services for public access through online communication services."

French court rulings and jurisprudence have tended to describe cloud computing service providers as hosting contractors (data hosts) as long as they do not contribute to selecting the content and substance via the cloud they manage. As long as their role is limited to storing blogs and discussions and providing a place to retrieve them without interfering in their selection, their liability, in this case, is not established unless they are aware of the illegal content available via the site, i.e. according to conditional liability [14].

French jurisprudence also tends to attribute the status of a data host and apply the rules specific to the data host, without imposing any obligation on him due to the content and substance contained in the cloud [15]. The Court of First Instance in Paris gave the Facebook platform the status of a technical service provider on the Internet as a data host, and the Court of Appeal in Paris considered YouTube a data host and gave this description to all social media [16].

The Paris Court, in its ruling issued on July 13, 2007, held that the site does not have intellectual control over the content or information and therefore is not considered a publisher. The court considered that carrying out technical operations such as preparing the presentation framework and providing the means to classify the content and substance is a necessary part of the host's activity. In fact, it is considered that operating the website commercially through advertising spaces is nothing more than a technical intermediary (host).

Furthermore, the French Court of Cassation ruled in its ruling issued on February 2, 2011, that advertising fees are irrelevant unless they involve control over information, and therefore the service provider should not be deprived of secure hosting as long as it was not the source of publishing the content and did not choose the content or influence it [16; 17].

2.2.2 The criterion of the economic role (considering it a publisher):

This trend considered the cloud computing service provider an electronic publisher responsible for the content and illegal content or renewing the content whenever he intervenes in it intending to make a profit [18], as the new generation of Internet operators has become more involved in producing and managing the content of others and providing services that go beyond mere hosting [19]

The French courts have refused to apply the provisions of hosting to content sites because its activity is not limited to hosting the content of others, but rather includes other tasks that are not explicitly covered by any special exemption from liability because it has gained a benefit from the advertisement and videos published on the website [19]. This trend is supported by the Paris Court of First Instance on June 22, 2007, which confirmed that if it is proven that the defendant company is performing a technical role in hosting, it is not limited to that, but in fact, it creates a design for the site using the frameworks that it makes available to the beneficiaries of the hosting and broadcasts advertisements on the occasion of each browsing process from which it earns a profit, and it is in the position of the publisher and must be subject to liability, which makes it responsible for what is contained on the site [19].

We argue that to bestow the status of the publisher on the cloud computing service provider, he must have a role in defining the online content and enabling the public to access it. The hosting contractor is typically any natural or legal person who enables the public, even free of charge, the service of storing images and messages of any nature via the Internet, which are provided by the beneficiary of these services. If his role is limited to storing the cloud content provided by the user on the website, he is considered an intermediary between Internet users and the online content, not a publisher. The scope of authority over the online information content determines the extent of the responsibility of each hosting contractor, who enjoys a special system of responsibility, which is limited liability, where he is not liable for the illegality of the online content except in two cases: knowledge of the illegal content and failure to intervene immediately upon knowledge of its illegal content and removing it or prevent access to it. As for the information content provider, he is the first to be held responsible for the illegality of the content published on the cloud, and therefore the scope of his responsibility is based on the general rules of liability.

2.3 Subject Matter Scope of Cloud Computing Contract Modification

Because of the broad range of cloud computing services available, the subjects covered by cloud computing contracts differ significantly in terms of complexity and type. During a single contract, its subject matter may change certain cloud computing services may be added or cancelled. The subject matter of the contract may include the provision of basic services, sub-services, and optional services. The description of the subject matter of the contract usually includes a description of the type of cloud computing services (Software as a Service (SaaS), Platform as a Service (PaaS), Utility as a Service (IaaS), or a combination thereof), their deployment model (public, community, individual, or hybrid), their technical, qualitative, and performance characteristics, and the technical standards applicable to them [7]. However, addressing the subject matter of amending these contracts requires identifying the characteristics and the conditions of amendments as follows:

2.4 Characteristics and conditions of modifying cloud computing contracts

The primary purpose of amending the cloud computing contract is typically to maintain the contractual relationship and protect the terms of the contract as much as possible by permitting partial modification to the contract. The preceding discussion reveals that amending the cloud contract is tightly connected to the implementation of contractual obligations. This suggests that it applies to an existing and valid contract and typically arises from a defect that prompts the amendment of the contract. Furthermore, the issue pertains to the duration of the implementation of contractual obligations, which must remain partial if it occurs during the execution of the contract. The objective is to maintain the validity of the contract and the obligations arising from it. The contract cannot be subject to unrestricted amendment; rather, it must be constrained by conditions for modification that align with its purpose. These conditions should ensure that any amendments are feasible and that they aim to achieve a legitimate interest. Moreover, the technical aspects of the contract must also be considered, as outlined below.

2.4.1 Characteristics of modifying cloud computing contracts:

Amendment to a cloud contract is characteristically governed by specific parameters that ensure fairness and legitimacy and protect the terms of the contract from arbitrary modification since unrestricted modification to the contract introduces entirely new obligations constituting a complete replacement of the original contract. The characteristics of modifying a cloud computing contract include the following:

2.4.2 Existence of a valid contract

The cloud contract is typically formed based on three basic requirements, namely, mutual consent, specified subject matter, and cause. The absence of any of these requirements rendered the contract void. However, to produce its effect, the contract must be valid and free from defects of consent. Amendment to the cloud contract is restricted to the implementation stage only, rather than the formation stage, to protect its validity. Nonetheless, a crucial concern emerges: Can all contracts be modified by default?

The French legislator, according to Article 1125 of the French Civil Code, has become ready to accommodate cloud computing contracts, as electronic means can be used to articulate the terms of the contract or information about funds and services [20], which correspond to Articles 93 and 102 of the Jordanian Civil Code. In contrast, American laws have taken a prominent role in addressing laws regulating cloud computing contracts, as Article 5 of Section 44-7061 of the Electronic Transactions Act (AETA) in Arizona No. 2417 of 2017 explicitly regulates these contracts and passes the legal protection of contracting models, since they were completed electronically, these contracts are legally binding and enforceable and cannot be cancelled. Likewise, the Nevada Electronic Transactions Act No. 398 of 2017 recognises and legitimates the platforms that are used to form these kinds of contracts.

The cloud computing contract is regarded as a time-based contract, where the emphasis lies on continuous or periodic performances of obligations. The importance of the amendment becomes particularly pronounced in time-based contracts. Such contracts typically involve situations that demand an amendment when there is a delay between the agreement's formation and execution. Regardless of how long or short the gap is, it produces scenarios that make the need for change vital [21; 22]; Law of Obligations and Contracts.2025; [23]; Decision of the Jordanian Court of Cassation No. 3534/2005).

The scope of the effect of time in amending contracts is expanding to address the imbalance in contractual obligations, which requires applying the amendment to all contracts that meet the conditions for amendment without exception as long as the contract has not been executed, provided that the delay is not due to a mistake or delay by the contracting party [24].

The rapid development has noticeably affected the conclusion and performance of contracts, especially the time required to fulfil the obligations. Therefore, it has become necessary to make amendments to the contract whenever there is a defect in the contract or the conditions for amendment are met, whether it is a term contract, a deferred immediate contract, or a non-deferred immediate contract [25; 26].

2.5 Imbalanced contract

The jurist George Ripert contended that contractual freedom should not lead to the unfair exploitation of the strong over the weak [27]). The balance must remain during the performance phase. Any modification in the contractual obligations leads to a defect and inequality in the obligations in the contract, such as the knowledge and awareness of the other party, so the contract is concluded in complete or partial ignorance of the aspects related to the contract [28; 29]. However, the French Court of Cassation, in one of its rulings, stated that the discrepancy in contractual performance must be assessed at the time of concluding the contract. Accordingly, we define contractual balance as equivalence and equality pertaining to economic positions and knowledge among the contracting parties, the stage of forming the contract, and contractual obligations in the stage of implementing the contract, in a way that attains the benefit of the contract.

It is worth noting that although cloud computing contracts are not excluded from the theory of emergency conditions, no special statute regulates how to apply this theory to them. This specifies that they are not exempted due to the method used in forming them (digitally), whether during formation or implementation. We suggest that the emergency circumstances theory should be applied to cloud computing contracts to maintain the contractual balance.

The subject matter of the cloud computing contract is the leasing of space agreed upon on the hard disk of the provider company, which can be accessed via servers. These servers can be in the country of the company providing the service, or a third country other than the country of the user or the providing company. Notably, what distinguishes a cloud computing contract from a traditional contract is that the former is concluded and performed via the Internet without the need for an external physical presence. Factors leading to a contractual imbalance in cloud

computing contracts typically differ from those in ordinary contracts, and they can be classified as follows:

2.5.1 Programming-related factors

Sometimes the other party to the contract is unaware of the program's validity or effectiveness in preserving the information stored in it, which can lead to damage to the information content and make the obligation's implementation difficult or impossible due to damage to the operating program and its attachments or the program activator, which is typically a program that is attached to the original program and cannot function without it. Additionally, some clouds may require subscription payments or require the contractor to install additional programs that significantly or exaggeratedly increase the cost to the parties to the contract, which disrupts the contractual obligations.

2.5.2 Technical factors

Since the formation and implementation of cloud computing contracts rely on the digital environment via the Internet, they could be halted if the information and content subject to the cloud are linked to a specific period. This would result in a significant loss, make it impossible to return to earlier stages, or hinder access altogether, which could lead to a deficit in contractual obligations.

2.5.3 Security incident

This aspect involves data or system manipulation or the inadequacy of the measures in place. Normal operations can be disrupted by unauthorised attempts to access systems or data, unscheduled service interruptions or disruptions, unauthorised data processing or storage, and unauthorised modifications to a system facility [7].

The contractual obligation is deemed onerous [Muhammad \[30\]](#) when the provider is unable to enable the user to utilise the hard disc space that was agreed upon in the contract, either in full or in part, or if the user is denied access to his data, files, and applications, or is not allowed to transfer or delete this data, even though the user has fulfilled his obligation to pay the amount of the cash consideration. However, an onerous contract is a contract in which the unavoidable costs of meeting the obligations under the contract exceed the economic benefits expected to be received under it [26; 31] It is a form of economic deficit in the performance of the two parties in the contract, but it is not intolerable to implement to the point of cancellation.

According to the prevailing view in jurisprudence, two criteria cause an imbalance in the contractual balance [32]. The first is the excessive advantages that the strong party receives at the expense of the weak party, as determined by the criterion of giving the professional excessive advantages. This results in an imbalance between the rights and obligations of the parties to the cloud contract. Finding the element that serves as the foundation for evaluating the unreasonable excessive advantage is challenging; to identify this imbalance, it is necessary to examine the entire cloud contracting process as well as the contractual circumstances surrounding its parties, rather than just the cloud contractual clause. The second is when the terms are skewed unfairly in favour of the professional who takes advantage of the weaker party's needs and imposes arbitrary terms creating a source of the cloud contractual imbalance ([33].

The concept of imbalance pertains to unforeseeable events that do not reach the threshold of unfeasibility [34]. This is typically assessed by comparing total revenues to total expenses, specifically in instances where losses surpass the "marginal price." The marginal price refers to the range between potential price increases and anticipated values at the time the contract is formed. Such a scenario suggests a substantial and unusual imbalance in the contract, which is typified by a reversal of the underlying economic principles. This reversal implies that circumstances that existed at the time of contracting were not entirely fulfilled, leading to losses that were beyond the parameters of the contract. Prevalent standards, the nature of the transaction, its subject matter, the circumstances surrounding the agreement, the contractual intent, and the general characteristics of the contract are some of the aspects that must be taken into account when analysing this imbalance [26].

As reported in the Notes on the Main Issues of Cloud Computing Contracts by [Uncitral \[7\]](#), "unforeseeable events are a common justification for unilateral suspension of services by the provider. Such events are typically defined as broadly encompassing any impediments beyond the control of the provider, including failures of subcontractors, sub-providers and other third parties involved in the provision of cloud computing services to the customer, such as Internet network providers. However, the parties may agree that suspension of services may occur only in limited cases identified in the contract (e.g., in case of a fundamental breach of the contract by the customer, for example, non-payment). The right of

suspension due to unforeseeable events may be conditioned on properly implementing a business continuity and disaster recovery plan. The contract may require that such a plan contains protections against common threats to the provision of cloud computing services and be submitted for comment and approval by the other party. Those protections may include a geographically separate disaster recovery site with seamless transition and the use of an uninterruptible power supply and backup generators."

The major legislative reform of the French rules of obligations of 2016 explicitly expressed the new values of contractual balance [35]. Similarly, Article 1171 of the Civil Code specified that the nullity of the conditions contained in the contract of adhesion that are not subject to negotiation and lead to a fundamental imbalance between the rights and obligations of the parties and considering them as if they did not exist. Additionally, Article 1143 on the exploitation of the state of subordination of one party to the contract to the other, or what is also stipulated in Article 1104 about the availability of the principle of good faith, which must be available from the stage of negotiating the contract until its implementation, as well as what is stipulated in the text of Article 1112-1, which grants the formal character to the obligation to provide information at a stage prior to the contract to prevent the occurrence of an imbalance in the contractual balance later, and also what is stipulated in the possibility of amending the contract in the event of changing circumstances through Article 1195 [36].

The knowledge imbalance between the contracting parties is represented by the knowledge of the other party, the contract is concluded in complete or partial ignorance of the aspects related to the contract, such that the contracting party is unable to make the correct choice based on the knowledge they have, which arises from the specialization of the contracting parties, or may arise from their exchange of information and data necessary for what is being contracted upon [33].

Furthermore, understanding the specifics of the contract's subject matter helps the contractual parties to produce enlightened contentment and determines the equivalency between them. In contrast to the weak party, who lacks sufficient knowledge of the subject matter of the contract and is, therefore, unable to determine the rights and obligations arising from it and maintain its balance, the party who is considered the "strong party" can achieve excessive benefits.

We contend that a knowledge imbalance occurs when there is a disparity of knowledge in the subject matter of the contract or the service between the parties to a contract. The party with the greater knowledge is referred to as the professional and is considered superior, while the one with less knowledge is called the consumer.

The Jordanian lawmaker established a legal presumption that contracts contain arbitrary conditions. If the debtor establishes that the estimate was greatly overstated, resulting in damage to the contracting party that is not commensurate with the high estimate stated in the agreement, the court may amend the arbitrary conditions included in these contracts. This would allow compensation to be within the prescribed percentage of expected damage [37]. Proportionality between the performances and the contract's economic goal and moral foundation must both be balanced. Additionally, they serve as the cornerstone for the concept of contractual justice, which is based on the notion of trade and is represented by the pursuit of an equilibrium between obligations [38].

3. The amendment must be partial.

The service provider can typically adjust its service portfolio at its discretion. Different contractual treatments may be appropriate depending on whether changes pertain to the core services or ancillary services and support aspects. Different contractual treatment may also apply to changes that might negatively affect services as opposed to changes that lead to service improvements such as a switch from a standard offering to an enhanced cloud computing offering with higher security levels or shorter response times. The consequences of some unilateral changes in the terms and conditions of the contract by the provider may be severe for the customer, in particular translating into high costs of migration to another system [7].

The amendment is primarily a partial change in the cloud contract, it does not include a complete change which constitutes forming a new contract portrayed by distinct terms, subject matter and mutual consent that diverges from those outlined in the original contract [39; 40; 41; 42; 43; 44] DALLOZ, 2009. This issue was also confirmed by the decision of the Egyptian Court of Cassation in appeal No. 5732 and the French Civil Code, Article 1915.

Nevertheless, it is insufficient for an amendment to simply address the divisible aspects of the contract; the modified elements mustn't pertain to grounds that the parties deemed essential for the contractual agreement as such grounds, being integral to the original intent of the parties, have a significance that is foundational to the obligations under consideration. However, Although the contract may differ in quantity and quality to the extent that it was amended, the purpose of amending a contract is usually to preserve its continuity with the amended part that was defective and to

ensure that the contract produces the same effects as the original contract. This means that the amendment modifies the defect content of the contract rather than changing its description or classification [45; 46].

The French judiciary adopted the concept of the main obligation for the benefit of the contract, as it considered the terms that deprived the debtor of the main obligation as if it did not exist [47; 48]. The amendments to the French Contracts Law of 2016 introduced a general and broad principle regarding the concept of the main obligation, pursuant to Article 1170, which stated that “Any contract term which deprives a debtor’s essential obligation of its substance is deemed not written”, protecting the benefit expected from the contract, considering this condition and its absence, whether based on the concept of the main obligation. According to this article, the legislator imposed expanded protection to shield the interest and benefit of the contract, as it considered every condition or action that strips the main obligation of the debtor of its content as if it was not agreed upon by the contractual parties and thus does not produce any effect.

3.1 Grounds of Contract Amendments

Generally, amendments to the obligations of the contract aim to remove the imbalance, therefore, the following grounds must be met: the amendment is feasible, and the intention of the amendment achieves a legitimate interest.

3.1.1 Amendment to the obligations is feasible.

The effect of impossibility varies based on whether the obligation entails the exercise of care or the achievement of a specific result. Different legal standards apply to these two principles. The impossibility in question, as it relates to cloud computing contracts, is an event that occurs after the contract is formed because of an unanticipated and inevitable circumstance. An occurrence like this makes it hard for the obligor to carry out their duties, which were not foreseen when the contract was formed. Similarly, the subject of the obligation must be feasible to be able to be modified. If it is impossible, the contract will not be created and there will be no room for modification. Impossibility in the cloud contract is related to the internal obligation content that is intended to be modified [25; 49; 50; 51].

For service providers, the obligations typically involve providing the service on a continuous and permanent basis, which constitutes an obligation to achieve the intended result. Although the user is responsible for safeguarding their data, applications, and files against damage, loss, or unauthorized access—whether from third parties or their own employees—the service provider must still ensure robust protection measures are in place [6].

For the user, to invoke the theory of emergency circumstances, he shall prove that the failure to achieve the intended result was due to the error of a third party, force majeure, or the error of the user himself. Yet, the service provider cannot claim the theory of emergency circumstances as the service interruption was due to his failure to pay the license fees for the Windows program owned by Microsoft. The service provider is obligated to pay the license fees for the program. The theory of emergency circumstances typically applies in situations arising from the service provider’s failure to provide adequate protection for the user’s data, as he is obliged to preserve the user’s data, applications, and files against damage, loss, or hacking by other persons who are not authorized to access them, whether from third parties or his employees [6].

However, an onerous obligation can be ceased based on the 1985 rule that if force majeure supervenes making the performance of the contract impossible to a reasonable extent, the corresponding obligation can be ceased, and the contract is automatically cancelled. The loss that arises from the cancellation of the terms is determined according to an objective standard that does not consider the capacity of the debtor and his special circumstances, but rather considers the transaction itself, apart from the circumstances of the debtor [12; 52; 53]. This is based on the corresponding performance, that there is an imbalance between the value of the performance due and the value of the corresponding performance. The contract remains in effect, and the debtor remains obligated to perform, and the burden is distributed between the two parties. The state of imbalance leading to the modification of the cloud computing contract has been referred to as “special impossibility- Onerous”. The condition of possibility for modification concerning emergency circumstances requires that the extraordinary incident makes the performance of the obligation onerous, but not impossible. To deem the modification valid, this condition is essential [54; 55; 56].

The service provider may reserve the right to unilaterally modify the price or price scales. In contrast, the parties may agree to specify in the contract the pricing methodology (such as how often the service provider may increase the price and by how much), the prices may be capped to a specific consumer price index, to a set percentage or the provider’s price

list at a given moment. The contract may provide for advance notice of a price increase and the consequences of non-acceptance of the price increase by the customer [7].

Even though upgrades may be in the interests of the customer, they sometimes may also cause disruptions in the availability of services (cloud computing services) since they could translate into relatively high downtime during ordinary working hours even if the service is to be provided on a 24/7 basis. However, the parties may agree on advance notification to the customer of pending upgrades and the implications demonstrating that upgrades, as a rule, will take place during periods of little or no demand for the customer. The contract may also provide for procedures for reporting and solving possible problems [7].

Furthermore, the upgrades provided may have further negative impacts, for instance, requiring changes to customer applications or IT systems or the retraining of customer users. The contract may provide for the allocation of the costs arising from upgrades. However, if major changes are to be made to the previous version, the parties could also agree that the old version of the service should be kept concurrently with the new version for a predetermined period to guarantee the customer’s business continuity. The cloud computing contract may address assistance that is offered by the provider with changes to customer applications or IT systems and with retraining of the customer’s end users when required [6].

Some causes may lead to the degradation of specific cloud computing services or their discontinuation with or without their replacement by other services such as in cases of technological developments, competitive pressure or other causes. The provider may, however, reserve in the contract the right to alter the service portfolio offering (e.g., by terminating a portion of the services). Discontinuation of even some cloud computing services by the provider may, however, expose the customer to liability to its end users.

In terms of the contract, it may provide the customer with advance notification of those changes, his right to terminate the contract in the case of unacceptable changes or an adequate retention period to guarantee the timely reversibility of any affected customer data or other content. Some contracts typically prohibit modifications that could negatively affect the nature, scope or quality of provided services, or limit permissible changes to “commercially reasonable modifications” [7].

A contract is considered onerous if the debtor faces a substantial risk of loss in fulfilling the obligation. It is usually ignored if the possible loss is not significant and this is typical in business transactions. Amendments to cloud contracts are limited to making reasonable adjustments to the obligations to lessen the burden. This is accomplished by dividing the loss equally between the creditor and the debtor, with the debtor taking some of the blame for the incident according to a judge-established objective standard. This decision is based on the conditions and circumstances of the contract, considering how those conditions affect the actual transaction. It is crucial to keep in mind that if the debtor makes a mistake that causes the obligation to be delayed, especially if the delay happens after the emergency circumstance has started, it may not be possible to change the contract. Such circumstances preclude the possibility of amendment [57; 58]. However, the Egyptian Court of Cassation’s Decision No. 142 12/20/1973, and No. 368 and the Jordanian Court of Cassation’s Decision in its Civil Capacity No. 1172/2001 [23; 59] adopted the same procedures.

4. Modification of cloud obligations is legitimate.

The legality of a cloud computing contract is greatly allied to the original contract; therefore, this contract is assumed to be legally valid unless there is a legal presumption to the contrary. Articles 136, 137 and 121 of the Egyptian Civil Code specify that the onus of proof falls on the party that claims invalidity of the contract, but due to the multiplicity of obligations resulting from the contract, it is not possible to set exclusive conditions to ensure its legality [60].

Morality, public order, and adherence to the law form the foundation of legitimacy and illegitimacy. Based on this, we contend that the legitimacy of modifying the cloud contract implies that it does not contravene the law, public order, or standards of morality. By consulting the subject matter of the contract and the obligation, we may determine the grounds that serve as the foundation for the legitimacy of the contract amendment. Even if it isn’t stated clearly, anything that transgresses morality and public order is deemed illegitimate and falls outside the purview of the law. Given the challenge of defining the reason for modification precisely, considering all of its facets, and addressing the criticism raised against it by jurisprudence that arose out of practical reality [60; 61; 62].

The terms of a cloud computing contract must not contravene public order, both concerning their provisions and their primary purpose, regardless of whether this purpose is known to both parties. The prohibition against contract terms that violate public order underscores the legitimacy of the subject matter of the contract according to traditional legal principles. Furthermore, the prohibition against an objective that violates public order

pertains to the legitimacy of the "reason" for the contract. This principle permits the invalidation of the contract if the reason is deemed illegitimate. Thus, both the terms and the purposes of the contract must align with public order to ensure its validity.

If one of the parties enters into the agreement with the intention of achieving an illegal purpose, the contract is considered invalid. However, if the other party acts in good faith and is unaware of the illegal intent, he retains the right to seek the annulment of the contract upon knowledge of the other party's illegal or immoral intent after the conclusion of the contract. Article 1162 of the French Civil Code stipulated that: "A contract cannot derogate from public policy either by its stipulations or by its purpose, whether or not this was known by all the parties."

5. Results

The cloud computing contract is a legal contract that is typically concluded via an open network for remote communication using electronic processing and creates contractual obligations to use the computer resources and systems owned by the service provider in return for a financial consideration paid by the beneficiary.

A cloud computing contract amendment: It is a legal action that modifies the contract's contractual obligations carried out via an open remote network that uses electronic processing, and it can be initiated by the contracting parties' consent, a law, or a court order. The contractual relationship can be maintained by amending one or more provisions of the agreement during the period of contract execution to correct imbalances in the contractual obligations and guarantee the use of the service provider's systems and computing resources in exchange for the beneficiary's continuous financial obligation.

Amending a cloud computing contract requires determining the personal and objective scope of these contracts by stating the terms and characteristics of the amendment. Otherwise, the amendment will be uncontrolled and will not achieve the desired purposes of this amendment, which is to address the imbalance in contractual obligations and achieve fairness.

Most cloud computing contract transactions are not regulated by special rules and are still subject to the general contracting rules contained in the law despite their special technical and technological features.

Recommendations

Enacting special electronic transactions statute addressing all applications of cloud computing contracts, as the Electronic Transactions Law fails to cover issues concerning the new contractual circumstances and set remedies for it since they have a special nature, unlike the usual traditional emergency circumstances.

Developing a contractual model for regulating cloud computing contracts, stating the rights and obligations of the parties to the contract.

Developing an ethical code to regulate cloud computing contracts and the contractual relationship based on governance and ethical measures.

Acknowledgments

The researcher extends sincere thanks to Ajloun National University in Jordan and Al-Bayan University in Iraq for the academic support and scientific cooperation they provided.

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