Scholarly Paper

Timing of Liquidated Damages Recovery and Related Liability Issues

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Abstract: Schedule overruns are persistently observed in the construction industry, and the process of accurately calculating the damages incurred by the injured party is perceived to be burdensome. To overcome that, liquidated damages (LD) provisions stipulate a predetermined sum for failure to perform the construction work within the contract's agreed completion date. While it is recognized that the courts consider the contract language when addressing any contract's breach, there is a lack of work investigating the collection of LD under standard forms of contract as well as the timing of such recovery. That said, it is still unclear as to when the owner's right for the recovery of LD from the contractor ripens and can consequently be exercised. Moreover, project owners perceive that LD provisions do not completely cover their delay losses; especially when a recovery limit is stipulated by the contract. To address that, owners search for additional recovery instruments to be used. To this end, the objectives of this paper are as follows: (1) review, compare, and analyze the LD provisions under national and international standard forms of contract; (2) examine the timing of LD recovery and the related liability issues; and (3) explore the different strategies or tools that could be used by the owner to ensure an ultimate recovery of delay damages, the possible interplay among these tools, and the impacts of the different recovery strategies and scenarios. The study contribution lies in advancing a clearer discernment on the LD recovery mechanism in terms of timing and available instruments. As such, the findings of this study help in identifying what may be viewed as the ideal time that owners become entitled to start levying delay damages as well as in deciding on the best recovery tool(s). **DOI: 10.1061/(ASCE)LA.1943-4170.0000390.** © *2020 American Society of Civil Engineers.*

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Introduction

In most instances, litigation has been the primary method for owners to recover actual damages due to late completion by contractors (Thomas et al. 1995). However, in recent public and private projects, delay damages clauses are being used in construction contracts. Those liquidated damages (LD) clauses stipulate, in advance, a sum for which the breaching party will be liable when late completion occurs due to its own default (Arkhon Corporation 1984). According to the global construction disputes report published by Arcadis (2018), one of the top causes of construction disputes is the failure to properly administer the contract (that is, poor contract administration). This reflects that there is a need for providing better contractual instructions to minimize disputes that possessed a global average value of USD 43.4 million and an average length of 14.8 months during the year 2017 (Arcadis 2018). In addition, Hashem et al. (2018) reported that most of the claims are of a contractual nature and are specifically related to delay damages (LD for late performance) and insufficient/defective plans or specifications. To this end, providing contractual instructions on LD provisions is of pertinent importance for the construction industry as well as for practitioners.

For owners, delayed completion may result in different types of losses and additional costs, which are difficult to calculate and even difficult to directly relate them to the late completion of the works. On the contractor's part, time-related costs are experienced, which include field, office personnel, and other delay-related expenses, and those costs are usually not accounted for in the bidding price (Caplicki and Guidry 2006). The LD recovery by the nonbreaching party, particularly if untimely affected, may—in practice—lead to claims and disputes to consequently arise between the contracting parties, which could end up being litigated or arbitrated.

Because new research should build on previous efforts to convey prospective findings that add to the body of knowledge (El-adaway et al. 2019), it is important to review existing research efforts that have studied LD. Most of the previous research did not address LD independently; however, it discussed delay damages at a secondary level. For instance, Livengood (2017) focused on reviewing the legal theories and the technical issues on concurrent delays and briefly discussed how sequential delays and concurrency affect the assessment for LD. El-adaway et al. (2016) studied the extension of time provisions under traditional standard construction contracts to assist in having efficient and effective management of claims for additional time, and they tackled the collection of LD in relation to time extensions. El-Hoteiby et al. (2017) provided a list of the pertinent provisions to be considered by contracts' practitioners while drafting new contracts and investigated the major risks facing construction projects, with LD clauses being identified as of one of the top 30 common particular conditions. Fawzy et al. (2015) discussed the circumstances supporting the success of time at large principle within the common law legal system, and how it affects the collection of LD. Other studies that more particularly addressed LD include the work by Sun et al. (2013), which looked at LD in incentive and disincentive contracts for transportation projects, and that by Rogers et al. (2019), which involved the administration of a survey that aimed

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at establishing a state of the practice for LD for high-value transportation projects.

Therefore, while it is recognized that the courts consider the contract language when addressing any contract's breach (CMS 2010), there is a research gap in the state of the art associated with the effect of LD as related to its collection under national and international standard forms of contract as well as the timing of such recovery. That said, it is still unclear as to when the owner's right for the recovery of LD from the contractor ripens and can consequently be exercised. Moreover, projects' owners perceive that LD provisions do not completely cover their delay losses; especially when a recovery limit is stipulated by the contract. To address that, owners search for additional recovery instruments to be used. Contractual issues related to the recovery of LD remain unanswered, primarily including the identification of (1) the conditions governing the recovery of LD including condition precedency, period of assessment, characteristics of the liquidated sum, extension of time after recovery of LD, sectional or partial completion of the work, and collection mechanism of LD; (2) the time at which the owner is entitled to start levying LD; and (3) the available recovery instruments that the owner could utilize to collect LD. To this end, this paper attempts to fill the existing knowledge gaps by studying the LD provisions under different standard conditions for the construction contract and investigating the proper timing of LD recovery and the liability issues associated with such recovery.

Goal and Objectives

The overall goal of this research is to study the collection mechanism of LD, the timing of recovery, and the related liability issues of different recovery methods under national and international standard contract forms. The major objectives of this paper are as follows: (1) to review, compare, and analyze the LD provisions under national and international standard forms of contract; (2) to examine the timing of LD recovery and the related liability issues; and (3) to explore the different tools that could be used by the owner to ensure an ultimate recovery of delay damages, the possible interplay among these tools, and the impacts of the different recovery strategies and scenarios.

Scope of Work

The scope of this paper is limited to the following six national and international standard forms of construction contracts: (1) the American Institute of Architects (AIA), (2) the Engineers Joint Contract Documents Committee (EJCDC), (3) the ConsensusDocs, (4) the International Federation of Consulting Engineers (FIDIC), (5) the New Engineering Contract (NEC), and (6) the Joint Contracts Tribunal (JCT). According to Barakat et al. (2018), as these standard conditions for the construction contract have been gaining wider acceptance, the reliance on them seems to continue to rise, and the interest in assessing the efficiencies of such conditions is likely to increase. As such, the scope of this work is concerned with the LD stipulations provided in the general conditions of contract and the main agreements between the owner and the contractor under the six national and international standard forms.

Research Methodology

The research methodology consists of six major steps: (1) singling out and reviewing the clauses/subclauses related to the conditions governing the recovery mechanism of LD under the six considered standard conditions of the construction contract—namely, AIA (2007b), EJCDC (2013b), ConsensusDocs (2017), FIDIC (1999), NEC (2013), and JCT (2011b)—where the selected versions were those that are believed to be in a wider use; (2) conducting a detailed analysis of the LD recovery mechanism; (3) identifying a gamut of strategies depicting different possibilities for the timing of recovery of LD as related to the contractual substantial completion versus the actual substantial completion; (4) deducing scenarios for the effects of the timing of meeting LD recovery requirements on the amount available for facilitating the collection of delay damages; (5) examining the permanent recovery instruments that have the potential to be used by the owner; and (6) pinpointing the impacts of the identified recovery tools. The contribution of this study lies in advancing a clearer understanding as to the LD recovery mechanism in terms of timing and available instruments. As such, the findings of this study will assist the construction industry in identifying the ideal time that owners become entitled to start levying delay damages and in deciding on the best recovery tool(s).

Standard Conditions Governing the Recovery of Liquidated Damages

This section intends to review, single out, and analyze the clauses/subclauses related to the conditions governing the recovery mechanism of LD under the six considered standard forms of the construction contract, namely (1) condition precedency, (2) period of assessment, (3) characteristics of the liquidated amount, (4) extension of time after the recovery of LD, (5) sectional/partial completion, and (6) collection mechanism of the liquidated sum.

Condition Precedency

It is crucial to understand the terms forming the condition precedency to the collection of LD so that the owner does not lose their entitlement to levy delay damages from the contractor, thus ensuring an appropriate recovery of LD. As such, Table 1 presents the condition-precedent terms related to the collection of LD under national and international standard forms of the construction contract.

As demonstrated in Table 1, all standard contract forms agree on the fact that LD are collected for the contractor's failure to abide by the contractual completion date. ConsensusDocs and EJCDC explicitly specify that the substantial completion and/or final completion of the construction work could be used as benchmark(s) for completion. In addition, EJCDC explicitly specifies that reduction in progress payments by the owner could be entertained if the contractor failed to achieve milestones. Conversely, ConsensusDocs and AIA explicitly state that the owner can collect LD when there is *a reasonable evidence* that the contractor will not be able to finish the construction work within the contract time. The other contract forms do not provide such explicit wording. This is evidently an important specification in helping answer the research question addressing the time at which the owner can start the recovery of LD.

In addition to the contractor's default in completing the works by the relevant completion date, JCT requires three certificates and notices to be issued prior to the collection of LD. Those certificates and notices are as follows: (1) noncompletion certificate issued by the architect/contract administrator; (2) notice issued by the owner, stating that they may require collection of LD; and (3) pay-less notice issued by the owner for their intention to withhold or deduct LD.

NEC requires the project manager and contractor to give an early warning by notifying the other as soon as either becomes

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Table 1. Relevant condition precedency terms

Standard contract form	Clause text associated with condition-precedent terms	Corresponding clause or article
1. ConsensusDocs	"... if the Substantial Completion date, which may be amended by Change Order, is not attained."	6.5.1.1
	"... if the Final Completion date, as may be amended by subsequent Change Order, is not attained."	6.5.3
	"[if there is a] reasonable evidence of delay in performance of the Work such that the Work will not be completed within the Contract Time."	9.3.5
	"... Owner shall give written notice to Constructor, ..., stating its specific reasons for such disapproval or nullification, and the remedial actions to be taken by Constructor in order to receive payment."	9.3
2. AIA	"... reasonable evidence that the Work will not be completed within the Contract Time, ..."	9.5.1 (6)
3. EJCDC	"... Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work."	15.01 E (j)
4. JCT	"If the contractor fails to complete the Works or a Section by the relevant Completion Date ..."	2.31
	"The Architect/Contract Administrator has issued a Non-Completion Certificate for the Works or a Section."	2.32.1.1
	"The Employer has notified the Contractor before the date of the Final Certificate that he may require payment of, or may withhold or deduct, liquidated damages."	
	"The Employer, if he intends to withhold or deduct all or any of the liquidated damages payable, must give the appropriate Pay Less Notice."	2.32.2.2
5. NEC	"The Contractor and the Project Manager give an early warning by notifying the other as soon as either becomes aware of any matter which could delay Completion."	16.1
6. FIDIC	"If the Contractor fails to comply with Sub-Clause 8.2 [Time for Completion] ..."	8.7
	"The Engineer shall then proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine (i) the amount (if any) which the Employer is entitled to be paid by the Contractor."	2.5
	"... if the Works, or a Section (if any), are not completed within the Time for Completion."	8.7[a]
	"If the Employer considers himself to be entitled to be paid delay damages, he is required to give notice and particulars in accordance with Sub-Clause 2.5 [Employer's Claims]."	
	"... the Employer is not entitled to withhold the amount from payments due to the Contractor, unless and until the procedure described in Sub-Clause 2.5 has been followed."	

[a]Specified in FIDIC (2000).

aware of any event that could delay the completion of the works. As such, the process in NEC focuses on encouraging the project parties to share their knowledge so that to avoid delays occurring in the first place. The duality of this early warning procedure is not explicitly provided in the other standard forms of contract, where the contractor may be the only party explicitly stated as being required to warn of future probable delay events, as in the case of FIDIC.

Finally, the condition-precedent terms to the collection of LD under FIDIC are as follows: (1) the contractor's failure to finish within the time for completion as specified in Subclause 8.2; (2) the owner's acting pursuant to the stipulation of Subclause 2.5 (where a notice and particulars are to be submitted by the owner or the engineer); and (3) the engineer's determination, under Subclause 3.5, of the liquidated amount due to the owner.

Ultimately, LD could be recovered only if nonexcusable delays occur, and the contractor fails to finish the work within the agreed time (being substantial completion, final completion, sectional completion, or milestones). Most of the standard contract forms explicitly require the engineer, architect, or contract administrator to issue some form of noncompletion certificate, notice, and/or determination before the owner's recovery of delay damages.

Period of Assessment

The LD's period of assessment dictates the total sum that the owner is entitled to collect. As such, it is important to understand the time period used to calculate the delay damages. Table 2 presents the period of assessment of LDs as stipulated by the different national and international standard forms of the construction contract.

As shown in Table 2, ConsensusDocs explicitly specifies that LD can be recovered for each day (ConsensusDocs defines it as a calendar day) that the actual substantial/final completion extends beyond the agreed contractual date. The actual substantial/final date is the date specified in the issued certificate of substantial/final completion. Moreover, the substantial completion date is the date when the work is believed to be sufficiently completed in accordance with the contract documents. That is, the date when, without unapproved disruption, the owner can use the project (or a portion of it) for its intended purpose. However, the final completion occurs when the contractor completes its obligations under the agreement, and when the owner accepts the work so that the final payment becomes due and payable to the contractor. In addition, ConsensusDocs (2007) provides that the LD's period of assessment could be based on other project milestones or performance requirements, if so agreed by the parties. This is reflected by Subarticle 6.5.3 in ConsensusDocs (2007), which gives the owner and the contractor the option to include other applicable LD; however, in this case, project parties shall make sure to include it as an agreement exhibit.

Similarly, AIA's period of assessment is the contract time, which is the substantial completion date specified in the contract documents, including any time extensions. Substantial completion is the date when the work (or a portion of it) is sufficiently finished in accordance with the contract documents. That is, the date when the owner can use the work for its intended aim. However, LD can be still recovered for late final completion or late milestones completion; however, the parties should provide that the contract time calls for final completion or milestones rather than substantial completion. In this case, final completion is the date when the architect

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Table 2. Period of assessment

Standard contract form	Clause text associated with period of assessment	Corresponding clause or article
1. ConsensusDocs	"... for each Day that Substantial Completion extends beyond the Substantial Completion date."	6.5.1.1
	"... for each Day that Final Completion extends beyond the Final Completion date."	6.5.3
	"Other applicable liquidated damages shall be included as Agreement exhibit."	6.5.4
2. AIA	"Liquidated damages are only assessed until the date of actual substantial completion."	8.1.1[a]
3. EJCDC	"... Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work."	15.01 E (j)
4. JCT	"... for the period between the Completion Date and the date of practical completion of the Works or that Section or such other date as is fixed either under clause 2.28 or by a Preagreed Adjustment."	2.32.2
5. NEC	"... from the Completion Date for each day until earlier of: 1. Completion and 2. The date on which the Employer takes over the works."	X7.1
6. FIDIC	"... for every day which shall elapse between the relevant Time for Completion and the date stated in the Taking-Over Certificate."	8.7

[a]Specified in AIA (2007c).

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believes that (1) the work is acceptable under the terms and conditions of the contract documents; (2) the contract is fully performed; and (3) the entire balance in the final certificate is due and payable to the contractor.

Conversely, EJCDC does not contain a separate LD clause in the general conditions of contract; however, note that under Subarticle 15.01 E (j) the substantial completion, final completion, and milestones are believed to be applicable assessment periods. According to EJCDC (2013b) a milestone is "a principal event in the performance of the Work that the Contract requires Contractor to achieve by an intermediate completion date or by a time prior to Substantial Completion of all the Work." In addition, substantial completion under EJCDC (2013b) is "the time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended."

Under JCT, LD are collected for the period spanning between the completion date and the practical completion date. The completion date is the date specified in the contract particulars or amended under Clause 2.28. However, practical completion is the date specified in the practical completion certificate or section completion certificate. This is the date at which the architect/contract administrator believes that the work or a section of work is achieved/completed, and the contractor has fulfilled their obligations by submitting the needed drawings and a health and safety file, as provided by Clause 2.30 (a file containing information needed for anyone who is performing subsequent construction works, delineating how to plan and carry out that work safely).

Under NEC, LD are assessed for each day from the completion date until the earliest of (1) completion, and (2) taking over of the works. Completion is when the contractor has completed all the works specified in the works information (if not specified, it is the date when the works were completed so that the owner can use the project), and when the contractor has corrected the notified defects that could prevent the owner from using the facility. However, taking-over of the works occurs when the owner starts using any part(s) of the works, except for particular uses stated in the works information or suiting the contractor's work method.

Under FIDIC, LD span from the relevant time for completion and the date stated in the taking-over certificate. The time for completion is the period stated in the appendix to tender—with any extensions of time—starting from the commencement date. However, the taking-over certificate is issued in accordance with Subclause 10.1; that is, when the contractor passes the tests on completion and completes all the works stated in the contract, except for any remaining minor works or defects that do not substantially affect the use of the works (or section) for the intended aim.

Ultimately, the various standard contract forms use different notations for designating the completion of the work. However, the period of assessment for collecting LD under the different contract forms is generally measured against the substantial/practical completion of the works; that is, the date at which the owner takes over the project for its intended use as specified in the contract documents. However, the owner and the contractor may elect to assess delay damages for other periods such as final completion, interim milestones, and/or performance requirements (as specified in ConsensusDocs).

Characteristics of the Liquidated Amount

To ensure the operability and enforceability of the LD clauses, the liquidated rate/amount should possess specific properties such that it shall not constitute a penalty that coerces performance by the contractor. Table 3 represents the characteristics of the liquidated amount as stipulated by the different national and international standard forms of the construction contract.

As shown in Table 3, LD under ConsensusDocs are in lieu of damages that are difficult to determine and specify. The liquidated sum is to be determined by the parties in the relevant clause, and it is to be collected as LD and not as a penalty. Moreover, the owner cannot claim actual damages in addition to LD. In addition, EJCDC provides that the contracting parties shall recognize the difficulties involved in proving—in a legal or arbitration proceeding—the actual loss suffered by the owner, and that the agreed sum shall aim to liquidate potential delay losses instead of acting as a penalty to ensure performance. Moreover, AIA provides that the LD shall not be a penalty to be inflicted on the contractor, but must bear a reasonably estimable relationship to the owner's damages.

Under JCT, the liquidated sum is specified in the contract particulars, and it is expressed as a rate. The liquidated rate could be decreased after the submittal of a notice by the owner. Similarly, the stipulated sum under NEC is specified in the contract data and expressed as a rate. The liquidated amount should be a genuine pre-estimate of the likely damages that the owner is expected to experience, and it should not constitute a penalty.

Under FIDIC, the delay damages sum along with the maximum amount for delay damages (if any) should be included in the

Table 3. Characteristics of the liquidated rate/amount

Standard contract form	Clause text associate with the characteristics of the liquidated amount	Corresponding clause or article
1. ConsensusDocs	"... damages which are difficult to determine and accurately specify."	6.5.1.1
	"... Constructor shall pay Owner [_____] dollars ($[_____]) as liquidated damages and not as a penalty for each Days..."	
	"These liquidated damages are in lieu of all liability for all extra costs, losses, expenses, claims, penalties, and any other damages of any nature incurred by Owner resulting from not attaining the Substantial Completion date."	
2. AIA	"If liquidated damages are to be assessed because delayed completion will result in actual loss to the Owner, the amount of damages due for each day lost should be entered in the Supplementary Conditions or the Agreement."	3.3[a]
	"Liquidated damages are not a penalty to be inflicted on the Contractor, but must bear an actual and reasonably estimable relationship to the Owner's loss if construction is not completed on time."	
3. EJCDC	"The parties also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by Owner if the work is not completed on time... Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty)."	4.03[b]
	"EJCDC recommends developing daily liquidated damages amounts that comprehensively account for the full range of Owner's damages, including costs of additional engineering, construction observation, inspection, and administrative services, and potential fines or penalties. Some Owners, however, prefer to charge a Contractor that has not completed the Work on schedule for Owner's additional hard-dollar costs for fines and penalties, and for extended engineering, construction observation, inspection, and administrative services; these charges are levied on top of the daily liquidated damages amount. It is very important if this practice is followed to be certain that the liquidated damages amount does not already include or rely in part on the potential for incurring these very same hard-dollar costs; if it does, then the separate charge for actual costs may be regarded as "double dipping" and the entire framework of liquidated damages for late completion may be called into question."	
4. JCT	"... to pay liquidated damages at the rate stated in the Contract Particulars, or lesser rate stated in the notice..."	2.32.2.1
	"If the Employer in relation to the Works or a Section has notified the Contractor... that he may require payment of, or may withhold or deduct, liquidated damages..."	2.32.4
5. NEC	"The Contractor pays delay damages at the rate stated in the Contract Data..."	X7.1
	"The amount included within the contract for delay damages should be a "genuine pre-estimate of likely loss, i.e., should not constitute a penalty."	X7.1[c]
	"The Contractor's total liability to the Employer for all matters arising under or in connection with this contract, other than the excluded matters, is limited to the amount stated in the Contract Data and applies in contract, tort or delict and otherwise to the extent allowed under the law of the contract. The excluded matters are amounts payable by the Contractor as stated in this contract for delay damages if Option X7 applies..."	X18.4
6. FIDIC	"These delay damages shall be the sum stated in the Appendix to Tender..."	8.7
	"... the total amount due under this Sub-Clause shall not exceed the maximum amount of delay damages (if any) stated in the Appendix to Tender."	
	"For the limit of delay damages, if it is to be stated, the usual percentage in international contracts generally varies between 5% and 15%."	8.7[d]
	"Delay damages are also subject to the limit of liability described in Sub-Clause 17.6."	
	"The sum may be expressed as a percentage of the Contract Price, unless this would not comply with applicable laws."	
	"a reasonable estimate of the Employer's losses or forgone benefits, which may be equivalent to financing charges for the Contract Price per day, plus the daily cost of the Employer's Personnel involved in supervising the execution of the Works during the period of prolongation."	
	"The currencies of payment may affect the Employer's calculations of the sum per day and the limit."	
	"These delay damages shall be the only damages due from the Contractor for such default, other than in the event of termination under Sub-Clause 15.2 [Termination by Employer] prior to completion of the Works."	
	"These delay damages are stated to be the only damages due to late completion. The Employer cannot recover his actual losses due to late taking over."	

[a]Specified in AIA (2007c).
[b]Specified in EJCDC (2013a).
[c]Specified in Hughes (2016).
[d]Specified in FIDIC (2000).

appendix to tender. The most common rate ceiling for delay damages is 5%–15% of the contract price (FIDIC 2000). Moreover, the delay damages should also be lower than the limit of liability under Subclause 17.6. The stipulated amount could also be expressed as a percentage of the contract price if the applicable laws allow for that, and the ascertained sum could be affected by the payments' currencies. In any case, the sum should be a reasonable estimate of the owner's damages, including financial charges and the cost of the owner's personnel involved in the supervision of the work. These delay damages are in lieu of any actual delay damages

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suffered by the owner, other than in the event of contract termination.

Note that AIA and EJCDC are the only two contract forms (out of the studied six standard forms) that do not have a stand-alone subclause for LD provisions in their general conditions of contract. Nevertheless, additional information on LD could be retrieved from their standard agreements. That said, and as shown in Table 3, EJCDC's standard agreement provides that, "The parties also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by Owner if the work is not completed on time . . . Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty)." In addition, EJCDC's standard agreement provides that LD could consist of: costs of additional engineering, construction observation, inspection, administrative services, and potential fines (Table 3). Conversely, AIA's standard agreement leaves it open for the parties to specify the LD stipulations by stating that, "Optionally, insert any provisions, for liquidated damages relating to failure to achieve Substantial Completion on time" (AIA 2007a).

Further, all contract forms agree on the fact that the liquidated amount is generally expressed as a rate that shall reflect a reasonable estimate of the future probable damages suffered by the owner and not a penalty. Finally, the JCT is the only contact form that explicitly allows the owner to decrease the liquidated rate by issuing a notice to the contractor, and FIDIC is the only contract form that explicitly specifies a recommended limit on the amount of delay damage if the contracting parties choose to include a cap by stating that, "For the limit of delay damages, if it is to be stated, the usual percentage in international contracts generally varies between 5% and 15%" (FIDIC 2000).

Extension of Time after the Recovery of Liquidated Damages

The operability of delay damages clauses is dependent on the extension of time mechanism stipulated by the contract. Many disputes arise in relation to whether the owner is allowed to start the recovery of LD while the engineer's decision on the extension of time period is still not determined. In addition, the time extension mechanism is very critical to the collection of LD because it could lead to *time at large* situations, and the owner might thus risk or lose its entitlement to the recovery of LD. Furthermore, a case could exist where the owner starts the collection of LD due to the contractor's default in completing the works on time, but a delay event then happens and an extension of time is granted afterward. To avoid the aforementioned issue and to ensure that the owner does not lose their entitlement for the recovery of delay damages, some standard contract forms stipulate the provisions governing those situations where an extension of time is granted after collection of LD by the owner, as shown in Table 4.

As it can be seen from Table 4, under ConsensusDocs, AIA, and EJCDC, there is no explicit clause as to how the collection of LD is affected if a subsequent extension of time is granted in respect of the period against which LD were previously levied. Conversely, JCT specifies that if a new completion date is fixed after the issue of a noncompletion certificate, this certificate should be canceled, and if delay is still experienced after the fixed completion date, the architect/contract administrator should issue another noncompletion certificate. This should not render the owner's notice to recover LD from the contractor as inoperable, unless the owner cancels it by writing. In addition, the owner is required to repay the contractor any deducted LD for the period spanning till the newly fixed completion date.

Similarly, NEC specifies that the owner should repay the contractor any overpayment of damages along with the relevant interest, which is assessed from the date the contractor paid delay damages to the owner until the date of repayment by the owner. Conversely, and under many law systems, the owner may not be able to recover delay damages if the extension of time mechanism is not followed appropriately because this might lead to time at large situations. Under FIDIC, the owner has to repay the contractor any overpayment, and the delay damages amount to be recovered should be reassessed. However, there is no clear provision if interest on the overpayment is to be paid to the contractor, but that would eventually be judged based on the applicable laws. Ultimately, it is crucial for the contract language to allow the completion date of the project to be extended by incorporating an appropriate extension of time clause so that the delay damages clause would remain operable and enforceable.

Sectional/Partial Completion

In many projects, the owner takes over part(s) of the works, and thus it is perceived to be unrealistic for the liquidated rate to remain as is. The reason behind this is that the owner benefited from the use of the completed part(s), and hence less delay damages are experienced for late completion of the remaining works. As such, it is important to have clear contract language that stipulates the way the liquidated rate is to be reduced if sectional or partial completion occurs. Table 5 shows the provisions of the different standard contract forms for the effect of partial/sectional completion on the stipulated amount.

As shown in Table 5, there is no explicit clause under ConsensusDocs, AIA, and EJCDC as to how LD are re-evaluated if sectional completion of the works takes place. If partial (sectional) possession by the owner occurs under JCT, a sectional completion certificate should be issued, and the LD amount shall be reduced by the same fraction of the value of the relevant works or part to the contract sum or to the relevant section sum. Conversely, if partial taking over of the works occurs under NEC, the project manager is required to assess the benefit of taking over this part of the works relative to that of taking over the whole of the works, and LD shall be reduced by this fraction. Similar to the JCT case, when a partial/sectional completion occurs under FIDIC, the engineer is required to determine in accordance with Subclause 3.5 the proportion of the remaining works, and delay damages shall be reduced by the proportion of the part that has been taken over by the owner to the value of the works or section as a whole.

NEC provides the fairest way to assess the remaining delay damages in case of sectional completion; nevertheless, it could also lead to disputes with the contractor because it is based on a subjective assessment. Conversely, the other contract forms stipulate that the liquidated sum is to be reduced by the same proportion that the completed section bears to the value of the whole of the works. For instance, if 30% of the entire work has been taken over by the owner, the LD rate shall be reduced by 30%.

Collection of the Liquidated Sum

Table 6 presents the mechanism by which the liquidated sum could be collected under the different standard forms of the construction contract. Under ConsensusDocs, the owner can adjust, reject, or nullify a certified payment if there is reasonable evidence that the contractor will not complete the works within the contract time. In addition, the money retained by the owner is released to the contractor via subsequent progress payments. The project parties could agree to the furnishing of a retention bond instead of the

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Table 4. Extension of time after the recovery of liquidated damages

Standard contract form	Clause text associated with extension of time after the recovery of liquidated damages	Corresponding clause or article
1. ConsensusDocs	No explicit clause provided	No explicit clause provided
2. AIA	No explicit clause provided	No explicit clause provided
3. EJCDC	No explicit clause provided	No explicit clause provided
4. JCT	"If a new Completion Date is fixed after the issue of such a certificate, such fixing shall cancel that certificate and the Architect/ Contract Administrator shall where necessary issue a further certificate."	2.31
	"If the Architect/Contract Administrator fixes a later Completion Date for the Works or a Section or such later Completion Date is stated in a Confirmed Acceptance, the Employer shall pay or repay to the Contactor any amount recovered, allowed or paid under clause 2.32 for the period up to that later Completion Date."	2.32.3
	"If the Employer in relation to the Works or a Section has notified the Contractor in accordance with clause 2.32.1.2 that he may require payment of, or may withhold or deduct, liquidated damages, then, unless the Employer states otherwise in writing, clause 2.32.1.2 shall remain satisfied in relation to the Works or Section, notwithstanding the cancellation of the relevant Non-Completion Certificate and issue of any further Non-Completion Certificate."	2.32.4
	"Grant of an extension of time requires cancellation of a Non-Completion Certificate and, within a reasonable time, repayment of any liquidated damages insofar as they relate to the period of the extension; it also requires the issue of a further certificate in respect of any residual period of default."	2.30–2.32[a]
5. NEC	"If the Completion Date is changed to a later date after delay damages have been paid, the Employer repays the overpayment of damages with interest. Interest is assessed from the date of payment to the date of repayment and the date of repayment is an assessment date."	X7.2
6. FIDIC	"The applicability of Sub-Clause 8.7 is not dependent upon all extensions claimed by the Contractor having been agreed or determined. The contractor cannot prevent the deduction by submitting claims for extension of time. However, the Employer may lose his entitlement to claim delay damages if he prevents extensions of time being agreed or determined in accordance with the penultimate paragraph of Sub-Clause 20.1. If the Employer fails to comply (or prevents the Engineer from complying) with Sub-Clause 8.4, he may be unable to rely upon Sub-Clauses 8.2 and 8.7, under many countries' Laws."	8.7[b]
	"In the rare event of a subsequent extension of time, the amount recoverable has to be recalculated, and any overpayment refunded. No express provision is made for payment of financing charges in respect of this refund."	

[a]Specified in JCT (2011a).
[b]Specified in FIDIC (2000).

Table 5. Sectional or partial completion

Standard contract form	Clause text associated with the effect of sectional or partial completion on the stipulated amount	Corresponding clause or article
1. ConsensusDocs	No explicit clause provided	No explicit clause provided
2. AIA	No explicit clause provided	No explicit clause provided
3. EJCDC	No explicit provided	No explicit clause provided
4. JCT	"As from the Relevant Date, the rate of liquidated damages stated in the Contract Particulars in respect of the Works or Section containing the Relevant Part shall reduce by the same proportion as the value of the Relevant Part bears to the Contract Sum or to the relevant Section Sum, as shown in the Contract Particulars."	2.37
5. NEC	"If the Employer takes over a part of the works before Completion, the delay damages are reduced from the date on which the part is taken over. The Project Manager assesses the benefit to the Employer of taking over the part of the works as a proportion of the benefit to the Employer of taking over the whole of the works not previously taken over. The delay damages are reduced in this proportion."	X7.3
6. FIDIC	"If a Taking-Over Certificate has been issued for a part of the Works (other than a Section), the delay damages thereafter for completion of the remainder of the Works shall be reduced. Similarly, the delay damages for the remainder of the Section (if any) in which this part is included shall also be reduced. For any period of delay after the date stated in this Taking-Over Certificate, the proportional reduction in these delay damages shall be calculated as the proportion which the value of the part so certified bears to the value of the Works or Section (as the case may be) as a whole. The Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these proportions."	10.2

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Table 6. Collection mechanism of the liquidated sum

Standard contract form	Clause text associated with the collection mechanism of the liquidated sum	Corresponding clause or article
1. ConsensusDocs	"Owner may adjust or reject a payment application or nullify a previously approved payment application, in whole or in part, as may reasonably be necessary to protect Owner from loss or damage based upon the following, to the extent that Constructor is responsible under this Agreement: reasonable evidence of delay in performance of the Work such that the Work will not be completed within the Contract Time."	9.3.5
	"If Owner chooses to use this retainage provision: after the Work is fifty percent (50%) complete, Owner shall withhold no additional retainage and shall pay Constructor the full amount due on account of subsequent progress payments."	9.2.4.1
	"Owner may release retainage on that portion of the Work a Subcontractor has completed in whole or in part, and which Owner has accepted. In lieu of retainage, Constructor may furnish a retention bond or other security interest acceptable to Owner, to be held by Owner."	9.2.4.3
2. AIA	"The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss which the Contractor is responsible, including loss resulting from acts and omissions in Section 3.3.2, because of reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay."	9.5.1.6
	"Owner shall make payment of retainage applying to such Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents."	9.8.5
	"This provision contemplates full release of any withheld retainage at substantial completion, excepting only retainage for work that is incomplete or not in accordance with the contract documents and damages due to any delay on the part of the contractor in achieving substantial completion."	9.8.5[a]
3. EJCDC	"In addition to any reductions in payment (set-offs) recommended by Engineer, Owner is entitled to impose a set-off against payment based on any of the following: liquidated damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work."	15.01 E (j)
4. JCT	"The Employer may, not later than 5 days before the final date for payment of the amount payable under clause 4.15, give notice to the contractor in the terms set out in clause 2.32.2."	2.32.1
	"... the Employer may recover the same as a debt; and/or ... from sums due to the Contractor ... "	2.32.2
	"Following the Final Payment Notice the Employer may not later than 5 days before the final date of payment give a Pay Less Notice in accordance with clause 4.13.1 and, if he gives such notice, the provisions of clause 4.15.5 shall correspondingly apply."	4.15.6.3
	"A Pay Less Notice shall specify both the sum that the Employer considers to be due to the Contractor at the date the notice is given and the basis on which that sum has been calculated, and may be given on behalf of the Employer by the Architect/Contract Administrator, Quantity Surveyor or Employer's representative or by any other person who the Employer notifies the Contactor as being authorized to do so."	4.13.1
	"Where a Pay Less Notice is given under clause 15.5.4, the payment to be made on or before the final date for payment shall not be less than the amount stated as due in the notice."	4.15.5
	"The Retention Percentage may be deducted from so much of the total amounts as relates to: work where the Works or (where there are Sections) the Section(s) of which it forms part have not reached practical completion."	4.20.2
5. NEC	"The Project Manager assesses the amount due ... "	50.1
	"The amount due is 1. The Price for Work Done to Date, 2. Plus other amounts to be paid by or retained from the Contractor 3. Less amounts to be paid by or retained from the Contractor."	50.2
6. FIDIC	"This amount may be included as a deduction in the Contract Price and Payment Certificates. The Employer shall only be entitled to set off against or make any deduction from an amount certified in a Payment Certificate, or to otherwise claim against the Contractor, in accordance with this Sub-Clause."	2.5
	"The Employer shall not make a claim under the Performance Security, except for amounts to which the Employer is entitled under the Contract in the event of: failure by the Contractor to pay the Employer an amount due, as either agreed by the Contractor or determined under Sub-Clause 2.5 [Employer's Claim] or Clause 20 [Claims, Disputes and Arbitration], within 42 days after this agreement or determination."	4.2
	"If the Employer becomes entitled to call the Performance Security under any of the circumstances described in sub-paragraphs (b) to (d) of Sub-Clause 4.2, the Employer may only claim the amount to which he is entitled to be paid by the Contractor under the Contract."	4.2[b]

[a]Specified in AIA (2007c).
[b]Specified in FIDIC (2000).

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retainage money. Under AIA, the architect can withhold or nullify a certified payment if there is a reasonable evidence that the contractor will not complete the works on time, and that the money accessible to the owner to cover actual damages or LD is not enough. Moreover, AIA states that the owner can withheld retainage money if the contractor did not finish the works within the contractual completion date. Under EJCDC, the owner can impose a set-off against any certified progress or final payments if LD are due from the contractor to the owner.

JCT explicitly specifies that the owner can recover LD as a debt or from sums due to the contractor. If the second option is chosen, the owner (or the architect/contract administrator, the quantity surveyor, the owner's representative, or any other authorized person) is required to give a pay-less notice to the contractor stating its intention to withhold or deduct a sum that is otherwise payable to the contractor. This notice should specify the sum that the owner determines is due from the contractor, and the basis on which that sum has been calculated. However, if the owner requires the contractor to pay, and the contractor fails to do so, the owner can then recover the LD as a debt. In addition, retention money could be withheld if the works are not completed on time. Under NEC, the project manager assesses the amount due, and this amount includes provisions for delay damages. Under FIDIC, the owner can set-off against or make any deduction from a certified payment, following the submission of a claim against the contractor in accordance with Subclause 2.5. Moreover, FIDIC explicitly allows the owner to claim, for the recovery of LD, under the performance security if the contractor fails to pay the amounts due (including LD) as determined under Subclause 2.5.

Most construction contract forms require the contract administrator (the engineer, architect, or any specified party) to value the progress of the works, and the owner is given the discretion to deduct the stipulated damages from moneys due to the contractor. NEC specifically requires the project manager to deduct or withhold such payments as part of making the valuation assessment and issuing the payment certificate.

Ultimately, as demonstrated in Table 6, the owner is entitled to withhold or deduct from moneys due or to become due to the contractor to recover LD. As such, the available payment-related instruments that serve this purpose include interim payments, final payment, retention money, retention bond, and performance guarantee/security. As such, the subsequent section studies the timing of LD recovery, the impacts of the recovery strategies that utilize these payment-related instruments, and the interplay among their possible usages. The possible recovery scenarios and their effects on the amount of money accessible for levying LD are also presented.

Comparison of the Standard Conditions Governing the Recovery of Delay Damages

Table 7 presents a summary and comparison between the standard conditions governing the recovery of delay damages as stipulated by the studied six contract forms. As shown in Table 7, ConsensusDocs and AIA are the only contract forms that explicitly state that the owner can collect LD when there is *a reasonable evidence* that the contractor will not be able to finish the construction work within the contract time. The other contract forms do not provide such an explicit wording. This specification assists in helping answer the research question by addressing the time at which the owner can start the recovery of LD. In addition, the various standard contract forms use different notations for designating the completion of the work. However, the period of assessment for collecting LD under the different contract forms is generally the substantial/practical completion of the works, that is, the date at which the owner takes over the project for its intended use as specified in the contract documents.

Moreover, all contract forms agree on the fact that the liquidated amount is generally expressed as a rate that shall reflect a reasonable estimate of the future probable damages suffered by the owner and not a penalty. Additionally, JCT, NEC, and FIDIC explicitly provide that the predetermined damages shall be reduced when sectional/partial completion occurs, and that LD shall be repaid to the contractor in case a subsequent extension of time is granted. Further, all contract forms allow the owner to collect LD as set-offs from moneys due to the contractor. Finally, the JCT is the only contact form that explicitly allows the owner to decrease the liquidated rate by issuing a notice to the contractor, and FIDIC is the only contract form that explicitly specifies a recommended limit on the amount of delay damage if the contracting parties choose to include a cap.

Timing of Liquidated Damages Recovery

Eggleston (2009) discussed how the timing of such recovery has traditionally been decided. To this end, reference was made to Clause 24 of JCT 80, prior to its amendment, which specifies that the contractor should pay or allow to the owner, "the whole or such part as may be specified in writing by the employer of a sum calculated at the rate stated in the Appendix ... for the period between the completion date and the date of practical completion" (Eggleston 2009). A reasonable interpretation of such contract language could be to the effect that the contractor should pay to the owner a well-defined single sum that could only be determined after actual completion has occurred and extensions of time having already been agreed and granted. This means that any deductions or withholdings before actual completion of the works are not contractually possible. The ambiguity in this previous JCT's clause was removed by Amendment 9 to JCT 80, stating, "... the contractor shall as the employer may require in writing but not later than the date of the final certificate pay or allow to the employer liquidated and ascertained damages at the rate stated in the Appendix (or such lesser rate as may be specified in writing by the employer) for the period between the completion date and the date of practical completion and the employer may deduct the same from any moneys due or to become due to the contractor under this contract..." (Eggleston 2009). This amendment removed the expression *of a sum*, which previously contributed to some uncertainties in interpreting the prior language. The new language made it clear that the owner can deduct LD prior to practical completion if they choose to do so, thereby allowing the avoidance of disputes in relation to the timing at which the owner can start the recovery of LD.

Table 8 summarizes the wording corresponding to the timing of recovery of LD, as stipulated by the different standard conditions for the construction contract examined in this study. It also presents the inferences made as to whether LD recovery is allowed to take place before or after the expiration of the contractual completion date. It can be concluded that only the language adopted by AIA and ConsensusDocs explicitly offers the owner the opportunity to start levying LD prior to the expiration of the agreed completion date.

Based on the aforementioned information, it could be concluded that three main options exist as related to the timing of LD recovery by the owner: (1) recovery before the expiration of the contractual substantial completion date, (2) recovery after the expiration of the contractual substantial completion date but before the actual

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Table 7. Summary and comparison of LD provisions under the different standard conditions

Condition	ConsensusDocs	AIA	EJCDC	JCT	NEC	FIDIC
When could the owner start collecting LD?	When there is a reasonable evidence that the contractual completion will not be achieved	When there is a reasonable evidence that the contractual completion will not be achieved	When the works are not actually completed on time	When the works are not actually completed on time	When the works are not actually completed on time	When the works are not actually completed on time
Is the substantial completion considered as the period for LD's assessment?	Yes	Yes	Yes	Yes	Yes	Yes
What are the characteristics of the liquidated amount?	Difficult to determine and accurately specify, as liquidated damages and not as a penalty, expressed as a daily rate	Not a penalty and must beat an actual and reasonably estimable relationship to the owner's loss	The stipulated amount shall act as liquidated damages and not a penalty	Delay damages are expressed as a rate	Genuine pre-estimate of likely loss, should not constitute a penalty, delay damages are expressed as a rate	A reasonable estimate of the owner's losses or forgone benefits, delay damages are expressed as a sum or as a percentage of the contract price, a maximum limit on the delay damages exists
Shall LD be reduced for sectional completion?	No explicit provisions	No explicit provisions	No explicit provisions	Yes	Yes	Yes
What happens if extension of time is granted after the collection of delay damages?	No explicit provisions	No explicit provisions	No explicit provisions	Cancelation of the noncompletion certificate and repayment of any liquidated damages	The owner repays the overpayment of damages with interest	The amount recoverable has to be recalculated, and any overpayment refunded. No express provision is made for payment of financing charges in respect of this refund
Can the owner recover LD as set-offs from payments due to the contractor?	Yes	Yes	Yes	Yes	Yes	Yes
Is there an explicit recommended limit on LD if the parties choose to?	No	No	No	No	No	Yes
Is there an explicit language that allows the owner to reduce the LD if they elect to?	No	No	No	Yes	No	No

Table 8. Liquidated damages recovery period under standard contract forms

Standard contract form	Contract language	Starting point of the recovery period
1. ConsensusDocs	"Owner may adjust or reject a payment application or nullify a previously approved payment application . . . based upon the following . . . : **reasonable evidence** of delay in performance of the Work such that the Work **will not** be completed within the Contract Time."	Before expiration of the contractual completion date
2. AIA	"The Architect may also withhold a Certificate for Payment or . . . may nullify the whole or a part of a Certificate for Payment previously issued . . . because of **reasonable evidence** that the Work **will not** be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay."	Before expiration of the contractual completion date
3. EJCDC	" . . . Owner is entitled to impose a set-off against payment based on any of the following: liquidated damages **have accrued** as a result of **Contractor's failure** to achieve Milestones, Substantial Completion, or final completion of the Work."	After expiration of the contractual completion date
4. NEC	" . . . the **Contractor fails** to complete the works by the Completion Date . . . "	After expiration of the contractual completion date
5. JCT	"If the **contractor fails** to complete the Works or a Section by the relevant Completion Date."	After expiration of the contractual completion date
6. FIDIC	"If the **Contractor fails** to comply with Sub-Clause 8.2 [Time for Completion] . . . " " . . . if the Works, or a Section (if any), **are not** completed within the Time for Completion."	After expiration of the contractual completion date

Note: Bold and underline denote text in support of the timing of liquidated damages recovery.

substantial completion date, and (3) recovery after the actual completion date. Fig. 1 shows these options as to better visualize and understand the timing of each recovery option.

The recovery Option 1 illustrated in Fig. 1 calls for the collection of delay damages before the expiration of the contractual completion date. Nevertheless, the owner is eligible to start such recovery only if the contract allows that. As previously stated, AIA and ConsensusDocs are the only standard forms that have an explicit language allowing the owner to start the collection of LD when there is a *reasonable evidence* that the work will not be completed within the contract time. This reasonable evidence could be the schedule updates, submitted by the contractor, and showing a completion date beyond the contractual one due to what will be viewed as nonexcusable delays. The recovery Option 2 shown in Fig. 1 calls for the recovery of LD after the expiration of the contractual substantial completion date but before taking over of the works. As shown in Table 8, all examined standard forms of the construction contract provide that the owner becomes entitled to the recovery of LD when the contractor fails to complete the works on time (that is, when the contractual completion date expires but the works are still not completed). This is considered applicable also in the AIA and ConsensusDocs cases, as these forms inherently allow such recovery at even earlier stages. The recovery Option 3 illustrated in Fig. 1 calls for the collection of LD during the maintenance and operation phase of the project; that is, after the actual completion of the construction work by the contractor.

Having said that, it is vital to know the available strategies or tools that could be used by the owner under each LD's timing recovery option to ensure the availability of enough accessible money from which the appropriate amount of LD may be collected. In this regard, the owner may wish to start exercising one strategy or tool at a time or might choose to use a combination of strategies or tools at some point in time. Note that each tool can have different impacts on the contractor's rate progress with the works. Therefore, it becomes important to study the possible recovery strategies and the interplay among the available instruments, as subsequently discussed. In what follows, the FIDIC's provisions will be used as an example to better understand the mechanism of the different recovery strategies.

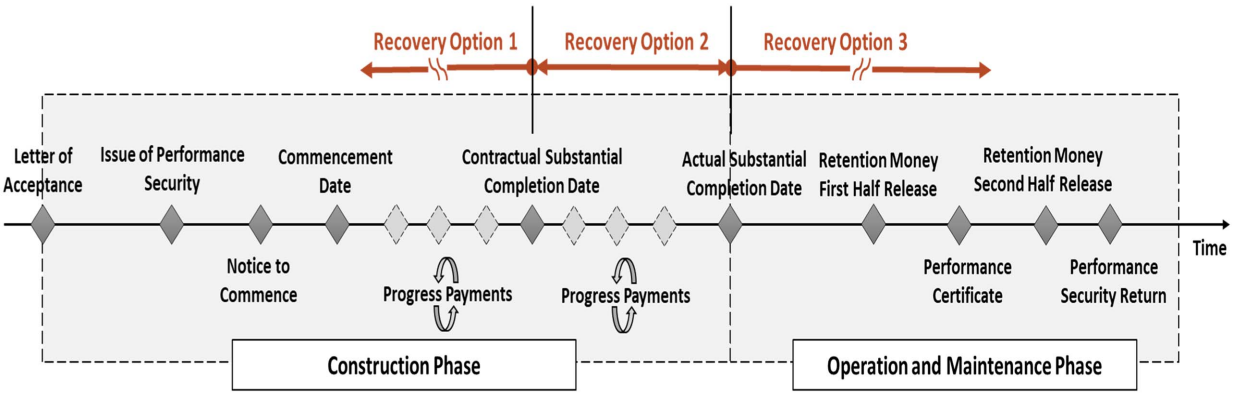

Fig. 1. Timing of different liquidated damages' recovery options.

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Strategy 1: Use of Unpaid Progress Payments to Recover Liquidated Damages

Strategy 1 calls for the use of the unpaid progress payments to recover LD. This strategy could be implemented by the owner under recovery Option 1, Option 2, and in some cases under Option 3 (if the owner starts the recovery of the LD before the payment of the last remaining progress payment). Unpaid progress payments are moneys due from the owner to the contractor for works previously performed by the latter. The unpaid progress payment reflects deductions in respect of the recovery of the advance payment (if any) and the effectuation of retention and other withholdings and set-offs, as the case may be. In addition, the unpaid progress payment up to month i is equal to the cumulative billed and executed works by the contractor at the end of month i minus the summation of the amounts successively paid to the contractor during each month up to month i. As such, the amount of the unpaid progress payments, as influenced by the contractor's rate of progress with the works, greatly affects the money accessible to the owner for collecting delay damages.

FIDIC's conditions as related to the application, certification, and payment of progress payments could be summarized by the following subclauses:

- FIDIC's (1999) Subclause 14.3 [Application for Interim Payment Certificates] states that, "The Contractor shall submit a Statement in six copies to the Engineer after the end of each month, in a form approved by the Engineering, showing in detail the amounts to which the Contractor considers himself to be entitled, together with supporting documents which shall include the report on the progress during this month."
- FIDIC's (1999) Subclause 14.6 [Issue of Interim Payment Certificates] stipulates that, "The Engineer shall, within 28 days after receiving a Statement and supporting documents, issue to the Employer an Interim Payment Certificate which shall state the amount which the Engineer fairly determines to be due, with supporting particulars."
- FIDIC's (1999) Subclause 14.7 [Payment] provides that, "The Employer shall pay to the Contractor the amount certified in each Interim Payment Certificate within 56 days after the Engineer receives the Statement and supporting documents." This reflects that in case the 28 days, stipulated by Subclause 14.6, were all exhausted by the engineer, the owner shall pay to the contractor within 28 days after the engineer's certification of the amount due.

As far as the collection mechanism of the delay damages is concerned, FIDIC's (2000) Subclause 8.7 provides that, "If the Employer considers himself to be entitled to be paid delay damages, he is required to give notice and particulars in accordance with Sub-Clause 2.5." In addition, FIDIC's (1999) Subclause 2.5 states that, "The notice shall be given as soon as practicable and no longer than 28 days after the Employer became aware, or should have become aware, of the event or circumstances giving rise to the claim . . . The Engineer shall then proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine the amount (if any) which the Employer is entitled to be paid by the Contractor." Further, FIDIC's (1999) provides that, "determinations shall not be unreasonably withheld or delayed." To this end, the owner is not entitled to withhold or deduct moneys due to the contractor unless and until all the steps required under Subclause 2.5 and Subclause 3.5 are followed. In other words, the owner is not entitled to collect delay damages before (or while waiting for) the outcome of the procedures described under Subclauses 2.5 and 3.5. Therefore, there exists three scenarios of the timing of recovery of LD under Strategy 1: (1) prompt compliance with the requirements of both Subclauses 2.5 and 3.5; (2) nonprompt compliance with the requirements of Subclause 2.5 and prompt compliance with the requirements of Subclause 3.5; and (3) prompt compliance with the requirements of Subclause 2.5 and nonprompt compliance with the requirements of Subclause 3.5.

Scenario 1: Prompt Compliance with the Requirements of Both Subclauses 2.5 and 3.5

Scenario 1 occurs when (1) the owner's submission of notice and particulars (requirements of Subclause 2.5) takes place promptly, and (2) the duration of the engineer's determination (requirements of Subclause 3.5) is relatively short. Scenario 1 is shown in Fig. 2, where the amount of accessible money refers to the certified interim payments and the amount of the available security money refers to the value of the performed work. To better visualize and understand the amount of money that could be used to levy delay damages, two observations are depicted, just after the end of month $i + 2$ and month $i + 3$, respectively (Fig. 2).

As shown in Fig. 2, under Scenario 1, the owner benefited from the prompt compliance with the requirements of Subclauses 2.5 and 3.5 because the engineer's determination happened before the owner's next payment to the contractor (certified amount for month i) became due and thus they were able to deduct LD from that payment. To this end, under Scenario 1, the accessible amount of money for the recovery of delay damages is equal to two certified interim payments (months i and $i + 1$) for Observations 1 and to 3 certified interim payments (months i, $i + 1$, and $i + 2$) for Observation 2. In addition, the amount of security money available for the owner is equivalent to the worth of work performed during 3 months (months i, $i + 1$, and $i + 2$) for Observation 1 and to the worth of work performed during 4 months (months i, $i + 1$, $i + 2$, and $i + 3$) for Observation 2.

Scenario 2: Nonprompt Compliance with the Requirements of Subclause 2.5 and Prompt Compliance with the Requirements of Subclause 3.5

Scenario 2 occurs when (1) the owner's submission of notice and particulars (requirements of Subclause 2.5) takes place nonpromptly, and (2) the duration of the engineer's determination is relatively short (requirements of Subclause 3.5). Scenario 2 is shown in Fig. 3 along with the same observations as those presented in Scenario 1. Scenarios 1 and 2 differ by only one parameter: the promptness of the submission of notices and particulars by the owner under Subclause 2.5. In Scenario 2, the owner is at a disadvantage because of the relatively late submission of notices and particulars; that is, due to the late compliance with the requirements of Subclause 2.5 leading to a notice submission occurring after the owner's first payment to the contractor (certified amount for month i), the owner thus looses the opportunity to deduct LD from that payment. As such, as shown in Fig. 3, the owner lost the ability to deduct the value of the works performed and certified during a complete month (month i). This is reflected in Fig. 3 where the accessible amount of money is equal to one certified interim payment (month $i + 1$) for Observation 1 (as compared to two certified interim payments under Scenario 1) and to two certified interim payments (months $i + 1$ and $i + 2$) for Observation 2 (as compared to three certified interim payments under Scenario 1). In addition, the amount of security money available for the owner is equivalent to the worth of work performed during 2 months (months $i + 1$ and $i + 2$) for Observation 1 (as compared to 3 months under Scenario 1) and to the worth of work performed during 3 months (months $i + 1$, $i + 2$, and $i + 3$) for Observation 2 (as compared to 4 months under Scenario 2).

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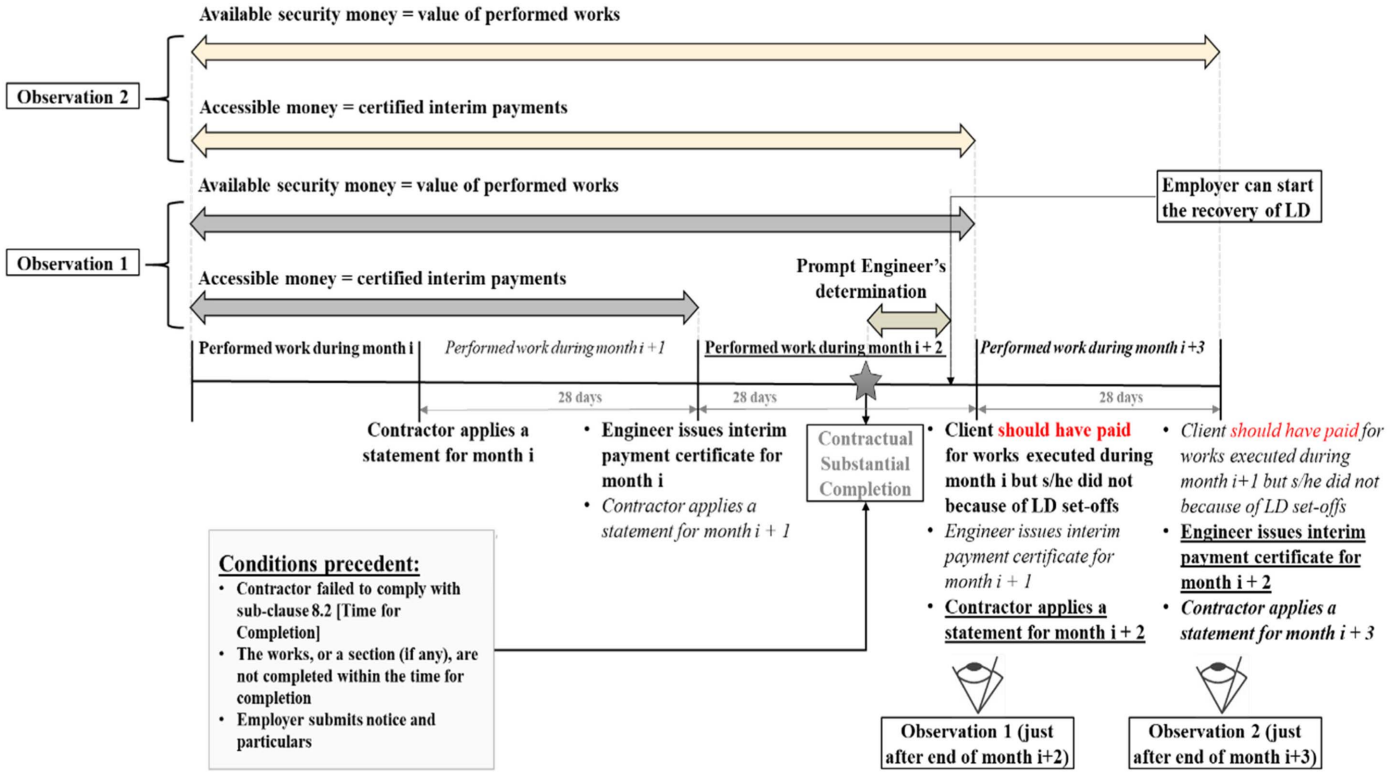

Fig. 2. Scenario 1 (the month's index and the corresponding actions have the same text format).

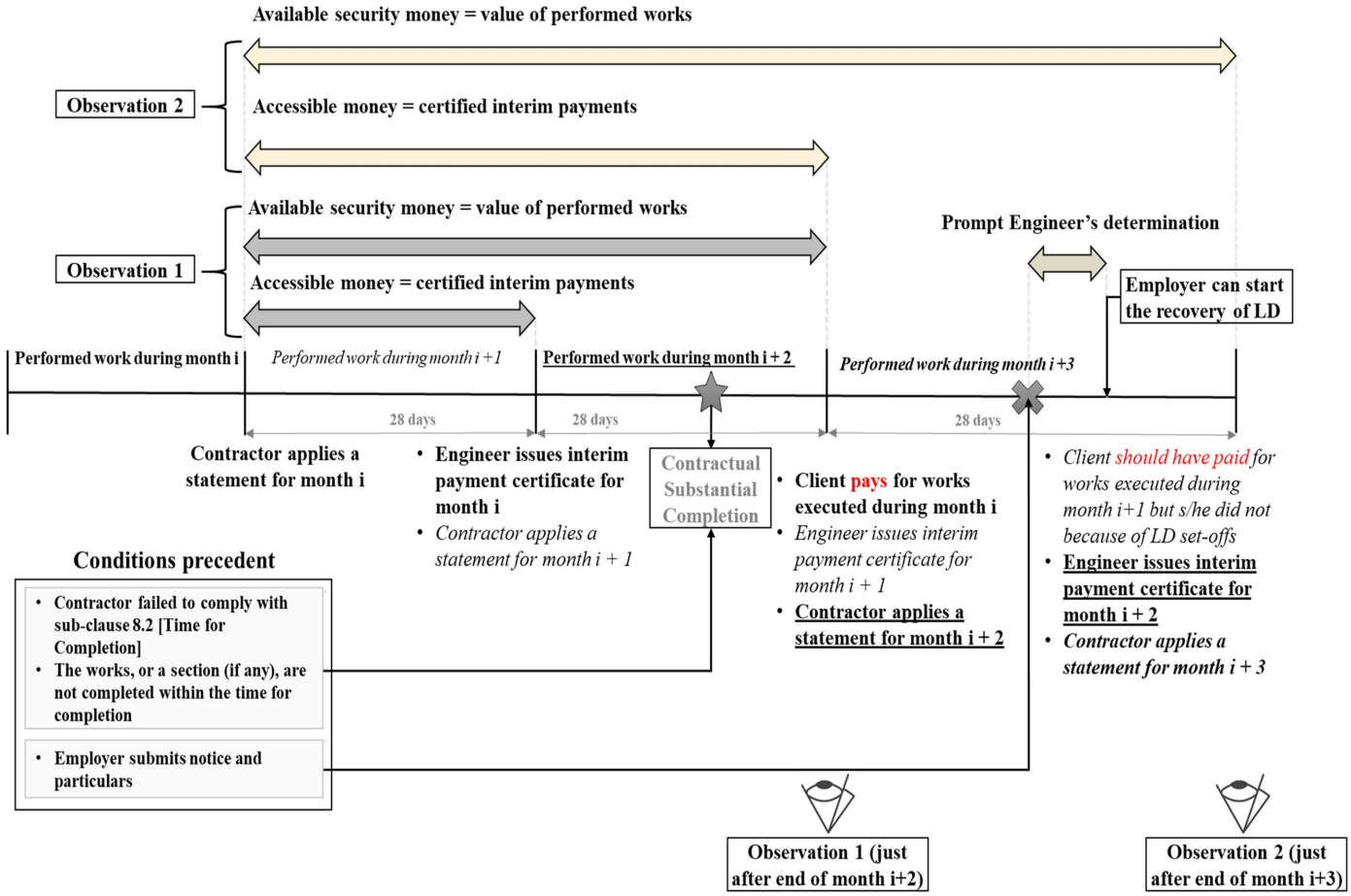

Fig. 3. Scenario 2 (the month's index and the corresponding actions have the same text format).

The lost amount of money under Scenario 2 (as compared to Scenario 1) could be equal to around 4%–5% (100% divided by 24 months) of the contract price for a 2-year project. This amount of money is considerably high. Note that an average earned value of 4%–5% was considered for demonstrative purposes; indeed, the progress of the works varies during different periods of the project. As such, depending on the project's construction phase period under investigation, the owner may have higher or lower earned value percentages. It is concluded that the amount of unpaid progress payments that could be used for the recovery of LD can be enhanced by timely submission of notices and particulars.

Scenario 3: Prompt Compliance with the Requirements of Subclause 2.5 and Nonprompt Compliance with the Requirements of Subclause 3.5

Scenario 3 occurs when (1) the owner's submission of notice and particulars (requirements of Subclause 2.5) takes place promptly, and (2) the duration of the engineer's determination is relatively long (requirements of Subclause 3.5). Scenario 3 is shown in Fig. 4 along with the same observations as those presented in Scenarios 1 and 2. Scenarios 1 and 3 differ by only one parameter: the period of the engineer's determination under Subclause 3.5. The same analysis of that of Scenario 2 applies to Scenario 3. In Scenario 3, and as shown in Fig. 4, the owner is at a disadvantage because of the relatively long period of the engineer's determination as this leads to the certification happening after the owner's first payment to the contractor (certified amount for month *i*), and the owner thus looses the opportunity to deduct LD from that payment. Similarly, it is concluded that the amount of unpaid progress payments that could be used for the recovery of LD can be enhanced by a short/prompt engineer's determination period.

Strategy 2: Use of Retention Bond to Lessen LD Recovery Effects

Note that excessive LD set-offs from progress payments are likely to lead to a cash flow shortfall and slow progress of the work, ultimately affecting the contractor's ability to provide construction financing for the execution of the remaining works. To this end, it is worth noting the stipulation by the FIDIC under Subclause 8.7 (FIDIC 2000), which sheds the light on this important repercussion, stating that, "Before the Employer deducts delay damages from moneys due to the Contractor, he could consider whether the delay is a reflection of cash flow shortfall from interim payments. If so, further diminution of cash flow (by withholding delay damages) could exacerbate the situation." This shows that owners may opt not to use the unpaid progress payments as a core strategy for recovering LD, thus necessitating the reliance on alternative recovery strategies, to the extent that is possible. As such, a second strategy that the owner could implement is the use of a retention bond.

A retention bond is a form of guarantee submitted by the contractor to the owner in return for releasing the retention money withheld by the owner up to the date of issuance of the said bond. The retention bond can mainly be used when the contractor starts experiencing construction financing problems as a ramification of the LD recovery process that has been put in place by the owner. The owner's release of such retained cash to the contractor, in return for such contractor's furnished security, will help the latter in expediting the progress of the works in order to avoid further delays in achieving substantial/practical completion. This facility by the owner is believed to keep them in a risk neutral situation because any portion of the released retention money could be collectable again, and at any time, via calling on the retention bond.

The retention bond mechanism is supported by the stipulation under JCT's (2011b) Subclause 4.19.2 [retention bond], providing

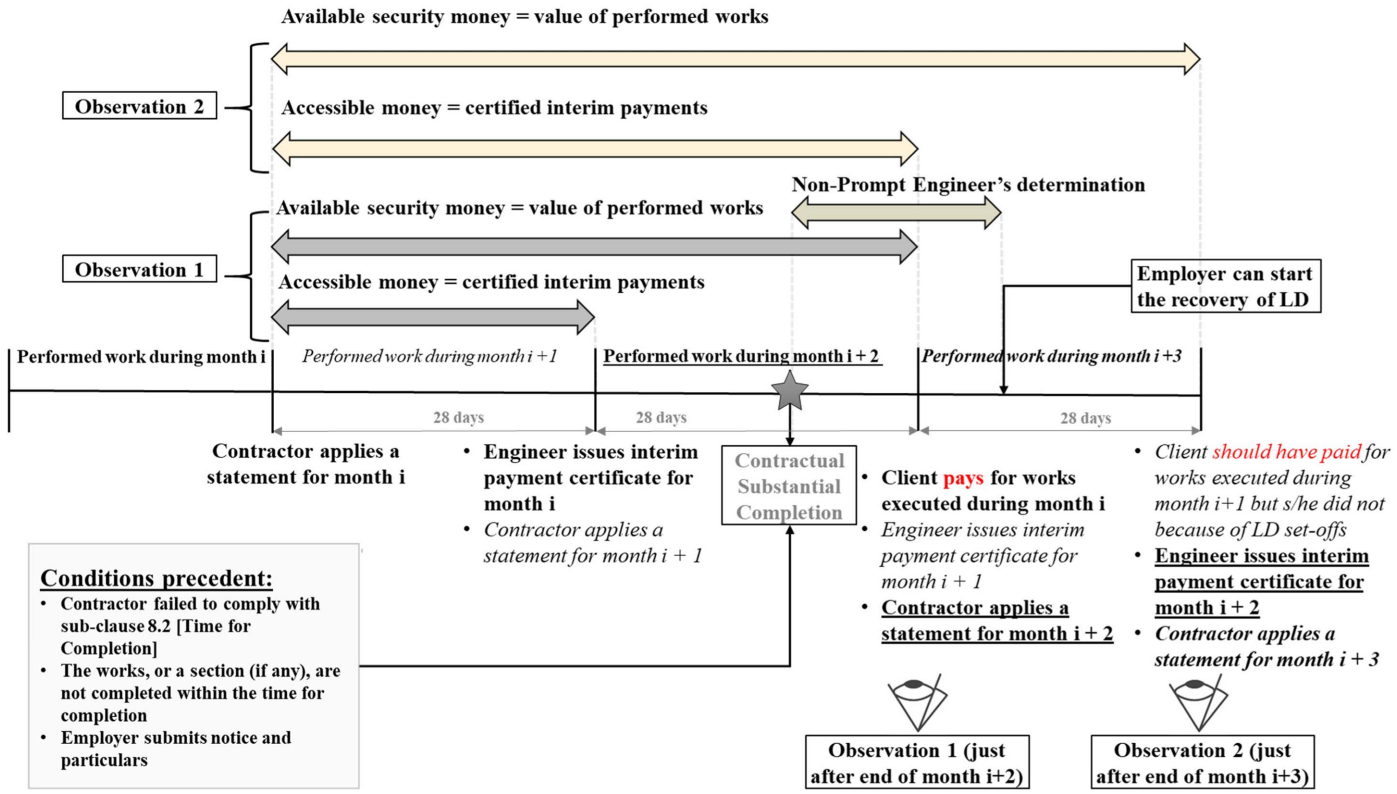

Fig. 4. Scenario 3 (the month's index and the corresponding actions have the same text format).

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that, "where the Contract Particulars state that clause 4.19 applies, then: on or before the Date of Possession the Contractor shall provide to the Employer and thereafter maintain a bond (the Retention Bond)." As such, Strategy 2 could be implemented by the owner under recovery Option 1 and Option 2 (Fig. 5). Therefore, because the retention bond could be issued on or before the actual completion of the works, it could also be used as a remedy for alleviating the effects of LD recovery through progress payment deductions by the owner. Fig. 5 shows the strategy of using the retained money in return for a retention bond for the purposes of avoiding further delays likely to emanate from the triggered LD recovery process. The employment of such a remedy would be an indication of the owner's good will in helping the contractor complete the works while minimizing the inevitable effects of triggering the collection of LD before actual substantial completion is achieved.

As shown in Fig. 5, there exist two possible cases when the retention bond is used as a strategy. Case 1 occurs when the retained money up to time t_i is greater than the amount of delay damages (that is, there is no LD balance), and Case 2 occurs when the retained money up to time t_i is less than the amount of liquidated damages (that is, an LD balance is present). To ensure complete recovery of LD, the distribution of the released money differs between the two cases, but with the total amount released to the contractor being the same and equal to the delay damages amount subtracted from the total retainage, such that the total collected money by the owner is equal to the amount of delay damages.

Strategy 3: Use of Retained Money to Recover Liquidated Damages

Retention can be defined as holding a part of the payments due to the contractor up to an agreed limit (Dayanand and Padman 2001). The retained money is usually released to the contractor in two halves: after actual substantial completion, and after the defects notification period. For instance, FIDIC's (1999) Subclause 14.9 [Payment of Retention Money] stipulates that, "When the Taking-Over Certificate has been issued for the Works, the first half of the Retention Money shall be certified by the Engineer for payment to the Contractor, [and] promptly after the latest of the expiry dates of the Defects Notification Periods, the outstanding balance of the Retention Money shall be certified by the Engineer for payment to the Contractor." The retention money primarily serves to retain the contractor's profit in order to maintain its interest in remedying the defects during the construction phase and during the defects notification period. However, the owner may elect to use the retained money to levy LD in case they do not have in hand sufficient unpaid progress payments; that is when the collected amount of delay damages from progress payments is less than the amount of delay damages due. Strategy 3 is mainly applicable under recovery Option 3 (Fig. 1). The mechanism for the interplay between triggered LD recovery and retained money usage is depicted in Fig. 6.

As shown in Fig. 6, the owner has collected an amount P_i at time t_i from progress payments that were otherwise due to the contractor. Nevertheless, the collected amount was not enough to ensure a complete recovery of LD for the owner because of the insufficiency in the available unpaid progress payments. As such, to ensure a complete recovery, the owner can use the retention money to levy delay damages. The total amount released to the contractor as retainage is equal to the total retainage reduced by the delay damages amount and then added to P_i (which was previously collected by the owner), such that the total collected money by the owner is equal to the amount of delay damages.

Strategy 4: Use of Performance Security to Recover Liquidated Damages

The last strategy (Strategy 4) is to use the performance bond/security/guarantee to levy LD. Performance bond is a guarantee submitted by the contractor to the owner in order to cover the owner's additional costs in the following cases: disputes between the owner and the builder; the contractor's insolvency, bankruptcy, default; and contract termination (Supardi et al. 2009). Some standard contract forms allow the owner to use the performance security to collect delay damages. For instance, FIDIC's (1999) Subclause 4.2 states that, "The Employer shall not make a claim under the Performance Security, except for amounts to which the Employer is entitled under the Contract in the event of: failure by

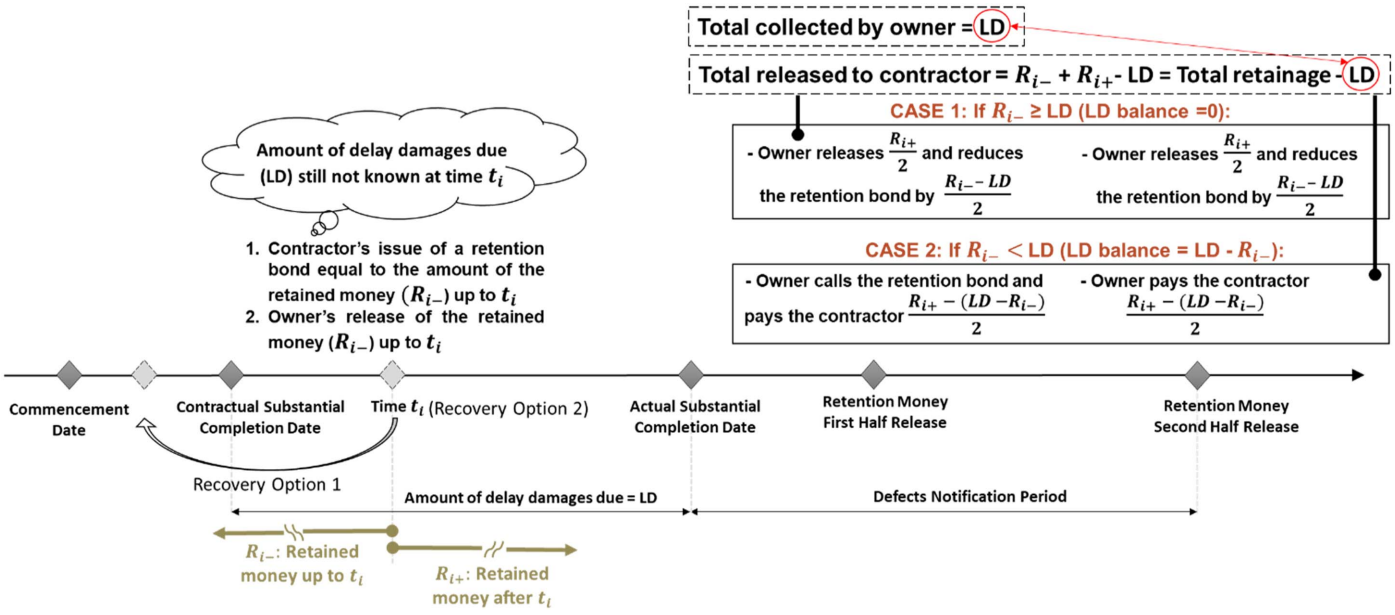

Fig. 5. Interplay between triggered LD recovery and retention bond usage.

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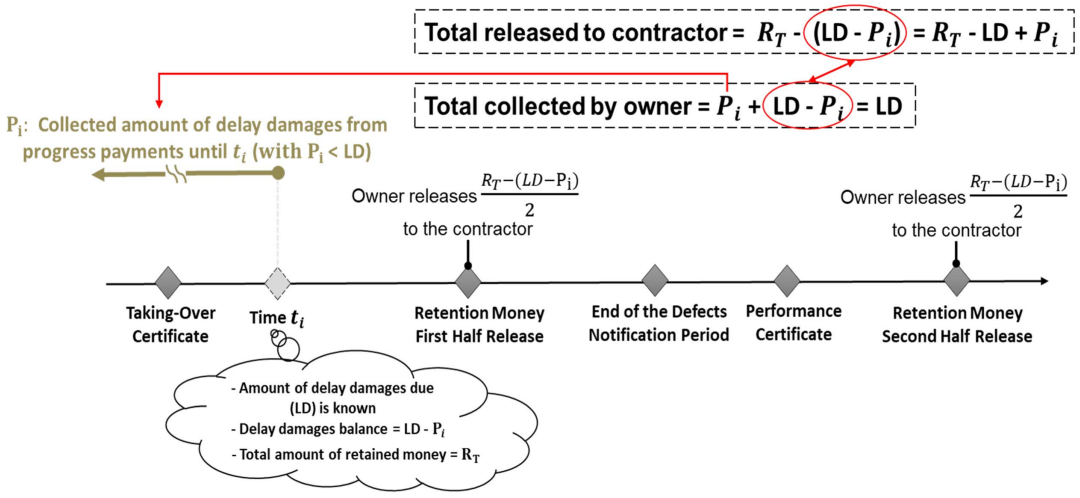

Fig. 6. Interplay between triggered LD recovery and retention money usage.

the Contractor to pay the Employer an amount due, as either agreed by the Contractor or determined under Sub-Clause 2.5 [Employer's Claim] or Clause 20 [Claims, Disputes and Arbitration], within 42 days after this agreement or determination … the Employer shall return the Performance Security to the Contractor within 21 days after receiving a copy of the Performance Certificate." FIDIC's (2000) adds that, "The Performance Security is required to be valid until the Works are complete and defects have been remedied, [and] if the Employer becomes entitled to call the Performance Security, [they] may only claim the amount to which he is entitled to be paid by the Contractor under the Contract." Notwithstanding possible stipulations (to the contrary) under the laws governing the contract, these provisions show that there is no contractual objection to the usage of performance guarantee for the collection of LD, and that this strategy could be used after the actual completion of the works (that is under Option 3 in Fig. 1) because the security remains valid until all works have been completed and remedied. The mechanism for the interplay between triggered LD recovery and performance security usage is depicted in Fig. 7.

As shown in Fig. 7, the owner has collected an amount P_i at time t_i from progress payments due to the contractor. Nevertheless, the collected amount was not enough to ensure a complete recovery of LD for the owner because of the insufficiency in the available unpaid progress payments. As such, to ensure a complete recovery, the owner can use the performance security/guarantee/bond to levy delay damages. In such cases, the owner calls on the performance security for an amount equal to the delay damages due reduced by P_i, such that the total collected money by the owner is equal to the full amount of delay damages.

Impacts of the Interplay between Triggered Liquidated Damages Recovery and Strategies Usage

Although the amount of money recovered by the owner under each of the strategies 1 to 4 is equal to the amount of delay damages due, the impacts of the interplay between triggered LD recovery and the usage of different strategies are not the same. In general, the use of Strategy 1 (unpaid progress payments) to levy LD benefits both parties. For the contractor, it can be considered as a motivation to finish on time (otherwise, the progress payments will not be paid), and it does not affect their reputation. For the client, it avoids the burden and cost of suing for recovery and protects them from insolvent contractors; otherwise, the owner must collect LD as a debt from the contractor. In addition, the owner benefits from the recovery of LD before the contractual completion date as they bear less risk about the quality of the works because they still hold in hand the retention money and the performance security, which could be called anytime later on if any quality defects exist. Conversely, the recovery of LD from unpaid progress payments might affect the financial status of the contractor because such collection is being entertained while the works are still in progress. As such, the contractor might experience a cash flow shortfall as a result of the usage of Strategy 1.

The owner's use of Strategy 2 (retention bond) to collect LD enhances the financing status of the contractor because the

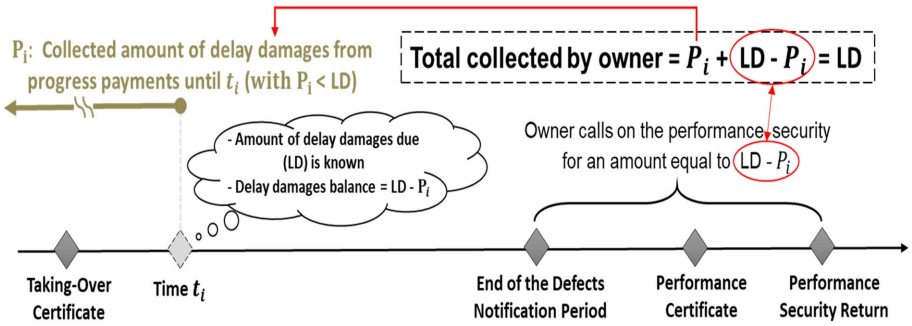

Fig. 7. Interplay between triggered LD recovery and performance security usage.

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retention money is released in cash; thus, it could be used to accelerate the contractor's rate of progress with the works. Strategy 2 is expected to reduce (and sometimes even cancel) the period of the delay and thus leads to fewer damages suffered by the owner and to a lesser contractor's liability in terms of the amount of LD due. Further, the recovery of LD using Strategy 3 (retention money) or Strategy 4 (performance guarantee) will not affect the financial status of the contractor because the actual collection of delay damages will be entertained after the actual completion of the works. Therefore, the owner will mainly choose these strategies to conciliate the cash flow implications of levying LD. Nevertheless, owners usually do not prefer to use of retention money or performance guarantee for the recovery of delay damages. This is owing to retention having the primary aim keeping the contractor interested in the project as to remedy all defects during the construction period, up to substantial completion, and spanning further until the end of the defect liability period. In addition to that, the use of Strategy 4 ruins the contractor's reputation in front of their guarantor and their credibility when seeking similar securities in the future.

Having said that, it is vital for the owner to know the available strategies or tools that could be used under each LD's timing recovery option to ensure the availability of enough accessible money from which the appropriate amount of LD may be collected. In this regard, the owner may wish to start exercising one strategy or tool at a time or choose to use a combination of strategies or tools at some point in time. Nevertheless, note that each strategy or tool can have a different impact on the contractor's rate progress with the works.

Conclusions

The paper singled out, reviewed, compared, and analyzed the standard conditions governing the recovery of LD under the following standard forms of the construction contract: AIA, ConsensusDocs, EJCDC, FIDIC, JCT, and NEC. This was performed on six levels: condition precedency, period of assessment, characteristics of the liquidated amount, extension of time after recovery of LD, sectional completion, and the collection mechanism of the liquidated sum. In addition, the study presented in this paper examined the timing of LD recovery and the related liability issues, and explored the different strategies or tools that could be used by the owner to ensure an ultimate recovery of delay damages. Moreover, the paper identified a gamut of options depicting different possibilities for the timing of recovery of LD as related to the contractual substantial completion and the actual substantial completion of the construction work. Furthermore, the paper pinpointed three scenarios regarding the effects of the timing of meeting LD recovery requirements on the available amount collected in delay damages. Finally, the impacts of four recovery strategies were presented.

It was found that all six standard conditions of the construction contract require the contract administrator (being the engineer or the architect or any specified party) to certify that the contractor failed to complete within the agreed time, and the owner to give a written notice to the contractor stating their intention to deduct or withhold LD. It was also concluded from the provisions of ConsensusDocs and AIA that LD could be recovered before the contractual completion of the work if there is a reasonable evidence that the contractor will not finish on time. In such cases, the contractor's schedule updates, showing a delayed completion could be used as a reasonable evidence. Conversely, it was concluded from the provisions of EJCDC, NEC, JCT, and FIDIC that LD are recovered after the expiration of the contractual completion of the work. Based on that, three timing recovery options were identified: (1) before the expiration of the contractual substantial completion date, (2) after the substantial contractual completion date but before the actual substantial completion date, and (3) after the actual substantial completion date. Furthermore, the findings reflected that the owner can use four main strategies to recover delay damages: progress payments, retention bond, retention money, and performance security. It was also highlighted that each strategy has its own impacts on the contractor's rate of progress with the works. Ultimately, the study's contribution lies in advancing a clearer discernment on the LD recovery mechanism in terms of timing and available instruments/strategies. As such, the findings of this study assisted in identifying what may be viewed as the suitable time(s) that owners become entitled to start levying delay damages as well as in deciding on the best recovery tool(s).

Data Availability Statement

All data, models, and code generated or used during the study appear in the published article.

Acknowledgments

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