

Article

# What Are the Readability Issues in Sub-Contracting's Tender Documents?

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**Abstract:** Readability is an important aspect that each sub-contracting's tender documentation should have in order to ensure commonality in the interpretation of its terms by the general contractor and sub-contractor. Otherwise, their contractual relationship is fueled by conflict. Previous studies indicated that the documents provided to the sub-contractors in practice are often not easy to read; the reason behind this problem has not been explored yet. This paper bridges this gap by defining 14 readability issues, following a systematic content analysis of real documents of 34 tenders of the sub-contracting arrangement. Further, it introduces a framework of the anti-measures of the specified issues through examining the readability-associated literature. The research's chief finding is that 8 out of the 14 readability issues are responsible for 73.1184% of the ease-of-reading problems in the sub-contracting's tender documentation. These readability issues are as follows: poor presentation of the format of the tender documentation, sentences and clauses are too long and complicated, spelling and grammatical errors, abstractness or vagueness of words or sentences, using controversial phrases, repetition of provisions or clauses, poor illustration of procedure or process, and listing of irrelevant conditions to the tender scope. The study also, while discussing the readability issues, categorizes them into four pivots, including structural and presentation-related problems, lengthening and repetition-related problems, text-related problems, and terminology-related problems. To date, it is believed that such classification has not been realized in any of the prior literature. These results have implications that can benefit drafters by enabling them to know the possible dimensions of the readability problems and their countermeasures concerning the sub-contracting's tender documents for up-skilling their drafting style when formulating such documentation in the future.

**Keywords:** readability; sub-contractors; sub-contracting; tender documents; construction



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## 1. Introduction

Sub-contracting is a contractual process where a firm or an individual adheres to its responsibilities and duties on behalf of another [1]. Nowadays, sub-contracting has gained worldwide prominence in the construction community [2,3]. According to Ulubeyli et al. [2], it has become an essential practice in any construction project to find that the project's general contractor is more focused on planning, organizing, and monitoring his/her project activities. Yet, the majority of the project's actual production works is implemented via the sub-contracting arrangement. In accordance with Hinze and Tracey [4], the volume of the works done by the sub-contractors in a project may represent, in many cases, 80–90% of the whole project's scope. This high percentage is owing to the technical and strategic functions that the sub-contractor can present to the general contractor. Technically, given the general contractor's lack of experience in executing the project's specialized trades and services such as painting, insulation, plumbing, etc., the necessity to hire the specialist sub-contractors for implementing these works is imperative [3,5]. This, indeed, does not only enable the general contractor to adequately finish his/her project's specialized trades and services, but further contribute to realizing them at lower costs more quickly [6]. Strategically, on the other hand, the general contractor's gains from the sub-contracting

practice are sharing the project risks with the sub-contractor, easing his/her cash flow and financing related problems, and reducing his/her overhead adherence, such as office staff, accommodations, etc. [3,7].

Emphatically, all of the aforementioned functions highlight that the general contractor's capability to deliver his/her project within quality, schedule, and cost objectives depends significantly on receiving the sub-contractors services [7]. This, in turn, indicates that the sub-contractors are key pillar in executing the construction industry's pertinent projects and realizing their success. Generally, the prime contractor can obtain the sub-contractors services relying upon the tendering approach, including any one of the forms of negotiated tendering, open tendering, selective tendering, pre-registered tendering, and annual tendering [8]. Definitely, utilizing any of these forms by the general contractor to sublet a part of his/her project is associated with providing the sub-contractor(s) with the tender documents. The tender documents are a package of documentation, encompassing: an invitation letter to the tender, instructions for the bidders, tender form and appendices, contract conditions, specifications, design drawings, and bill of quantities and schedule of rates [9]. Building on the clarity and consistency of these documents, the tenderer can be equipped with sufficient information, including the financial, contractual, legal, administrative, and technical aspects regarding the tender scope. This information, in turn, enables the tenderer to perfectly study the tender, know his/her contractual obligations and rights, and price its schedule of rates easily and accurately [1,10]. Hence, the more clarity and consistency the tender documentation has, the more certainty the tenderer has when interpreting his/her assigned responsibilities and rights. Conversely, the less clarity and consistency the tender documents have, the more ambiguous the understanding of their terms becomes.

According to Youssef et al. [11], the clarity- and consistency-related issues of the words, sentences, paragraphs, and clauses in a contract's textual documentation are known as the readability issues. The severity of this issue lies in that when the readability of a text in a contract document is low, its possibility for being interpreted in terms of low commonality degrees by the contracting parties is high [12]. This, unfortunately, makes the consistency between the contract parties on their duties and rights unattainable. Consequently, their contractual relationship is fueled by disputes [13]. Focusing on the readability issue in the sub-contracting's tender documentation, the sub-contractors confirm that the documents provided to them in practice are often not plain and consistent [1,14]. Regrettably, since the construction community has been plagued by this problem, and hitherto, there has not been a sufficient answer for the next question: "what are the readability issues in the sub-contracting's tender documents?". The reason is completely comprehensible, as the sub-contractors associated studies always receive unfair interest from the construction industry researchers [14]. Therefore, it is not surprising to examine the literature on the factors affecting the construction documents' readability, which is really very limited [15], to find that scant investigations, if any, have been conducted on the sub-contracting documentation. This gap can negatively influence the success of applying the disputes-avoiding mechanisms (DAMs) of the sub-contracting arrangement. This is because the analysts of the DAMs (e.g., [16]) clearly reported that providing easy-to-read documents without ambiguity or contradictions in their interpretation is among the top-ranked effectual ways for avoiding the disputes in the sub-contracting arrangement. As Chong and Zin [13] explained, this mechanism is a proactive-based dispute preventing approach, and accordingly, its achievement depends on a previous knowledge of the sources of unclarity and inconsistency in the contract documentation for being eliminated. Thence, the lack of specifying these sources impedes the shaping of a disputes-free contractual relationship between the general contractor and the sub-contractor.

Against this backdrop, this research intends to draw the answers of the two most frequently raised questions in the construction community: (1) "what are the readability issues in the sub-contracting's tender documents?" and (2) "what are the measures for enhancing the readability in the sub-contracting's tender documents?". Based on the answers to these

questions, the consequences of the present paper are twofold. First, it acquaints the drafters of the sub-contracting's tender documents with the agents responsible for the readability issues in these documents and their anti-measures. This is a highly desirable knowledge because, upon its basis, the drafters can remove the sources of the unclarity and inconsistency from the sub-contracting's tender documentation. Accordingly, the interpretation of these documents' content becomes clearer and more comprehensible, fostering the agreement between the general contractor and the sub-contractor on their contractual responsibilities and rights. This, in turn, establishes a harmonious framework free of the lesion of disputes between the general contractor and the sub-contractor. Drawing on this implication, the second contribution of the research is realizing a proactive anti-dispute strategy in the sub-contracting practice by providing easy-to-read documents for its contracting parties, without fuzziness or inconsistency in their explanation. These contributions will be realized by examining real documents of 34 tenders of the sub-contracting arrangement in Egypt, employing the Content Analysis Approach (CAA). This is one of the first recognized endeavors to define the readability issues in the sub-contracting's tender documentation from the documents submitted to the sub-contractors in practice. This is for both the international construction community in general and the developing construction markets like that of Egypt in particular.

This study chose to consider the case of Egypt's construction sector as the research context, given the greater expansion of the Egyptian government than ever before in terms of executing several mega national projects for serving its economic growth. According to a recent report on Egypt, the values of the contracts awarded in 2020 and those underway in Egypt are nearly USD 14.9 billion and USD 435.9 billion, respectively, positioning the country as the third-biggest project market in the Middle East and North Africa [17]. Undoubtedly, this expansion cannot be realized without the effective cooperation between the Egyptian prime contractors and their sub-contractors. Certainly, the success of this cooperation requires the contractual relationship between the general contractor and his/her sub-contractors to be free of the troubles of conflicts, disputes, litigations, and legal proceedings for running their construction project smoothly. As a proactive management strategy against these troubles [15], the tender documentation of the sub-contracting should be written clearly to ensure commonality in the interpretation of their terms by the general contractor and sub-contractor. Unfortunately, the literature in Egypt on the issues pertinent to the readability problem and their countermeasures with respect to the sub-contracting's tender documents is silent similar to their counterparts in the developing and developed countries. This gap, in turn, portends severe consequences on the effectiveness of the cooperation between the general contractor and the sub-contractor in specific and the construction project's work progress in general, either in the Egyptian construction market or any construction sector elsewhere. Hence, this research, by addressing the readability issues in the sub-contracting's tender documents in Egypt, bridges a significant gap in the construction tender management literature. More significantly, it serves as a pioneering study for directing the scholars in other economies to take a step forward towards examining their sub-contracting's tender documentation for assessing and improving their readability and consistency.

The remainder of this paper reviews, in Section 2, the research methods of the prior works concerning scrutinizing the readability issues in the construction documentation and their countermeasures. Further, it outlines the gaps unapproached by these works. Section 3 involves the methodology adopted to extract the readability issues from the assembled sub-contracting's tender documents and to define their anti-measures. Section 4 analyzes the findings and compares them with those of the found peer researches of the developing economies to generalize the implications of the study towards these countries. Section 5 discusses the findings and their implications. Finally, Section 6 sums up the study and introduces its limitations, along with the future research directions.

## 2. Literature Review

Generally, text readability is described as the measure of reflecting the ease of reading of a written textual document and comprehending its content [12]. For embedding this measure in the construction documentation, it is necessary to provide the industry's drafters with the factors obstructing the comfortability in reading and apprehending these documents, along with their corresponding countermeasures. Disappointingly, the responses of the construction industry researchers to these necessities are countable. More critically, most of the scholars' efforts have been focused on one type of construction documentation, i.e., the contracts (e.g., [13]). In accordance with Youssef et al. [11] and Koc and Gurgun [15], the works associated with exploring the readability issue in the contracts have been based upon: (a) comparative-based case study, (b) text analysis algorithms, (c) interview, and (d) questionnaire survey. In the course of the comparative-based case study, Broome and Hayes [18] concentrated on investigating the drafting style of the New Engineering Contract (NEC), comparing it to that of the FIDIC contracts. Building on interviews with 81 personnel from the organizations of the employers, contractors, and sub-contractors, the study denoted that the NEC conditions are clearer and more understandable than those of the FIDIC contracts. This has been ascribed to the improper drafting of the FIDIC conditions in terms of having too-long sentences, several redundant legal expressions, and poor layout. By Lam and Javed [19], another comparison has been fulfilled between the practitioners in the United Kingdom and Australia to recognize the probable pitfalls in the output specifications of the contracts interrelated with the public-private partnership/private finance initiative. Referring to many cross-referencing to other documents has been highlighted as an influential readability issue in emerging the pitfalls in the output specifications.

Using the text analysis algorithms, the second literature strand in the body of knowledge of the readability issue has been emerged. Rameezdeen and Rajapakse [12] measured the readability in the NEC 1993 and FIDIC 1999 New Red Book, utilizing the Flesch Reading Ease Score (FRES) algorithm of the text analysis. This algorithm employs the average sentence length along with the average figures of syllables per word to denote the reading degree of a text. Further, its standard range is from 0 to 100, where the closer the FRES is to 100, the higher a text's ease-of-reading becomes. Based on this algorithm, the FRES values of the NEC 1993 and FIDIC 1999 are 40.70 and 29.70, respectively, indicating the high readability of the NEC 1993. Six years afterward, Rameezdeen and Rodrigo [20] utilized the algorithms of the FRES, Average Sentence Length (ASL), and Average Packet Length (APL) to quantify the readability of the clauses pertinent to the FIDIC Red Book versions: 1969, 1977, 1987, and 1999. The independent variables in the ASL and APL are the number of words, sentences, and packets in the clause. Moreover, the lower the scores of the ASL and APL are, the higher the clause's readability is. According to these algorithms, FIDIC 1999 has been termed as the easiest readable edition because it has the highest FRES with the lowest ASL and APL, in comparison with the three other editions. A year later, the FRES algorithm has been called up again by Rameezdeen and Rodrigo [21] to study the impact of modifying the standard forms-based contracts on the readability. Using 281 amended clauses from 12 infrastructure projects executed in Sri Lanka against their original counterparts in FIDIC 1987 and 1999, the researchers concluded that amending the originally drafted clauses makes their clarity and readability too difficult process.

In another line of efforts, the research strategies of the questionnaire survey and interview shaped the mainstream trend in discussing the features of the readability issue, especially in the developing economies. In Malaysia, Chong and Zin [13] administered a questionnaire-based survey of 11 problems related to the clarity of the standard form-based contracts utilized by the public sector. Based on the responses of 30 Malaysian experts, lengthening the wording of the contract clauses' sentences has been graded as the top-ranked cause behind contract unclarity. Menches and Dorn [22], additionally, surveyed 26 students of a construction management course to scrutinize their emotional reactions towards drafting the contract clauses in both positive and negative styles of language. The

findings illustrated that formulating the contract clauses in a positive manner of language raises the reader's positive emotional reactions, and vice versa. Three years later, Chong and Oon [23] carried out a two-round Delphi survey to explore the feasibility of using plain language in elucidating the legal formulating in Malaysia's construction contracts. All of the 12 participants in the survey unanimously affirmed that formulating the contract clauses in plain language serves as a line of defense against many readability issues, encompassing the sentences' length as well as their presentation in passive voice and negative manner of writing. In the same vein, Masfar [24] reaffirmed that simplifying the language style of the public works contract within Saudi Arabia by using plain language is essential to avert the readability problems of the length, complexity, and ambiguity of the contract clauses.

In another investigation, additionally, following the semi-structured interview research approach, Besaiso et al. [25] analyzed the perspectives of 12 Palestinian professionals concerning the readability, clarity, interpretation, and understanding of the clauses associated with FIDIC 1999 Red Book. In this respect, the experts criticized the readability and lucidity of the FIDIC clauses, given the extensive use of cross-referencing, the length of the sentences, and the presence of phrases with uncertain/double meanings. Most recently, through a comprehensive review and face-to-face group interview with three experts, Koc and Gurgun [15] presented 18 risks influencing the construction contracts' readability. The identified risks were then included in a questionnaire survey that used the Fuzzy Visekriterijumska Optimizacija I Kompromisno Resenje approach to assess their consequences on the readability of the contracts. The replies of 18 experts indicated that the unnecessary complexity in utilizing nouns and the inappropriate employing of referents is the most significant risk contributing to rise in readability issues in contract documents. Far from the few realized studies concerning exploring readability problems in contracts, fewer researches have been accomplished by Ali and Wilkinson [26], Chong and Zin [13], and Chong and Oon [23] to determine their countermeasures. These works have been achieved relying upon two methodologies. First, reviewing the related archival literature, either to compile a list [13] or develop a guideline [23,26] of the measures that can be followed to confront the readability issues. Second, surveying the compiled list of the measures among the practitioners to investigate the extent to which the presented measures are influential to boost the contracts' readability [13]. Drawing on these efforts, the scholarly-based knowledge has been provided with an important guideline of several measures for improving the contracts' readability. More details of these measures can be found in the aforementioned studies.

On the basis of the foregoing discourse, the prior works can be characterized by four noteworthy features. First, the studies in the area of the readability of construction documents are too limited, emphasizing on the contracts. Second, the research approaches of the interview and questionnaire survey have been broadly used in the methodologies of the readability works. Although utilizing these methods captures evidence from the extensive expertise of the parties involved in the contracts, the evidence is anecdotal [27]. More critically, usually the contributions provided in accordance with these methods are influenced by the number of the participants in the study. This, in turn, adds a major limitation to the extracted findings in terms of their generalization and representation [15]. Third, concerning the other literature on the readability, in which their approaches have been built on text-analysis algorithms, their outcomes are not sufficient to be relied upon for reflecting the contract's readability risks. This is completely understandable, as the independent variables of these algorithms do not consider the grammatical structure or the language style of the evaluated contract clause. These algorithms, however, appraise the readability of the contract clause in terms of the number of its words, sentences, and packets. Fourth, neither the researches associated with the questionnaire survey and interview nor those related to the text-analysis algorithms have been interested in touching on the readability issues with respect to the sub-contracting's tender documents.

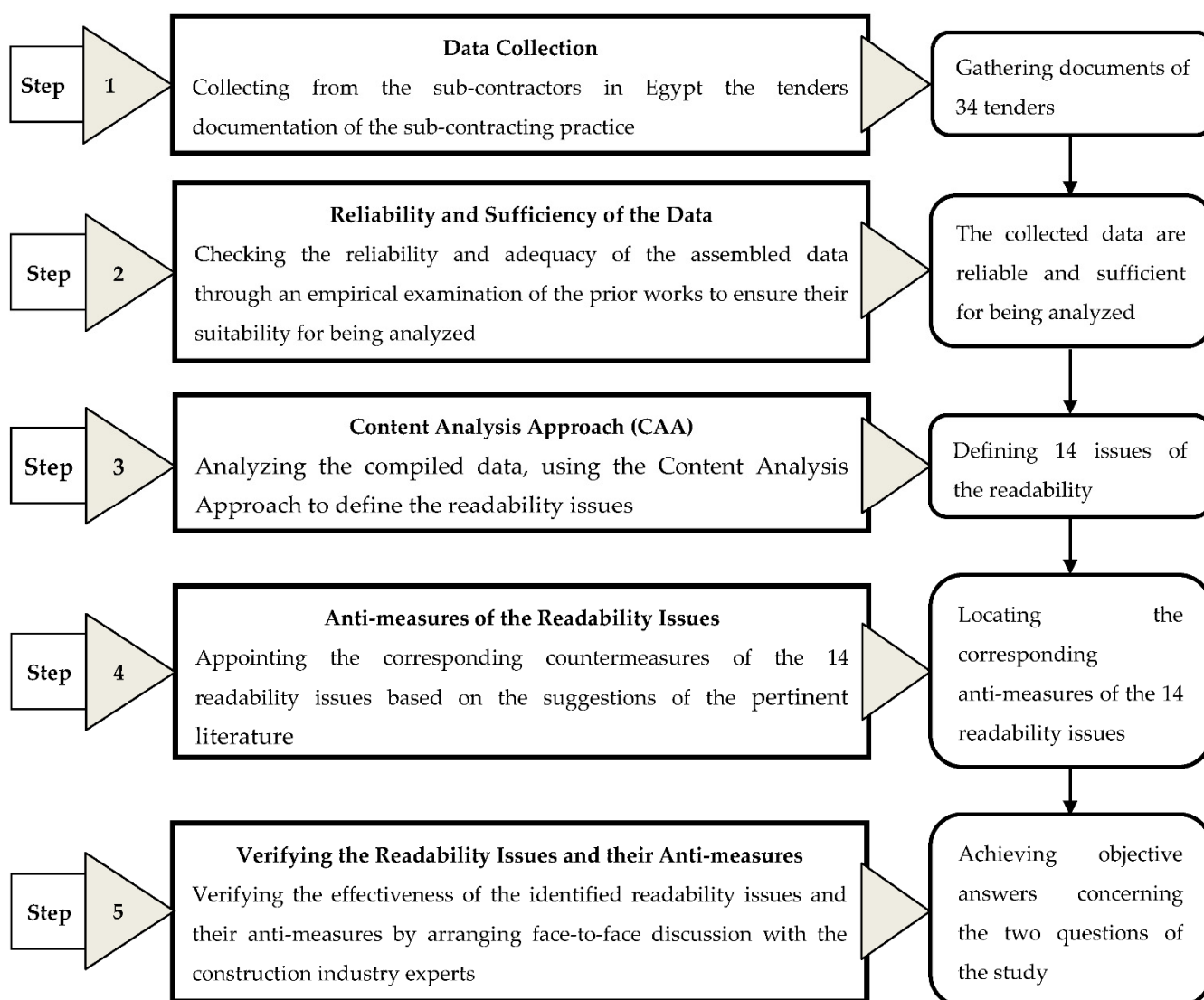
Aggregating the aforementioned features together, the result is that there is an urgent need to perform a systematic examination of the sub-contracting's tender documents to



obtain a deep and realistic comprehension of the readability issues in these documents. Hence, a better allocation for the anti-measures of these issues can be realized. Consequently, in a more clear and consistent manner, the sub-contracting's tender documentation can be drafted in the future for boosting the commonality in the explanation of their terms by the general contractor and sub-contractor.

### 3. Research Methodology

To objectively answer the study questions, the author adopted a scientifically sound and broadly utilized methodology consisting of 5 steps. Figure 1 summarizes the target, outcome, and sequence of these steps. Additionally, each step will be illustrated in detail within the subsequent sections.



**Figure 1.** Research methodology steps.

#### 3.1. Data Collection

In this research, the source of the data is the documents submitted to the sub-contractors in practice during their tender process with the general contractors. Obtaining data in studies pertinent to construction management has several methods, such as a questionnaire survey and interviewing. However, extracting the data from real documentation or contracts presents direct and factual information with respect to the issue being investigated. More importantly, it handles the shortcomings of the data gathered relying upon the ques-

tionnaire survey and interviewing in terms of the potential recall and bias of the participants in the survey or the interview [27]. To this end, two Egyptian sub-contractors based on the author's personal acquaintances have been contacted to provide the sub-contracting's tender documents. The firms of these two sub-contractors have been established in 1998 and 2017. Moreover, they have the last grade (i.e., seven) according to the classification system of the Egyptian Federation for Construction and Building Contractors (EFCBC), which is responsible for grading the construction companies in Egypt based on their capitals, employee numbers, and assets. Depending on these two Egyptian sub-contractors, the documents of 34 tenders have been compiled to form the data of this paper.

Table 1 shows the characteristics of the collected tenders in terms of their issued year, number of pages, and scopes. It appears by examining the tender documents that they are released from one of the leading construction companies in Egypt. This firm's class, in accordance with the classification system of the EFCBC, is a first-grade company. Owing to its participation in many mega national projects, which involve a lot of the specialized works, it always depends on receiving the sub-contractors services for accomplishing its contracted projects. A deep examination of the tender documents, additionally, informs that their common contents are a simple invitation letter to the tender, bill of quantities and schedule of rates, specific and general conditions, and requirements related to the occupational safety and health. Yet, the specifications and design drawings have been found in a little of the tender documentation. These tenders are: 06, 07, 11, 13, 18, 22, 23, 24, 27, 29, 31, and 33. It is worth mentioning that all the tender documents have been written in Arabic, since Egypt's first language is Arabic. Nevertheless, English has been used to describe some terms, mainly in the bill of quantities and schedule of rates as well as the design drawings.

Another observation concerning the tender documents is that the sub-contractors have been invited to the tenders and received their documentation via their e-mail accounts. However, if the sub-contractors want to participate in the tenders, they have to deliver their documents in hand to the sub-contractor department of the prime contractor. The last column of Table 1 includes the scopes of the tenders sent to the sub-contractors. As this column presents, various trades relevant to the civil, architectural, electrical, and mechanical engineering disciplines have been mentioned. In the civil engineering field, the main activities are: plain and reinforced concrete; excavation and dewatering; joint sealing; compaction and paving; road signs and surface markings; fencing and gates; insulation; laying curbs and interlocking tiles; and building using stones. Yet, the architectural trades encompass the works of aluminum and glass doors and windows, floor covering, and finishing. As for the electrical and mechanical specializations, the associated trades are: installing and commissioning of an electrical and mechanical filtration system for pools, establishing high-density polyethylene pipelines for drainage and cable protection, and electrical installation and commissioning of a fire alarm system. Certainly, the diversity in the tenders' scopes means that the drafting style of their documentation is different from one tender to another. This diversity, in turn, affords an excellent opportunity for the current study for illustrating several factors of the readability issue in the sub-contracting's tender documents.

**Table 1.** Tender documents characteristics.

Tender No.	Release Data	No. of Pages	Scope of Sub-Contracting Package
01	2017	10	Reinforced concrete, including shuttering, fabrication and erection of steel rebar, and pouring.
02	2017	9	Manual excavation, dewatering, and transferring of the excavation output.
03	2017	9	Sealing of joints in concrete slabs.
04	2017	12	Installing and commissioning of an electrical and mechanical filtration system for pools.
05	2017	9	Establishing the base-course layer in a highway.
06 *	2017	31	Road signs and surface markings.
07 *	2017	18	Fencing.
08	2018	9	Manual excavation.
09	2018	7	Mechanical drilling.
10	2018	9	Laying and leveling of concrete floors.
11 *	2018	13	Fencing and gates.
12	2018	9	Aluminum doors and windows.
13 *	2018	11	Road signs.
14	2018	13	Finishing works.
15	2018	9	Insulation.
16	2018	20	Earthworks, plain and reinforced concrete, and finishing works.
17	2018	9	Floor covering using ceramic, porcelain, and marble.
18 *	2018	19	Finishing works.
19	2018	10	Laying interlocking tiles and sealing of expansion joints.
20	2018	9	Laying curbs and interlocking tiles.
21	2018	10	Paving.
22 *	2018	25	Finishing works.
23 *	2018	35	Finishing works.
24 *	2018	11	Glass and glazing of doors.
25	2018	10	Plain and reinforced concrete, including shuttering, fabrication and erection of steel rebars, and pouring.
26	2018	10	Repairing and insulating concrete surfaces against water leakage.
27 *	2019	6	Insulation.
28	2020	7	High-density polyethylene piping for drainage.
29 *	2020	12	Electrical installation and commissioning of a fire alarm system.
30	2020	7	High-density polyethylene piping for protecting cables.
31 *	2020	9	Road signs.
32	2020	7	Building using riprap stones.
33 *	2020	29	Rail information and directional signboards.
34	2021	18	Finishing works.

\* means the tender documents contain the specifications or the design drawings.

### 3.2. Reliability and Sufficiency of the Data

In view of the compiled documentation of the tenders, reliable and objective outputs from their analysis can be drawn. This is related to two reasons. First, since the documents of the assembled tenders reflect real-life cases from the construction community and they will be subjected to the CAA, they are precious for presenting reliable findings to the



construction management literature. This has been assured by Li et al. [28] that analyzing real documented construction data using the CAA affords more trustworthy results than those relevant to the questionnaire survey and interview. Second, several studies—in which the data sources are real construction contracts, documents, and reports as well as the CAA are their major analytical tool—have been conducted based on a smaller sample of the construction documentation than that collected in the current research. For instance, the common causes of claims in Canada have been defined relying upon the data of 24 construction claim reports [29]. In addition, in the United States, Nguyen et al. [27] investigated the allocation of the risks in the public–private partnership (PPP) scheme on the basis of the content analysis of 21 contracts pertinent to the PPP projects. Undoubtedly, this empirical examination of the prior works indicates that the obtained data (i.e., 34 tenders) represents an acceptable sample for performing the CAA, and thus, it can be deemed as a firm foundation to afford objective results.

### 3.3. Content Analysis Approach

The CAA has been adopted to analyze the tender documents, so as to have a precise answer concerning the first question of the research: “what are the readability issues in the sub-contracting’s tender documents?”. The CAA is an observation-based research technique that is employed to systematically analyze the content of all the forms associated with the recorded communications [30]. Furthermore, it can be utilized with either the qualitative or quantitative information and in an inductive or deductive manner [31]. Owing to these features, the CAA has been employed extensively by the construction industry researchers to assist them to draw real data from the construction documentation, including reports, contracts, and news reports. This has been noted in the context of several important branches of the construction management researches, such as claims, PPP schemes, and prefabricated buildings (e.g., [27–29]).

To study the tender documents, a protocol of a three-step content analysis has been set. In the first step, the intention is to form an initial framework of the factors behind the readability issue in the sub-contracting’s tender documentation. In this regard, the checklists of Chong and Zin [13] and Koc and Gurgun [15] have been relied upon as a guideline for exploring the readability issues in the assembled document packages. The registers of Chong and Zin [13] and Koc and Gurgun [15] have 15 and 18 risks influencing the construction contracts’ readability, respectively. Moreover, they have 12 common risks, as has been mentioned in Koc and Gurgun [15]. More details pertinent to these two lists can be found in Chong and Zin [13] and Koc and Gurgun [15]. The reason for choosing these two checklists is that they have been developed following an accurate methodology, encompassing a comprehensive review of the relevant literature and validation with subject matter experts. Moreover, in addition to the lists of the readability issues of Chong and Zin [13] and Koc and Gurgun [15], to the best of the authors’ knowledge, there is no other list, other than that of Chong and Oon [23]. However, the checklist of Chong and Oon [23] is completely similar to the checklist of Chong and Zin [13]. Therefore, the lists of Chong and Zin [13] and Koc and Gurgun [15] have been considered appropriate to direct the author when scrutinizing the tender documents.

Similar to the suggestion of Nguyen et al. [27], round one of the content analysis process has been based upon an initial set of the tender documentation. These documents belong to the tenders from 1–10 (see Table 1). This preliminary investigation is a very significant stage in the CAA to refine the checklists of Chong and Zin [13] and Koc and Gurgun [15], as they do not exemplify the readability issues of the sub-contracting’s tender documentation. They, however, represent the construction contracts’ readability risks. Appreciating this importance, the documents of each tender have been read in detail several times. According to Arshad et al. [32], this can help in realizing an objective understanding of the documentation content and preventing the author’s subjectivity while extracting the result. At the end of studying the first 10 tender documents, 14 readability issues have been drawn. Table 2 presents these issues, illustrating that while 10 of the

readability issues have been stated in the checklists of Chong and Zin [13] and Koc and Gurgun [15], the other 4 ones have been derived from analyzing the 10 tender documents. As a further refinement of the compiled list of the readability issues, the second step of the content analysis process has been started to examine the rest of the documentation (i.e., tenders from 11–34). Consequently, the possibility of adding any new unlisted issue is available. As has been followed in the prior step, the 24 documents packages have been carefully read multiple times. The finding indicated that the list of the readability issues of Table 2 is sufficient and no new issue has emerged.

In the third step of the content analysis, all the tender documents have been rechecked to reaffirm that no factor has been missed during the first and second rounds of scrutinizing the documents packages. Similar to the first and second steps of the content analysis procedure, the 34 tender documents have been accurately checked. The result of this stage affirmed that no new issue has been found, other than those mentioned in Table 2. This affirmation may be due to the precise investigation of the tender documentation during the first and second rounds of the content analysis process. These two rounds lasted for approximately 28 working hours over 2 weeks to extract the readability issues from the documents packages. Building on the finding of this step, all the found issues can be shown in Table 2, encompassing their negative impacts on the readability of the sub-contracting's tender documentation. In addition, it includes their sources, either from the relevant literature or the content analysis of the tender documents. It is worth mentioning that, in this step, for each readability issue, its Frequency of Appearance (FA), Relative Frequency of Appearance (RFA), and Ranking (R) have been defined for the statistical analysis. The FA of each readability issue has been determined by figuring up the number of times it appears in the tender documents. As for the RFA of each issue, it has been calculated by dividing its RA by the grand total of the RA of all the readability issues. Yet, for defining R, the issues have been ranked in a descending order of their RFA values, where the issue of the highest RFA receives the first rank. The FA of the readability issues can be found in Table 3, whereas their RFA and R appear in Table 4.

**Table 2.** Readability issues in the tender documents.

ID	Readability Issue	Negative Consequence on the Readability	Source		
			A	B	C
RI <sub>1</sub>	Poor presentation of the format of the tender documentation (e.g., figures, tables, font, indentation, line spacing).	Adversely impacting the lucidity of the tender scope for the sub-contractor.		•	•
RI <sub>2</sub>	Sentences and clauses are too long and complicated.	Reducing the willingness of the sub-contractors to read the tender documentation precisely; accordingly, overlooking matters that could be crucial in defining their obligations and rights.	•	•	•
RI <sub>3</sub>	Spelling and grammatical errors (e.g., missing letters, nouns, and verbs, as well as poor sentence formation).	Impacting the sub-contractor to understand the tender documents' provisions and clauses correctly.	•	•	•
RI <sub>4</sub>	Abstractness or vagueness of words or sentences.	Causing more than one meaning or misunderstanding for the sub-contractor.	•	•	•
RI <sub>5</sub>	Using controversial phrases.	Resulting in interpreting the tender documents' provisions and clauses in a different sense than what the general contractor intends to tell.	•	•	•
RI <sub>6</sub>	Using specific vocabulary, legal terms, and legal jargon.	Causing the clarity and readability problems owing to the presence of incomprehensible legal terminology for the sub-contractor.	•	•	•
RI <sub>7</sub>	Referring to engineering terminology, code, or specification that are not frequent to all disciplines.	Causing the clarity and readability problems due to the presence of incomprehensible engineering terminology for the sub-contractor.		•	•



Table 3. Cont.

Tender No.	RI <sub>1</sub>	RI <sub>2</sub>	RI <sub>3</sub>	RI <sub>4</sub>	RI <sub>5</sub>	RI <sub>6</sub>	RI <sub>7</sub>	RI <sub>8</sub>	RI <sub>9</sub>	RI <sub>10</sub>	RI <sub>11</sub>	RI <sub>12</sub>	RI <sub>13</sub>	RI <sub>14</sub>
23	•	•	•	•	•	•	•	•	•	•	•	•		•
24	•	•	•	•	•	•		•	•	•	•	•		
25	•	•	•	•	•	•		•	•	•		•		
26	•	•	•	•	•	•		•	•	•		•		•
27	•	•	•	•	•		•	•	•			•		
28	•	•	•	•	•			•	•			•	•	•
29	•	•	•	•	•		•	•	•	•	•	•		•
30	•	•	•	•	•		•	•	•		•	•	•	
31	•	•	•	•	•		•	•	•	•		•	•	
32	•	•	•	•	•			•	•	•		•		
33	•	•	•	•	•		•	•	•	•	•	•	•	
34	•	•	•	•	•		•	•	•	•	•	•	•	•
FA	34	34	34	34	34	26	16	34	34	26	10	34	9	13

Table 4. Relative frequency of appearance and ranking of the readability issues.

ID	FA	RFA (%)	Ranking (R)
RI <sub>1</sub>	34	9.1398	1
RI <sub>2</sub>	34	9.1398	1
RI <sub>3</sub>	34	9.1398	1
RI <sub>4</sub>	34	9.1398	1
RI <sub>5</sub>	34	9.1398	1
RI <sub>6</sub>	26	6.9892	9
RI <sub>7</sub>	16	4.3011	11
RI <sub>8</sub>	34	9.1398	1
RI <sub>9</sub>	34	9.1398	1
RI <sub>10</sub>	26	6.9892	9
RI <sub>11</sub>	10	2.6882	13
RI <sub>12</sub>	34	9.1398	1
RI <sub>13</sub>	9	2.4194	14
RI <sub>14</sub>	13	3.4946	12
<b>Grand Total</b>	<b>372</b>	<b>100%</b>	

### 3.4. Anti-Measures of the Readability Issues

For avoiding the 14 specified readability issues, and consequently, improving the clarity of reading and understanding the sub-contracting's tender documentation, their anti-measures should be determined. This purpose is the scope of the second question of this paper: "what are the measures for enhancing the readability in the sub-contracting's tender documents?". To answer this question, the research associated with discussing the readability issues of the contracts (e.g., [15,25]) and their countermeasures (e.g., [13,23,26]) have been reviewed. Indeed, these studies do not include the anti-measures of all the 14 readability issues; they include the countermeasures of the readability issues RI<sub>1</sub>, RI<sub>2</sub>, RI<sub>6</sub>, RI<sub>8</sub>, and RI<sub>9</sub> and parts of those pertinent to RI<sub>4</sub> and RI<sub>7</sub>. However, the deep scrutinizing of these researches guided the author to suggest the anti-measures of the rest of the read-

ability issues. This is on the basis of the concept identified by these studies regarding the role of a countermeasure with respect to a readability issue. This notion is that the function of an anti-measure of a readability issue is minimizing its consequence or preventing its occurrence for making the reading easier, supporting the comprehension, and avoiding the misinterpretation risk. Building on this concept, the author has been enabled to derive the corresponding countermeasures of the rest of the readability issues. Table 5 elaborates the anti-measures of all the readability issues, together with their sources, either from the relevant literature or the author's suggestion. Further, it shows how these anti-measures can improve the readability of the sub-contracting's tender documentation.

**Table 5.** Anti-measures of the readability issues.

ID	Corresponding Anti-Measure	Positive Consequence on the Readability	Source				
			A	B	C	D	E
RI <sub>1</sub>	Preparing adequate format for the tender documentation in terms of font size and type, indentation, line spacing, tables, and figures.	Improving the lucidity of the tender scope for the sub-contractor.	•				
RI <sub>2</sub>	Reduce the number of words per sentence to be within 20 words.	Enabling the sub-contractor to easily read and comprehend the tender scope.	•	•	•		
RI <sub>3</sub>	Reviewing the spelling and grammar of the tender documentation before being released.	Improving the readability and avoiding the misunderstanding risk.					•
RI <sub>4</sub>	Draft the scope of the tender in an informative and understandable manner; Employ the words of the unique meaning, rather than those with multiple interpretations.	Supporting the clarity of the tender scope; Improving the readability and avoiding the misinterpretation risk.	•				•
RI <sub>5</sub>	Avoiding the usage of the controversial phrases.	Avoiding the misinterpretation risk.					•
RI <sub>6</sub>	Utilize everyday words; Abandoning the usage of legal language.	Increasing the clarity, readability, and understanding of the tender scope.		•	•	•	
RI <sub>7</sub>	Employ engineering terminology frequent to all disciplinarians wherever possible; Attaching the necessary clauses of the referred code or specification with the tender's documentation package.	Enhancing the clarity, readability, and understanding of the tender scope.		•			•
RI <sub>8</sub>	Eliminating the redundancy or repetition of words.	Reducing the size of the tender documentation package, leading to optimizing the concentration of the sub-contractor towards the tender scope.		•	•		
RI <sub>9</sub>	Supporting the procedures/processes with flow chart or illustrative examples.	Enhancing the understanding of the sub-contractor in terms of the data of the tender scope; accordingly, avoiding the misunderstanding risk.		•	•		
RI <sub>10</sub>	Attaching a clear presentation of all the related drawings with the tender documentation package.	Improving the visual representation of the tender scope for the sub-contractor.					•
RI <sub>11</sub>	Mentioning the definitions of the utilized acronyms.	Increasing the clarity, readability, and understanding of the tender scope.					•
RI <sub>12</sub>	Omitting the irrelevant conditions to the tender scope by eliminating the usage of the standard templates of the tender documentation.	Reducing the size of the tender documentation package, leading the sub-contractor to be more focused on the tender-relevant conditions.					•
RI <sub>13</sub>	Checking the consistency among the tender clauses before releasing the tender documentation.	Avoiding the risks of misinterpretation and misunderstanding.					•
RI <sub>14</sub>	Translating the English words/idioms into understandable Arabic phrases.	Improving the clarity, readability, and understanding of the tender scope.					•

A: [26]; B: [13]; C: [23]; D: [25]; E: author's suggestion.



### 3.5. Verifying the Readability Issues and their Anti-Measures

Although the assembled data have been discussed to be enough for undertaking the CAA and scientific sound steps have been followed to determine the readability issues and their anti-measures, the effectiveness of these factors needs to be verified. This is because, on the basis of the analysis conducted by the author on the compiled tender documents, by using the CAA, the readability issues of Table 2 have been revealed. Further, some of the countermeasures of Table 5 have been defined relying upon the author's suggestion. Hence, the subjectivity in outlining the elements of Tables 2 and 5 may exist. To check the soundness of the outcomes of Tables 2 and 5 as the factors responsible for causing the readability issues and controlling their consequences concerning the sub-contracting's tender documentation, interviews with the construction industry experts have been performed. The interviews have been arranged, employing face-to-face discussions with 3 experts. The number of experts is similar to the sample utilized by Koc and Gurgun [15] for verifying the suitability of their readability risks. Importantly, the experts' bio-data paid the author to appoint them from his personal network for conducting the interviews. In terms of their educational background, 2 of the experts hold Ph.D. in structural engineering, whereas the other has a bachelor's degree in civil engineering. As for their expertise within the construction field, it is lengthy, ranging from 16 to 18 years, with broad knowledge of the tendering procedures and their documents. This has been known from the top administrative positions which they occupy in their firms. While 2 of them are the owners of construction companies with grades of 6 and 7, according to the classification system of the EFCBC, the other expert is one of the project managers of a contracting firm with a grade of 1. Moreover, their companies have several contributions in the Egyptian construction sector, either as sub-contractors or general contractors.

To conduct the interviews, a package in a hard copy, encompassing a sample of the tender documentation, the readability issues of Table 2, and the anti-measures of Table 5 have been printed. Subsequently, each expert has been interviewed to discuss the sources of the readability issues as the author found in the sample of the tender documents. Moreover, at the interview, the expert has been asked to examine whether the factors of Table 2 cover the readability issues of the sub-contracting's tender documentation, or if some missing factors have to be involved. In the same vein, the countermeasures of Table 5 have been checked. All the interviewed experts unanimously highlighted that the elements of Table 2 reflect the relevant factors of the readability issues in the sub-contracting's tender documents and the anti-measures of Table 5 are sufficient to avoid their happening. This consensus, in turn, implies that the findings of this study are objective. Consequently, they can be introduced to the drafters of the sub-contracting's tender documents as effective solutions to formulate highly readable and consistent documents.

## 4. Analysis and Comparison of the Results

In this study, as Table 2 comprises, 14 issues, together with their negative consequences on the readability of the sub-contracting's tender documents, have been determined utilizing the CAA. Table 3 counts the FA of these readability issues as has been found while analyzing the documentation of the 34 sub-contracting tenders. In accordance with Table 3, 8 of the readability issues have been present in all the tender documents. They are RI<sub>1</sub>, RI<sub>2</sub>, RI<sub>3</sub>, RI<sub>4</sub>, RI<sub>5</sub>, RI<sub>8</sub>, RI<sub>9</sub>, and RI<sub>12</sub>. Yet, the other 6 issues, encompassing RI<sub>6</sub>, RI<sub>7</sub>, RI<sub>10</sub>, RI<sub>11</sub>, RI<sub>13</sub>, and RI<sub>14</sub> have appeared in some of the tender documents, with a FA ranging from 9 to 26. Based on the FA of the readability issues, their RFA and R have been computed. Table 4 includes these statistics. As this table presents, given the existence of RI<sub>1</sub>, RI<sub>2</sub>, RI<sub>3</sub>, RI<sub>4</sub>, RI<sub>5</sub>, RI<sub>8</sub>, RI<sub>9</sub>, and RI<sub>12</sub> in all the tender documents, they have the highest RFA of 9.1398%. As a result, they have been awarded the first ranking, and therefore, they are the most-frequent readability issues in the documentation of the sub-contracting tenders. Another observation from the analysis of these eight issues is that the summation of their RFA values is 73.1184%. This consequence, in turn, indicates that 73.1184% of the problems affecting the clarity of reading and understanding the sub-contracting's tender documents are associated with

these 8 issues. Building on this finding, the consequence is that the more the focus on avoiding the occurrence of these issues is, the higher the possibility becomes for providing easy-to-read and comprehensible documentation of the sub-contracting tenders.

As can be extracted from Table 4, additionally, regarding the other six issues of the readability in terms of their RFA and R is that two of them, comprising RI<sub>6</sub> and RI<sub>10</sub> have been ranked ninth, with an RFA of 6.9892%. Yet, RI<sub>7</sub> (RFA = 4.3011%), RI<sub>14</sub> (RFA = 3.4946%), RI<sub>11</sub> (RFA = 2.6882%), and RI<sub>13</sub> (RFA = 2.4194%) have the positions of eleventh, twelfth, thirteenth, and fourteenth, respectively. With a deep insight into these six issues together, it can be summarized that they represent 26.8816% of the sources of the unclarity and inconsistency in the tender documents of the sub-contracting practice. Certainly, this small percentage can describe these six issues as factors with limited consequences with respect to the theme being discussed, especially when it is compared to the proportion relevant to the top-eight frequent issues of the readability. Nevertheless, neglecting their avoidance implies that the documents of the sub-contracting tenders are not perfectly functional for being understood without different interpretations or misunderstanding of their clauses. Hence, it is advised that, for drafting the sub-contracting's tender documents in a compatible and understandable manner, the readability issues of both those of the highest and lowest RFA in the tender documentation have to be addressed. Table 5 supports this end by identifying for each readability issue its corresponding anti-measure, along with its possible positive impact on improving the readability of the sub-contracting's tender documentation, regardless of its RFA.

The prior analysis of the readability issues is beneficial, whether for the drafters of the sub-contracting's tender documents or Egypt's construction sector, as this study has been performed with respect to these contexts. Nevertheless, associating the reached findings with those of the relevant literature can afford further consequences from the conducted analysis for being directed to a wider context. In this regard, the top-eight frequent issues of the readability have been compared with the outcomes of Chong and Zin [13] and Koc and Gurgun [15]. These works have been considered because they are the only ones that are concerned with grading the readability issues in descending order of their impact on grasping the construction documentation. Hence, their findings have been deemed appropriate for being compared with the outputs of the current study. As Table 6 illustrates, the context of the present paper is Egypt. In addition, the work of Chong and Zin [13] has been conducted in Malaysia for rating 11 readability issues. Yet, the study of Koc and Gurgun [15] is believed to be associated with Turkey's construction industry for sorting 18 readability risks. These features, in terms of the countries of these studies, indicate that the results of the comparison will be useful to the developing construction markets only.

**Table 6.** Rankings of the top-eight frequent issues of the readability in the developing countries.

Study Characteristics	Study	This Study	Chong and Zin [13]	Koc and Gurgun [15]
	Country	Egypt	Malaysia	Turkey
Ranking of the Readability Issues	Scope	Sub-Contracting's Tender Documents	Contracts	Contracts
	No. of Issues/Study	14	11	18
	RI <sub>1</sub>	1st	-	12th
	RI <sub>2</sub>	1st	1st	3rd
	RI <sub>3</sub>	1st	9th	6th
	RI <sub>4</sub>	1st	6th	2nd
	RI <sub>5</sub>	1st	11th	5th
	RI <sub>8</sub>	1st	3rd	9th
	RI <sub>9</sub>	1st	10th	-
RI <sub>12</sub>	1st	-	-	

-: means the readability issue has not been mentioned in that study.

According to Table 6, 3 out of 8 of the top-frequent readability issues of the present research have been assessed as highly ranked risks in Malaysia. These issues are RI<sub>2</sub>, RI<sub>4</sub>, and RI<sub>8</sub>, having the first, sixth, and third places, respectively. On the other hand, 4 out of 8 of the most frequent issues of readability, including RI<sub>2</sub>, RI<sub>3</sub>, RI<sub>4</sub>, and RI<sub>5</sub>, have been marked with high scores in Turkey. Their associated ranks are third, sixth, second, and fifth, respectively. These two facts together mean that while RI<sub>2</sub> and RI<sub>4</sub> are readability issues, having a full occurrence of 100% in all the investigated countries, RI<sub>3</sub>, RI<sub>5</sub>, and RI<sub>8</sub>, have a rate of frequency of 50%. In the same vein, the rest of the top-eight frequent issues of the readability in the sub-contracting's tender documents, comprising RI<sub>1</sub>, RI<sub>9</sub>, and RI<sub>12</sub> are with an occurrence proportion of 0%. These statistics, in turn, classify the highly ranked readability issues in the construction documentation of the developing countries into 3 groups, as follows:

1. Group one: consists of RI<sub>2</sub> and RI<sub>4</sub> and it is the most critical group, since its associated issues have been graded across all the investigated countries as severe issues with respect to the readability of the construction documents;
2. Group two: includes RI<sub>3</sub>, RI<sub>5</sub>, and RI<sub>8</sub> and it is the second most critical group, as its related issues have appeared in 50% of the surveyed countries as issues with serious consequences on the clarity of interpreting the construction documentation;
3. Group three: involves RI<sub>1</sub>, RI<sub>9</sub>, and RI<sub>12</sub> and it is the least critical group because its relevant issues have not been mentioned in the studied countries as issues with extreme impacts on the construction documents' readability.

Certainly, the aforementioned classification enriches the drafters of the construction documentation and the scholars in the developing countries with a prioritized plan to better comprehend the issues pertinent to their documents' readability. Accordingly, their efforts can be optimized to manage the effects of those issues; particularly this study affords them with the anti-measures of these issues, as Table 5 comprises. Another significant conclusion from Table 6 is that the researches of Chong and Zin [13] and Koc and Gurgun [15] have focused on the same type of construction documents, i.e., contracts. However, the ranks of their readability issues are somewhat different. For instance, in Chong and Zin [13], RI<sub>5</sub> and RI<sub>8</sub> have the positions of eleventh and third, respectively. Yet, in Koc and Gurgun [15], their associated ranks are fifth and ninth, respectively. These differences, in turn, denote that the ranks of the readability issues are context-bound, varying from country to country. Hence, the top-ranked issues of readability, with respect to the same type of construction document, can differ greatly relying upon the context of the country.

## 5. Discussion and Implications of the Results

This research highlights the readability issues in the sub-contracting's tender documents in Egypt. In light of reviewing the literature of the construction documents' readability risks, this investigation seems to be the first known contribution in this respect, either in Egypt or internationally. This supports the value of this study towards the knowledge account because it reveals the characteristics of the factors obstructing the comfortability in reading and apprehending the sub-contracting's tender documentation. This contribution has been achieved, using the CAA to analyze the documents of 34 tenders of the sub-contracting arrangement. As a result, 14 readability issues have been defined, along with their RF, RFA, and R for the statistical analysis. Of these, as Table 3 illustrates, 10 issues, including RI<sub>1</sub> to RI<sub>10</sub> have been present in the prior works of the readability of contracts. Yet, four issues, from RI<sub>11</sub> to RI<sub>14</sub> have been noticed as distinctive factors regarding the sub-contracting's tender documents. This is a vital implication, because it adds 4 new elements to the limited existing risk checklists of construction documentation readability, particularly in the tender documents-related field. More significantly, it means that although the majority of the readability issues may be similar in different construction documents' types, each type of documentation has its relevant issues. Accordingly, it can be deduced that the construction documents' readability risks are documents-distinct factors. Koc and Gurgun [15] also agree with this significant conclusion that the readability issues may differ

depending on the contract type. Based on this consensus, realizing additional researches in the future for scrutinizing each particular type of the construction documentation in terms of its readability issues is warranted. Hence, more inclusive theories and practices can be developed, supporting improving the wording of the construction documents.

By analyzing the RF, RFA, and R of the 14 readability issues, it has been shown that “poor presentation of the format of the tender documentation” (RI<sub>1</sub>), “sentences and clauses are too long and complicated” (RI<sub>2</sub>), “spelling and grammatical errors” (RI<sub>3</sub>), “abstractness or vagueness of words or sentences” (RI<sub>4</sub>), “using controversial phrases” (RI<sub>5</sub>), “repetition of provisions or clauses” (RI<sub>8</sub>), “poor illustration of procedure or process” (RI<sub>9</sub>), and “listing conditions that are not related to the tender scope” (RI<sub>12</sub>) are the top-eight frequent issues of the readability in the sub-contracting’s tender documents. Each of which is with an occurrence in all of the tender documents, accounting for 9.1398% of the grand total of the RFA of the 14 readability issues. Thus, in total, they represent 73.1184% of the problems encountered by the sub-contractors regarding the ease of interpreting the documentation of the tenders to which they are invited to. This result is a crucial message for the drafters of the sub-contracting’s tender documentation, making them aware of the major recurrent mistakes that they are responsible for when preparing these documents. Another significant message for those drafters in this regard is that they can recognize the other 6 readability issues, which have been mentioned in some of the tender documents. These issues together exemplify 26.8816% of the whole summation of the RFA of the readability issues. They are, in descending order of their RFA percentages: “using specific vocabulary, legal terms, and legal jargon” (RI<sub>6</sub>), “lack of/poor visual representations” (RI<sub>10</sub>), “referring to engineering terminology, code, or specification that are not frequent to all disciplines” (RI<sub>7</sub>), “transliteration of English words/idioms into Arabic” (RI<sub>14</sub>), “using abbreviations without illustrating their definitions” (RI<sub>11</sub>), and “inconsistencies among the tender clauses” (RI<sub>13</sub>).

By taking a closer look into these factors, the characteristics of the readability issues in the sub-contracting’s tender documents can be summarized in four pivots: (a) structural and presentation-related problems, (b) lengthening and repetition-related problems, (c) text-related problems, and (d) terminology-related problems. The structural and presentation-related problems appear in RI<sub>1</sub>, RI<sub>9</sub>, and RI<sub>10</sub>. This pivot highlights that the poorer the quality level on which the tender documentation is formatted and produced, the lower the visual representation and the information flow of the tender scope for the sub-contractor. This fact stems from the case that, when the sub-contractor is unable to know and see all the detailed data of the requested work consistently, avoiding the risk of misunderstanding becomes extremely low [15]. The consequence of this relation may extend further to discourage the sub-contractor to read the tender documentation and negatively impact on his/her decision towards participating in the tender. So, it is exceedingly recommended that releasing the tender documentation should be in a proper presentation, whether in the format or the content of its structure, data, and drawings. This is a highly necessary feature that each document should have for comprehensively and clearly providing the sub-contractor with the tender scope. This recommendation can easily be achieved by following the corresponding anti-measures of the issues of this pivot (see Table 5). This is another implication of this study, as it not only contributes to determining, analyzing, and ranking the readability issues in the sub-contracting’s tender documents, but also introduces a framework of the countermeasures of the identified issues. Relying upon Table 5, RI<sub>1</sub> can be avoided, employing suitable font size and type, indentation, and line spacing for enhancing the documents’ general format and their readability for the reader in particular [26]. Further, by supporting the tender procedures with a flow chart or illustrative examples and attaching all the detailed drawings adequately with the tender documentation package, RI<sub>9</sub> and RI<sub>10</sub> can be eliminated, respectively. Notably, the consideration of these anti-measures has multiple benefits for the sub-contractor, including enabling him to see, read, and understand the tender documents more clearly; reducing his/her misunderstanding risk; and consequently, encouraging him to participate in the tender.

RI<sub>2</sub>, RI<sub>8</sub>, and RI<sub>12</sub> represent the second dimension of the readability issues in the sub-contracting's tender documents. As these issues point, they contribute to lengthening the tender documents' sentences and clauses and increasing the size of the tender documentation package. According to Koc and Gurgun [15], the negative consequence of RI<sub>2</sub> on the readability, with respect to the contracts, encompasses reducing the willingness of the readers to read them precisely. Consequently, they can overlook matters that could be crucial in defining their obligations and rights. As for RI<sub>8</sub> and RI<sub>12</sub>, they cause the contract documents to be voluminous, resulting in the complexity of extracting the information. As a result, the attention of the reader can be distracted from the main relevant conditions of the contract. Combining these impacts together, the possible result is that exposing the reader to the problems with ease-of-reading. As the author noticed when analyzing the 34 tender documents, three causative factors may be behind the occurrence of RI<sub>2</sub>, RI<sub>8</sub>, and RI<sub>12</sub>. First, the drafters are not sufficiently skilled to formulate the tender documentation's sentences and clauses in a shorter and informative manner. Second, given their utilization of a standardized template for producing any tender documentation package, regardless the scope it reflects, the documents include repetitive and unnecessary clauses. Third, the documentation package has been issued without an accurate revision, either from the drafters or their managers. Although this analysis reveals the root causes of the lengthening and repetition-related issues of the sub-contracting's tender documents, it has two significant implications for controlling them. First, the drafters' skills need to be honed to master how a sentence or clause in a document can be written shortly in an informative way. This is achievable by involving the drafters in training courses to learn from the expertise of the academics and practitioners in this field. Second, the managers of the drafters should set a precise multi-step system for revising the documentation before being released. The steps of this system can incorporate a senior drafter to review the works of his/her junior drafting team, followed by the approval of the manager of the tenders' preparation department.

Table 5 provides additional recommendations for addressing the issues of RI<sub>2</sub>, RI<sub>8</sub>, and RI<sub>12</sub>. In terms of RI<sub>2</sub>, this table indicates that the words number per sentence should be within 20 words. This is an important feature that each sentence should have since long sentences have been highlighted by many scholars and practitioners as a major source of the lack of clarity and misinterpretation [13]. As for RI<sub>8</sub> and RI<sub>12</sub>, it can be informed that the size of the tender documentation package must be as simple as possible by eliminating the repeated provisions, clauses, or the irrelevant conditions to the tender scope. This makes the reading of the sub-contracting's tender documentation easier and increases the attention of the sub-contractor on the pertinent terms of the tender.

Pivot three of the readability issues is concerned with the text-related problems. Its relevant issues are RI<sub>3</sub>, RI<sub>4</sub>, RI<sub>5</sub>, and RI<sub>13</sub>. As Table 2 pinpoints, the explanations of these issues reflect that the text-related problems are responsible for causing the tender documentation's sentences and clauses to have a poor language structure and be inconsistent, unclear, and incomprehensible. The consequences of these issues are that they cause the sub-contractor to interpret the tender documents' provisions and clauses in a different sense than what the general contractor intends to tell. Consequently, the chance of interpreting the tender documentation's provisions and clauses with a high degree of commonality by the sub-contractor and the prime contractor becomes low [12]. Hence, the agreement between these two parties on their duties and rights being elusive, leading to the risk of disputes [13]. Rameezdeen and Rodrigo [21] also support this analysis, that the lower the readability of a construction document is, the higher is the disputes between the contracting parties. In the same vein, Koc and Gurgun [33] confirmed that if the construction documents are not understandable because of the inconsistency and ambiguity in their clauses, the failure of the contractual relationship between the involved parties is inevitable. For avoiding such consequences, Table 5 suggests that first, the seniors of the drafting teams and the managers of the tenders' preparation departments should adopt the above-proposed revising system of the tender documentation. This system can assist in refining the tender documents'



sentences and clauses in terms of their language structure, so as to enhance their readability. More importantly, it allows them to check the consistency among the tender clauses for assuring that they are consistent with each other having the same meaning for the sub-contractor. Second, they advise to employ the words of the unique meaning, rather than those with multiple interpretations, and avoiding using the controversial phrases. This is a valuable recommendation because it enables the sub-contractors to know their responsibilities and rights without the risks of misinterpretation or ambiguity.

RI<sub>6</sub>, RI<sub>7</sub>, RI<sub>11</sub>, and RI<sub>14</sub> signify the terminology-related problems. Referring to the descriptions of these issues in Table 2, they result in the presence of incomprehensible terminology for the sub-contractor, encompassing specialized legal and engineering terms, abbreviations, and literally translated words/idioms from English into Arabic. Unfortunately, finding the intended meaning of such specific terms could be a time-consuming and too-difficult process for the sub-contractor [34], resulting in the unclarity and readability risks [13,15]. The reason behind the existence of these problems is that the drafter considers the sub-contractors are familiar with all the terminology and abbreviations that he/she writes or translates. According to Besaiso et al. [25], this belief is incorrect since the readers of an engineering document of a contract or tender are almost engineers not schooled in law to understand the legalistic language of the contract or tender. Further, although they are engineers, it is ordinary to be unacquainted with the technical terminology, codes, specifications, and abbreviations of all engineering disciplines. More critically, Egypt's engineers and its sub-contractors are native Arabic speakers. Hence, including English words/idioms in the tender documentation or literally translating them into Arabic will make the documents inapprehensible to them. In consistence with this analysis, Besaiso et al. [25] justified the FIDIC clauses' unclarity, because they have been written utilizing very legalistic language. Additionally, Koc and Gurgun [15] revealed that employing infrequent engineering terminology to all disciplines and too many abbreviations are among the readability risks of the contracts, causing disparity between the contracting parties. This analysis informs the drafters of the sub-contracting's tender documents and their managers of a significant fact: not every term or abbreviation they add to the tender documentation provides ease-of-reading for the sub-contractor. This can, however, increase his/her fuzziness and incomprehension risks.

For addressing the terminology-related issues, Table 5 highlights that utilizing everyday words and abandoning employing legal language by the drafters are warranted to limit the presence of legalistic terms in the tender documents. Further, when it is essential to point to an engineering term in the tender documents, it should be frequent to all disciplinarians wherever possible. Similarly, the necessary clauses of the referred-to code or specification and the definitions of the utilized abbreviations must be attached with the tender documentation package. Moreover, any English words/idioms have to be translated into understandable Arabic phrases. Indeed, all of these anti-measures contribute to providing the sub-contractor with comprehensible terminology, supporting the highly needed aspects in any construction documentation, comprising clarity, readability, and understanding.

The above-mentioned analysis and discussion bring a detailed insight about the readability issues in the sub-contracting's tender documents by categorizing them into structural and presentation-related problems, lengthening and repetition-related problems, text-related problems, and terminology-related problems. The accuracy of this classification stems from involving the issues of the similar nature under the same group, depending on their descriptions and impacts on the readability for the reader. To date, it is believed that such framework has not been realized in any of the prior literature. This classification provides a significant implication for enhancing the drafters' and academics' knowledge to obtain an accurate description regarding the pivotal sources of the readability problems in a construction document. This study, additionally, in view of the top-eight frequent issues of the readability in the sub-contracting's tender documents, introduces another classification to benefit the developing countries generally. Relying upon investigating whether these

eight issues are highly ranked risks in the found peer researches of Malaysia and Turkey, a hierarchy of three levels has been developed. The top of the hierarchy comprises RI<sub>2</sub> and RI<sub>4</sub>, representing the issues impacting the readability in all the developing countries. Level two points to the issues present in 50% of the developing construction markets, including RI<sub>3</sub>, RI<sub>5</sub>, and RI<sub>8</sub>. Level three is the least critical one because its issues, i.e., RI<sub>1</sub>, RI<sub>9</sub>, and RI<sub>12</sub>, have 0% in terms of their occurrence as critical readability problems in Malaysia and Turkey. This hierarchy contributes to afford an initial classified checklist of the issues obstructing the construction documentation's readability in the developing economies, serving as the bedrock for helping the drafters and academics in those countries to define their associated readability problems.

## 6. Conclusions

This study contributes to answering two questions raised frequently in the construction community: "what are the readability issues in the sub-contracting's tender documents?" and "what are the measures for enhancing the readability in the sub-contracting's tender documents?". Building on applying the CAA to real documentation of 34 tenders of the sub-contracting arrangement in Egypt, 14 readability issues have been extracted. Further, through examining the prior works of readability, the corresponding anti-measures of the specified issues have been allocated. Subsequently, the soundness of the reached results has been confirmed by arranging face-to-face discussions with three experts. By determining the FA of the readability issues within the tender documents, "poor presentation of the format of the tender documentation", "sentences and clauses are too long and complicated", "spelling and grammatical errors", "abstractness or vagueness of words or sentences", "using controversial phrases", "repetition of provisions or clauses", "poor illustration of procedure or process", and "listing conditions that are not related to the tender scope" have been specified as the top-eight most frequent issues in the sub-contracting's tender documentation. These eight issues have then been compared with the outcomes of the found peer researches of Malaysia and Turkey. The findings of the comparison highlight that "sentences and clauses are too long and complicated" and "abstractness or vagueness of words or sentences" are severe issues obstructing the ease-of-reading and understanding of the construction documents in the developing countries. Relying upon discussing the identified readability issues, they have been categorized into four pivots, including "structural and presentation-related problems", "lengthening and repetition-related problems", "text-related problems", and "terminology-related problems". This classification, along with the other outputs of this paper, benefits the drafters and academics to obtain an accurate description regarding the possible pivotal sources of the readability problems in a construction document.

As in all studies, this research has limitations. First, since the readability issues have been drawn from the documents of 34 tenders of the sub-contracting practice in Egypt, replicating this research in the future by increasing the sample of the tender documents is recommended. Second, given the readability issues have been simply ranked in terms of their FA, relying upon applying the CAA to the documentation of the assembled tenders, the findings derived from these ranks should be viewed with caution until verifying these ranks. This can be realized in future research streams by involving the readability issues in a questionnaire and exploring the experts' perspectives regarding their frequency, severity, and criticality. Third, as the findings of the paper have been verified by three experts, surveying more practitioners in the future can enhance their reliability. Fourth, within the context of Egypt, which is a developing country, the study outcomes have been realized. Accordingly, its results, particularly in terms of the ranks of the readability issues, are limited to Egypt only. This is owing to the conclusion derived from the current paper that the most important issues of the readability are contingent upon the context of the country. Fifth, in this study, the readability issues have been classified into four dimensions by involving the issues of the similar nature under the same dimension, depending on their descriptions and impacts on the readability for the reader. Thus, validating this

classification in the upcoming research directions, utilizing the analytical techniques of the Exploratory Factor Analysis, the Principal Component Analysis, or the Cluster Analysis, is important to refine its precision.

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