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The Adequacy of Contractual Provisions in Managing Construction Failure in Malaysia

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Abstract

Arising of any failure in construction is a vital issue. It could be a source of dispute among different parties involved in construction. Therefore, the contract is the main reference to overcome issues regarding to failure claims. When construction failure occurred after the contractual period, the contract provisions are not applicable. Moreover, the contractual relationships couldn't be referred anymore. Thus, all parties seek to the justice to define their role and duty on failure loss and remedial cost based on the contract. The level of inadequacy of failure management consideration in the current contract documents was measured. Moreover, the limitations in current contractual provisions were evaluated to suggest the new scope for contractual provisions in managing construction failure. The evaluations were performed by interview with a panel of experts in the construction industry and legal sector. Furthermore, all current contracts provisions were investigated. Therefore, any related issues to the failure events were illustrated precisely. Then, the questionnaire survey identified the limitations and indicated opportunities to extend the scope of current provisions. Related Index was used to rank the factors and issues based on their importance. Refusing to cooperate during the failure event from default parties is the main limitation. Moreover, low quality of completed projects; bringing a bad image to client, and disputes between the involved parties are the main causes due to limitations based on engineers' and the legal sector's ideas. The new scope of contractual provisions was approved by more than %70 of the respondents.

Keywords: Building failure; Contract conditions; Contract documentation; Contract law.

1. Introduction

The incidents of structural failures have generated a lot of tension to the public recently. Despite some of the cases have been publicity reported by the mass media, but most of the cases are not reported at all and only known to the stakeholders of the effected structures (Allen, 2010). Structural failure can be contributed by many factors. It can be due to poor design, poor detailing, poor quality control and construction error or due to inferior material quality used in construction or even manmade mistakes because of poor health and long working time of the labours. Some of these issues cause fatigue and stress, and an accident is one possible outcome (Carper, 1986, Bracken and Roda, 2007, Sang et al., 2007, Frühwald and Thelandersson, 2008, Chan, 2011). Arising of any failure in construction is a vital issue. Since, construction firms have not put sufficient emphasis on strategic planning; it could be a source of dispute among different parties involved in construction (Soetanto and Dainty, 2009). Therefore, the contract is the main reference to overcome any issues regarding to failure claims (Janney, 1986). However, any uncertainty and equivocalness of clients should be managed to prevent any further disputes (Levander et al., 2011). Janney (1986) defines the construction failure as a failure that occurs during the construction project and after the project completed. They are considered to be either collapse, or distress of a structural system to such a degree that it cannot safely serve its intended purpose. Hence, these study focusing on the failure after the construction period; most of the failures in a construction project mainly in building construction generate controversy, long and expensive argument (Jacob Feld, 1997). This will follow by a

litigation process to resolve those issues. Therefore, failure in a construction project has close relations to the ability of building structure to receive such massive loads and also depends on the quality of the material applied.

Structural failure affects both the appearance and structural stability of the building. Most of the building consists of combination of three basic elements such as walls, roofs and floors. These elements are arranged to create both space division and unobstructed space (Ambrose, 1993) according to building's functions. Commonly, the causes of structural collapse include poor workmanship, lack of supervision just to name a few, which lead to serviceability problems such as distress, excessive deformation, leaking roofs and facades, and also inadequate interior environmental control system (Kaminetzky, 1976, Yates and Lockley, 2002, Messervey, 2007, Jacob Feld, 1997, Carper, 1986). On the other hand, former studies try to estimate exact probabilities of occurrence of fault events (Pan, 2006). However, more precise categorization for classifying the structural failure could be defined as element errors, errors in site selection and development, planning and scheduling deficiencies, errors in design, errors during construction, deficiencies of material and errors in service operation.

From previous research, there were surveys, which indicated several numbers of methods that appropriate to minimize construction failure (Yates and Lockley, 2002, Hall and Tomkins, 2001). It is commonly known that construction failure cannot be eliminated as it only can be reduced or minimized by improving the current construction environment. The lists of methods in reducing the failure in construction gained from that survey which received most responds from their respondents as stated below:

1. Design and detailing of critical connections by the engineer of record.

2. Design and supervision of construction of temporary structures by a professional engineer.

3. Clear definition of responsibility among the engineer, contractor and employer or client.

4. Constructability reviews during design stage.

5. Full time inspection of construction by structural engineers.

6. Peer review of the structural design and details by an independent professional.

In order to overcome the failure event, several contract documents are established by the statutory body and professional societies. There are a number of provisions that govern the quality of construction works, and some of the research shows the need of prequalification to ensure the quality of contactors' work (Hatush and Skitmore, 1997, Russell et al., 1992). They also specify the role and responsibilities of parties in the contracts in respect of defects. Moreover, the party's rights and obligations to a contract are governed by the contract itself. Previous study also stated that most construction contracts specify certain extraordinary powers to a particular person. This person's decisions are final and binding upon both parties (Iyer and Satyanarayana, 2002). However, the effects of provisions are only limited during the contractual period. Although there are governing laws to manage construction failure, the process is lengthy and costly.

The investigation of documents only focused on the available form of contract that is commonly used in Malaysia. These forms of contracts are:

PWD Form 203/203A (Rev.2007);

PAM Contract 2006 (With Quantities);

I.E.M Conditions of Contract for Works Mainly of Civil Engineering Construction;

CIDB Standard Form of Contract for Building Works 2000 Edition and

Occasional reference shall be made to the FIDIC Form as a matter of interest. FIDIC contract which is better described by its title 'Conditions of Contract (International) for Works of Civil Engineering Constructions'.

The contract documents are necessary as aid tools in a construction process (Laryea, 2011). Thus in the occurrence of construction failure it helps to each party know their rights and obligations during construction activities. The significant reasons are the client, and the professional advisors will know exactly what they want the respected party that doing the construction to perform well in terms of design,

quantity, quality and specification. Since legal knowledge is important in dealing with contract terms, construction practitioners must have at least basic knowledge to ensure the effectiveness of particular provisions. Therefore, rights and obligations of the parties to a contract are governed by the contract itself (Neo, 2005, Kremers et al., 2010). These rights and obligations will be expressly informed in the contract and are known as the express terms of the contract. In addition, there are instances where the terms of contract may be implied to relate the failure in construction with the provision in contract documents. Better understanding and clear interpretation are needed to avoid any disputes regarding to contract terms (Ashworth, 2001).

The adequacy of contractual provisions in managing construction failure is aimed to be evaluated. Moreover, the new scope of contractual provision for managing structural failure should be provided. Thus, the objectives consist of identifying the state of art of the existing provisions in managing construction failure and identifying the limitation of the current provisions in managing construction failure. It tries to suggest new scopes of provision that should be included in contract document in Malaysia.

2. Method of study

In the first step, it is focusing only on provisions in contract document such as PWD 203/203A, IEM1989, CIDB 2000, PAM2006 and FIDIC conditions (red book) which related to construction failure. The comparative table has been extracted and developed based on the clauses in aforementioned contract documents. The comparative table projects the factors which are covered in the scope of different provisions in Malaysian and international contract documents.

In general, there are a lot of case laws in construction industries consist of various cases mainly caused by disputes and breach of contracts due to the failure event. Ten case studies from Malaysian construction industry extracted from official document of Malaysian central curt. All the case studies have been investigated, and several limitations due to insurance provision and others are identified and categorized precisely.

The structured interview has been carried out. This interview consists of ten questions in parallel to the study objectives, which focuses on the contract limitations and new scope of contract provisions. The aim of this interview is to identify the relevant clauses and limitations of contract provisions. The interview session for this study was conducted with ten professionals who are tolerantly dedicated in their respective field. They have wide knowledge and experience in managing construction failure of more than three years. Their profession backgrounds consist of Civil Engineers, Lawyers and Quantity Surveyors. Out of ten interviewees, five of them are Civil Engineers from local authority and consultant firms. Three interviewees represent Quantity Surveyors from the developers, and other two are the law practitioners.

The study is continued by the questionnaire survey developed based on the information gathered in previous interview session. The design of the questionnaire is purposely to achieve the second and third objectives, which are oriented to identify any limitations and the potential of new scope to be considered in the contract provisions. Respondents were required to rate the information provided in terms of several choices. The questionnaire was established in three steps. In the first step, respondents presented their personal information including the field of their profession. In the next step, the respondents identify any constraints in the contract document based on the information collected in literature search and interview. Respondents are required to respond on all information by stating their level of agreement based on five ordinal measures known as Likert Scale from one (1) to five (5) according to specified level. The last section in this questionnaire requires respondents to state their level of agreement on which the new scope is suitable to be considered in current contract documents. There were eight potential new scopes identified from the literature search and interview.

According to the scale, questionnaire rating is following the five-point scale described previously and converted into relative important indices for each factor. These indices are adopting the Relative Index (RI) ranking technique based on equation 1 (Kometa et al., 1994).

$$RI = \frac{n(1)\times 1 + n(2)\times 2 + n(3)\times 3 + n(4)\times 4 + n(5)\times 5}{N_{total}\times 5} \quad (1)$$

Where n(i) is the number of responses with scale, i (i=1,..., 5) and N is the total number of responses to each question. The maximum value for RI is 1, and the minimum is 0.2 accordingly. Moreover, Mann-Whitney U Test as a non parametric analysis has been employed to illustrate any significant differences between two independent samples regarding to different professions as engineers and non-engineers. Totally, 30 questionnaires have been collected from respondents. The frequency distribution is 66.7 percent for engineers versus 33.3 percent for non-engineers.

3. Result and discussions

3.1 Literatures and Interview

According to the comparative research on different contract document, the provisions could be categorized in two categories. First are the related provisions, which are mentioned about managing structural failure straight forward. These provisions are defined in table 1 among all 5 aforementioned contractual documents.

'Table 1 here'

The second category is regarding to the provisions, which are related to managing structural failures by their effects. These provisions try to contribute solutions regarding to minor effect of structural failures. Table 2 defines these provisions in different contractual documents.

'Table 2 here'

Based on the results of the interview, 90% of the respondents had been engaged with structural failure previously and among all the respondent 70% of them agree with the lack of the adequacy of provisions in managing structural failure. All the experts appointed clause 44 as the most affected provision in the event of construction failure. Since the 70% of experts have faced with problems in the current guideline in managing structural failure, the need of improvement of the guideline is perceived. However, 60% of interviewees agree with this issue. Furthermore, most of the experts agree for adding the new scope regarding to managing construction failure. The reasons for adding the new scope consist of protecting the client's right, improving quality, to suit current construction scenario and minimizing construction dispute with scope, which is easy to understand based on experts' idea. Table 3 tries to identify and summarise the panel of experts' idea on each of the questions.

'Table 3 here'

3.2 The Limitations of Current Provisions in Managing Construction Failure

Based on the questionnaire survey nine factors are introduced that lead to limitation in the contract provisions. Four factors record the highest RI among the others. The first rank is the default parties refused to cooperate in managing construction failure after the contractual period is over. Although the RI value (0.81) for first rank is similar with second rank, the frequency on agreed and strongly agreed in the first factor is higher. Second rank is the need of third party to continue the work if failure happened. Followed by the 3rd rank (RI=79) which is the lack of knowledge from parties involved about relevant applicable laws and provisions. Factor with rank 4 also shares a similar RI value (0.79) with 3rd factor, which is the inconsistency with other standards. The reason is current governing laws, and contract provisions to use redundant legal expressions. Table 4 summarizes the results of the questionnaire for limitations of current provisions.

'Table 4 here'

Since the respondents are categorized in two groups, which are engineers and non-engineers such as lawyer and Quantity Surveyors (QS), table five shows, there is not any significant difference between the ideas on probable causes that lead to limitation in contract documents of these two groups based on Mann-Whitney

test. The results show, there is not any significant different between different groups' ideas as P values > 0.05 for all factors. Both groups seem to share a similar idea upon these causes.

'Table 5 here'

3.3 Effects due to the Limitation of Contractual Provisions

The effects during the construction and after the handovers of the project are being considered to evaluate the impact of limitations in contractual provisions. Table 6 shows seven effects of limitations stated in questionnaire and 20 respondents of the engineer group are responding thoroughly. Decreased in project quality is being identified as the most preferable cause due to the limitations of contractual provisions. It records the highest RI value (0.84) compare to other causes. Followed by increased in project costs (RI=0.79). "Disputes between parties involved" and "delay in completion schedule" (RI=0.78) also mostly preferable by the engineers.

'Table 6 here'

Table 7 shows the responses from non engineering group. They give aggressive responds towards the limitation effects during construction. Their Relative Index value is the highest (RI=0.86) for "increasing in project cost", "decreased in project quality" and also "disrespectful aroused from parties involve". This can be assumed that non engineer emphasis more on the effects of contractual provisions itself compared to engineer group.

'Table 7 here'

After indicating the limitations, the effects during construction also are identified to show the impact from the limitation of contractual provisions. Table 8 shows that these two groups have similar ideas on "the delay in payment and decreased of project quality". However, they don't share the similar idea for "disrespectful from parties involved" as a limitation since the P value is 0.042 < 0.05.

'Table 8 here'

Table 9 shows the causes due to the contractual limitations after the project handovers. According to highest RI value (0.81), "low quality of completed project" is the most important factor in engineers' side of view. This also would "bring bad images to the client or employer who owns that project" which get the 3rd rank (RI=0.77) between respondents' answer.

'Table 9 here'

Table 10 shows that majority of non engineer group agreed that contract limitations cause "low quality of a completed project" (RI=0.92). Then, "disputes would be occurred between parties involved" get second rank with RI=0.86. Finally, the 3rd rank achieved by "bring bad images to clients as their credibility".

'Table 10 here'

It is also an emphasis on the issues taking place after the handover of construction projects to the client, for instance "the certified completed building". There are significant differences between the ideas of an engineer and non engineer group. This can be seen in table 11, where the P value is 0.015 on "clients do not have rights to request any action from the contractor after the project handover" and 0.004 on "the client cannot claim as the contract period is already expired". Hence, this responds is being assumed with a higher impression from the engineer group as they practice the construction activities compared to non engineer who mostly relied on the theory and assumptions from previous cases.

'Table 11 here'

3.4 Suggestion of New Scope of Provisions to be Included in Contract Documents

This suggestion is combining all these two groups' ideas. They state their level of agreement due to the suggestion provided in the questionnaires.

The result shows 53.33% of the total respondents agree on the suggestion of new scopes. Other 30% are strongly agreed due this suggestion. Only 16.67% of the total respondents are neither disagree nor agree with the suggestions. Hence, table 12 below shows the frequency of each suggestion. First rank indicates that most respondents agreed to this factor "there should be detail and proper procedures of claim issuance

to resolve matters arising" (RI=0.85). It is followed by the suggestion on separated clause of construction failure due to its scope of an event (RI=0.84). Same RI value recorded on specific clauses related to managing the failure events.

'Table 12 here'

4. Conclusions

Majority of the respondents shared similar ideas about the lack of adequacy for contractual provisions. Either engineers or non engineers are giving strong agreement based on the results except for certain factors. Decreasing the project quality and increasing the project cost are two main effects due to limitations in the contractual provisions during the construction period. From the survey, certain questions are agreed mostly by non engineer group based on their professional point of view; in contrast to the practitioners in construction industry who are directly involved in managing construction failure. Thus, the survey also shows that most of the respondents agree, there are limitations when using the contract documents. Both engineer and non engineer group giving a positive responds to the suggestion of modifying the new scope in contractual provisions. This scope should follow certain principals as:

- Clear procedure;
- Simplicity;
- Clear classification;
- Ensure effectiveness;
- Extending duration of applicability;
- Developing the guideline.

There is a gap between theory from non engineering group and practice from the engineering group. However, neither of them sufficiently explains underlying reasons to this gap. Further research is recommended due to these issues as might help in finding that reasons.

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Table 1. Related Provisions to failure management in different contact documents

PWD 203/203A (Rev.2007)	CIDB 2000	PAM Contract 2006	IEM 1989	FIDIC (International)
1) Clause 13 Performance Bond(PB)/Performance Guarantee Sum(PGS): *Clause 13.1(a), Clause 13.3, Clause 13.5* 2) Clause 14.0 Indemnity in Respect of Personal Injuries and Damage to Property: *Clause 14.1* 3) Clause 18.0 Insurance of Works: *Clause 18.1: Taking of Insurance, Clause 18.3: Payment of Insurance in the Event of any Loss/damage* 4) Clause 40.0 Damages for Non-Completion: *Clause 40.1, Clause 40.2* 5) Clause 43.0 Delay and Extension of Time: *Clause 43.1* 6) Clause 45.0 Investigation by the Government and Other Persons in Case of Accident, Failure or Other Event. 7) Clause 48.0 Defects After Completion: *Clause 48.1: Completion of outstanding Work and Remedying Defects. Clause 48.2: Default in Remedying Defects.Clause 48.3: Diminution of Works. Clause 48.4: Certificate of Completion of Making Good Defects* 8) Clause 50.0 Suspension of Works: *Clause 50.1: Suspension and Resumption of Works. Clause 50.2: Extension of Time (EOT)*	1) Clause 3.5 Urgent Repairs 2) Clause 7 General Obligations of The Contractor: *Clause 7.1: Contractor's General Responsibilities.* 3) Clause 12 Setting Out: *Clause 12.2: Errors in Setting out* 4) Clause 15.7 Defects during Progress of the Works 5) Clause 20.3 Access for Remedial work 6,7) Clause 24(1), 24(3)(b) Extension of Time 8) Clause 26 Non-Completion and Damages For Delay in Completion: *Clause 26.2:Damages for non Completion, Clause 26.3:Employer's rights for Damages at Law* 9) Clause 27 Defects Liability After Completion 10) Clause 27.5 Contractor To Search	1) Clause 15.0 Practical Completion and defects Liability: *Clause 15.1, Clause 15.3, Clause 15.4, Clause 15.5, Clause 15.6* 2) Clause 18.0 Injury to Person or Loss and/or Damage of Property and Indemnity to Employer: *Clause 18.2* 3) Clause 19.0 Insurance Against Injury to Person and Loss and/or Damage to Property: *Clause 19.1* 4) Clause 20.A Insurance of New Buildings/ Works – By the Contractor: *Clause 20.A.1* 5) Clause 20.B Insurance of New Buildings/Works – By the Employer: *Clause 20.B.1* 6) Clause 22.0 Damages for Non-Completion: *Clause 22.1, Clause 22.2* 7) Clause 23.0 Extension of Time (EOT): Clause 23.1	1) Clause 3 Scope of the Contract 2) Clause 32 Indemnities to Employer in Respect of Personal Injuries and Damage to Property 3) Clause 33 Insurance Against Personal Injuries and Damage to Property 4) Clause 34 Insurance of Works 5) Clause 37 Performance Bond: (a) & (d) 6) Clause 40 Damages for Non-Completion 7) Clause 43 Delay and Extension of Time (EOT): (d) 8) Clause 45 Defects After Completion: (a) & (e)	1) Clause 20.1 Contractor responsibility until Taking Over Certificate 2) Clause 20.2 Contractor responsibility for loss and damage to the satisfaction of the Engineer with his own cost 3) Clause 40(1) Suspension of Work: (b) & (d) 4) Clause 21.1 Contractor responsibilities for insurance 5) Clause 44.1 EOT 6) Clause 49(1) Defects Liability Period: (a) & (b)

Table 2. Semi-related provisions in different contract documents

PWD 203/203A (Rev.2007)	CIDB 2000	PAM Contract 2006	IEM 1989	FIDIC (International)
1) Clause 3.1 Duties of S.O and S.O's Representative 2) Clause 4.0 S.O's Rights to Take Action 3) Clause 5.0 S.O's Instructions: *Clause 5.1(g)* 4) Clause 6.0 Scope of Contract: *Clause 6.3* 5) Clause 7.0 Contract Sum 6) Clause 10.1 Obligations of the Contractor: (f), (j) 7) Clause 15.0 Insurance Against Personal Injuries and Damage to Property: *Clause 15.1: Taking Insurance (b), Clause 15.5: Loss or Damage Occasioned by Insured Risk (c)* 8) Clause 19.0 Setting Out : *Clause 19.3* 9) Clause 22.0 Design: *Clause 22.2: Design Guarantee Bond (b)* 10) Clause 31. Final Account and Payment Certificate *Clause 31.3* 11) Clause 32.0 Effect of	1) Clause 1 Definitions and Interpretation: *Clause 1.1: Definitions* *The All Risk Insurance* 2) Clause 3 Superintending Officer's Instructions: Clause 3.1: *Compliance with the S.O's Instruction (SOI)* 3) Clause 4.8 Consequences of Delay in Supplying Further Drawings 4) Clause 7.3 Contractor's Responsibility for Sub-Contractors 5) Clause 18.0 Other Contractors: *Clause 18.2*	1) Clause 1.0 Contractor's Obligations: *Clause 1.2: Temporary Work and Construction Method* 2) Clause 5.0 Levels and Setting Out of The Works: *Clause 5.1* 3) Clause 7.0 Royalties and Intellectual Property Rights: *Clause 7.1* 4) Clause 25.0 Determination of Contractor's Employment by Employer: *Clause 25.1 (a), (b) & (f)* 5) Clause 37.0 Performance Bond (PB): *Clause 37.3*	1) Clause 4 Work to be to Satisfaction of Engineer 2) Clause 5 Engineer's Instruction (EI) 3) Clause 13 Setting Out 4) Clause 51 Termination of Contractor's Employment	1) Clause 22.1 Damage to Persons and Property 2) Clause 22.3 Employer indemnify the Contractor 3) Clause 40.1 Contractor can recover extra cost due to suspend the work progress 4) Clause 50.1 Engineer may instruct the Contractor with copy to the Employer to search if any defects, shrinkage or other fault in the works appears prior to the end of DLP.

S.O's Certificates 12) Clause 38.0 Possession of Site: *Clause 38.4* 13) Clause 39.0 Completion of Works: *Clause 39.3 (b)* 14) Clause 57.0 Effect of Force Majeure: *Clause 57.1*				

Table 3. Results of interview with professionals

No.	Interview Questions	Responses	
Q1	Do you have any experiences in handling matters like construction failure before?	90% answered 'yes' 10% answered 'no'	
Q2	Can you please explain about your role in managing the construction failure?	40% answered 'supervise construction work' 30% answered 'checking, inspecting and evaluating the material and method used in project' 20% answered 'managing claim' 10% answered 'in charge in remedial work'	
Q3	From your knowledge, which provisions in contract document is the most affected in the event of construction failure?	100% answered 'Clause 44' 40% answered 'Clause48' 30% answered 'Clause 45' 30% answered 'Clause 50' 20% answered 'Clause 10'	
Q4	Do you think that current provisions in standard form are adequate in managing construction failure?	70% answered 'no' 30% answered 'yes'	
Q5	If the relevant provisions are limited, are there any related laws that can be referred to?	70% answered 'yes-available laws and contract acts' 10% answered 'yes-Engineer code of ethics' 20% answered 'not sure'	
Q6	In your opinion, are there any problems with current guideline in managing construction failure?	70% answered 'yes' and 30% answered 'no'	
Q7	Do you think there necessary to improve the current provision?	60% answered 'yes', 30% answered 'no', and 20% answered 'not sure'	
Q8	As a professional directly / indirectly involved in the construction, would you like to propose the new scope of the provisions of the contract, in order to make it more sufficient?	50% answered 'review by expertise often' and 30% answered 'not necessary' 10% answered 'add provisions of claim procedure' and 10% answered 'provision of third party'	
Q9	Why did you think this new scope is necessary in managing that event?	- To protect client's rights - To suit with current construction scenario -- Easy to understand	- Emphasis on quality control of project - To gain respect from party involve - To minimize construction disputes
Q10	Lastly, what you can conclude on the overall performance of current contract documents?	- still lacking in direct information - provision for re-construct of existing building still not available	- do not have right provision for managing failure after contract period - still need to be improved - provisions should be revised by right expertise

Table 4. The frequency of responses in the limitations

Limitations	Likert Scale Frequency					Total	Relative Index (RI)	Rank
	1	2	3	4	5			
Default parties refused to cooperate during failure event.			3	22	5	30	0.81	1
The need of third party to continue the works if failure occurred.		1	4	17	8	30	0.81	2
Lack of knowledge about relevant applicable laws and provisions.	1	1	3	19	6	30	0.79	3
There is an inconsistency with other standards.			9	14	7	30	0.79	4
Unable to use the contract provisions as they lack of guidance and experiences.		2	8	11	9	30	0.78	5
Misinterpret the true intent of contract provisions.		3	7	14	6	30	0.75	6
Discrepancies in contract document (between drawing and specifications in particular) which may lead to the failure.		3	9	14	4	30	0.73	7
Default parties make unreasonable claim's amount as there is no details procedures in issuing a claim.	1	4	10	15		30	0.66	8
Although current provisions have been superseded, they prefer to use old form.		4	17	9		30	0.63	9

Notes:
1. Scale used: 1=Strongly disagree, 2=Disagree, 3=Neither Disagree nor Agree, 4= Agree, 5=Strongly Agree

Table5. Mann Whitney U Test for the limitations

	Lack of knowledge about relevant applicable laws and provisions.	Misinterpret the true intent of contract provisions.	Unable to use the contract provisions as they lack of guidance and experiences.	Default parties refused to cooperate during failure event.
Mann-Whitney U	79.000	81.500	64.500	92.000
Wilcoxon W	289.000	291.500	274.500	147.000
Asymp. Sig. (2-tailed)	.282	.385	.101	.650

Table 6. Frequency of responses from engineer group regarding to the effects during construction

Cause due limitations during construction	Likert Scale Frequency					Total	Relative Index (RI)	Rank
	1	2	3	4	5			
Decreased in project quality		1		13	6	20	0.84	1
Increased in project cost			5	11	4	20	0.79	2
Dispute between parties involved			3	16	1	20	0.78	3
Delay in completion schedule			6	10	4	20	0.78	4
Decreased in productivity			5	13	2	20	0.77	5
Disrespectful from			7	11	2	20	0.75	6

parties involve regarding to the contractual provisions effectiveness.								
Delay in payment	2		8	7	3	20	0.69	7

Notes:
1. Scale used: 1=Strongly disagree, 2=Disagree, 3=Neither Disagree nor Agree,
4= Agree, 5=Strongly Agree

Table 7. Responses from non engineer group regarding to the effects during construction

Cause due Limitations during construction	Likert Scale Frequency					Total	Relative Index (RI)	Rank
	1	2	3	4	5			
Increased in project cost		1		4	5	10	0.86	1
Decreased in project quality			1	5	4	10	0.86	2
Disrespectful from parties involve regarding to the contractual provisions effectiveness.			1	5	4	10	0.86	3
Delay in completion schedule		1	1	3	5	10	0.84	4
Dispute between parties involved			1	7	2	10	0.82	5
Delay in payment			2	5	3	10	0.82	6
Decreased in productivity		2	1	4	3	10	0.76	7

Table 8. Mann Whitney U Test for both groups regarding to the effects during construction

	Delay in payment	Decreased in project quality	Disrespectful from parties involve regarding to the contractual provisions effectiveness.
Mann-Whitney U	65.000	93.500	58.000
Wilcoxon W	275.000	303.500	268.000
Asymp. Sig. (2-tailed)	.103	.741	0.042

Table 9. Responses from engineer group for causes due to the contractual limitations after the project handovers

Cause due Limitations after project handover	Likert Scale Frequency					Total	Relative Index (RI)	Rank
	1	2	3	4	5			
Low quality of completed projects		1	3	10	6	20	0.81	1
Bring bad images to Client			7	5	8	20	0.81	2
Disputes between the parties involved.			6	11	3	20	0.77	3
Client cannot claim the contractor as the contract period is already expired.		3	9	5	3	20	0.68	4
Client does not have rights to request from the contractor to make good of defects.	2	2	6	7	3	20	0.67	5
Client has to suffer the loss caused by the failure alone.	2	2	6	7	3	20	0.67	6

Table 10. Responses from non engineer group for contract limitations cause after handovers

Cause due Limitations after project handover	Likert Scale Frequency					Total	Relative Index (RI)	Rank
	1	2	3	4	5			
Low quality of completed projects				4	6	10	0.92	1
Disputes between the parties involved.			1	5	4	10	0.86	2
Bring bad images to Client			2	5	3	10	0.82	3
Client has to suffer the loss caused by the failure alone.		4	2	4		10	0.60	4
Client does not have rights to request from the contractor to make good of defects.	1	6	2	1		10	0.46	5

Client cannot claim the contractor as the contract period is already expired.	1	5	4	10	0.46	6

Table 11. Mann Whitney U Test for both groups for contract limitations cause after handovers

	Client does not have rights to request from the contractor to make good of defects.	**Bring bad images to Client**	**Client cannot claim the contractor as the contract period is already expired.**
Mann-Whitney U	46.500	97.500	37.500
Wilcoxon W	101.500	307.500	92.500
Asymp. Sig. (2-tailed)	**.015**	.907	**.004**

Table 12. List of suggestions for the new scope

Suggestion of the new scopes in contract provisions	Likert Scale Frequency					Total	Relative Index (RI)	Rank
	1	2	3	4	5			
The detail and proper procedures of claim issuance to resolve matters arising.			3	16	11	30	0.85	1
The relevant provisions of construction failure should be stated in separate clause due to its scope of event.			4	16	10	30	0.84	2
There should be a specific clauses in the contract related to managing construction failure.			4	16	10	30	0.84	3
Each matter in provisions should be reviewed by related expertise to enhance its effectiveness.			7	15	8	30	0.81	4
The needs for client and parties to understand the contractual provisions thoroughly.			7	15	8	30	0.81	5
The clause related to managing failure in contract document must be made to enforce reasonable period of DLP.			7	15	8	30	0.81	6
The default party should be liable if the failure happened due to its work. It should completely being charged.		1	5	18	6	30	0.79	7
A specific agencies or bodies must be existed for the party involved to set guideline in resolving that matters.		1	10	15	4	30	0.75	8