Conflict Avoidance in Construction Projects: Six "C" Rescue Factors

Nirmal Kumar Acharya* · Young Dai Lee** · Sa Myeong Kim***

Abstract

Conflict is aroused when different people having different interest work together for fulfilling same the objectives. As the construction field is large, complex, volatile and requires tremendous capital, there are always greater challenges and possibility of risks of conflicts. Poor management practices in construction site and trying to protect risks and threats by contracting parties are the cited sources of the construction conflicts. The best management practice is to resolve the problems before these cultivate as conflicts. This paper has identified six dispute avoidance factors-Convince, Coordination, Consideration, Compromise, Consolation and Coercion. Six 'C' factors described in this paper are the mantra (formula) to execute a conflict free construction project. The conflict avoidance factors have been verified through a successfully executed project called TEVT development project (Technical Education and Vocational Training) during 1993-1998 in Nepal. The results show that the six 'C' factors if considered during the implementation of the project, construction conflicts would be controlled or minimized effectively.

Key Words:, Construction conflict, Conflict free project, Conflict avoiding factors, Owners, Contractors

1. Introduction

Dreaming a conflict free project in the large construction industries gives a pleasure feeling for the project executors. It would be a great achievement, if a construction project is completed without having any hindrances all through its life cycle. To dream this situation is a positive thinking of project implementers. But, would it be possible- Could be; but it would be very much difficult in the construction projects where millions of dollar, large numbers of workers and chain partners are involved and continued for several years. In this type of long-term relationships, conflict is inevitable and it happens in personal, professional, family and even in social relationships (Bragg, 2001). So, we have to expect it.

Gould (2002), states that complexity in the construction project is increasing year by year. As the construction industry is large, volatile and requires tremendous capital outlays, there are greater risks, challenges and complexity during implementation of construction projects (Ahmed et al., 2003). This complexity has been often found resulted in complex disputes, which predominantly arise from the composition and magnitude of the work, multiple prime contracting parties, poorly prepared and/or executed contract documents, inadequate planning, financial issues, and communication problems (Harmon, 2003).

* Nirmal Kumar Acharya, Ph.D Student, Dept. of Civil Engg, Pukyong National Univ. Busan, nirmal_pknu@yahoo.com
** Young Dai Lee, Professor, Dept. of Civil Engg, Pukyong National Univ. Busan(Corresponding author) ydlee@pknu.ac.kr
*** Sa Myeong Kim, Ph.D Student, Interdisciplinary program of CEM, Pukyong National Univ. Busan, sa460@daum.net

When the projects face conflicts then there will be delays, claims, counter claims, dissatisfaction, negative emotions, losses, pain etc. in contracting parties, which ultimately affects the overall objectives of the project. Due to the high level of interaction amongst the project participants, conflict management is an important factor in the entire project management process (Leung and Yu, 2003). Since forms of dispute avoidance are preventative in their approach to conflicts and claims, it is useful to explore the origins of disputes to trace causative patterns that will point to us critical areas to be addressed.

Construction disputes should never escalate into litigation (Pinnell 1999) as construction litigation cost is expensive as well as process is lengthy. Even any one party wins the case after a long time of litigation the winner could not taste the win enthusiastically. Therefore, the contracting parties require looking for conflict avoiding measures in their projects.

The objective of this paper was to deduce simple conflict preventing or avoiding approaches and to show how these work in real construction field. The rationale behind these objectives was to propagate the concept of "prevention is better than cure." If the construction problems are solved or understood (which are often minor nature in the beginning) right in the beginning, then these could be stopped to be transformed into the major problems later, which usually termed as 'Construction Conflicts or construction Disputes'.

After reviewing related literatures about conflicts in construction projects and also applying experiences of authors, eight conflict avoiding factors were sorted out. Out of eight factors, professionals involved in construction sites have identified six factors as the best conflict avoidance measures in civil engineering and building construction fields. These six factors have been verified by a case study. The case study project was regarded as a successfully executed Technical School building project in Nepal. Since the forms of construction project management are almost identical around the world, the results of this paper are expected to be useful for project implementers. Although, the conflict prevention tools have been applied in technical school construction project; it is not limited to this area only, nevertheless applicable in any building and civil engineering projects.

This paper has been composed in seven sections. Section 2 and 3 deal about what is conflict and how the conflicts are erupted in construction field. Section 4 deals about the six 'C' conflicts avoidance factors. Section 5 describes about the case study project and section 6 discusses about the results of application of six factors in real field. At last, not the least section 7 concludes the paper.

2. Conflict Process

Conflict is predominantly, a legal term; which has the tremendous effect in social, political and economical fields. Conflict is a serious difference between two or more beliefs, ideas or interests. If two beliefs, ideas, or interests are in conflict, they are very different from each other and it seems impossible for them to exist together.

According to Rubin (1993), many conflict processes involve a predictable psychological cycle (see Fig.1). The cycle generally includes three stages: 1) the conflict escalation 2) climax and stalemate and, 3) conflict de-escalation (cited in Ock and Han, 2003).

When the conflict increases, it reaches a climax, that is a worse situation, and then the conflict participants come to a deadlock (stalemate). In the de-escalation stage, there happened to be a move toward a settlement of the conflict by means of compromise or court's verdict. Compromise or court's verdict usually results a WIN/LOSE situation for disputants. This works only for temporarily. Although the disputants get verdict, there could be some ill-feelings in the disputants' minds known as conflict residue (shown in Fig 1) which may increase an atmosphere of stress and causes more desperate conflicts later on.

3. Sources of Conflict

A construction project is considered only as a successful project, if it is completed within the originally scheduled

time period, within budgeted cost and with specified quality. Apart from these three fundamental success measures, there are number of other variables on which the success of a project depends on. Other project success variables are: commercial value and profitability from project, participants' satisfaction, users' expectation and satisfaction, functionality, environmental performance, health and safety etc. (Chan and Chan, 2004). Unfortunately, the successful project goal is not achieved as often as the contractual parties would like (Harmon, 2003).

Pinnell (1999) has viewed many, if not the majority of

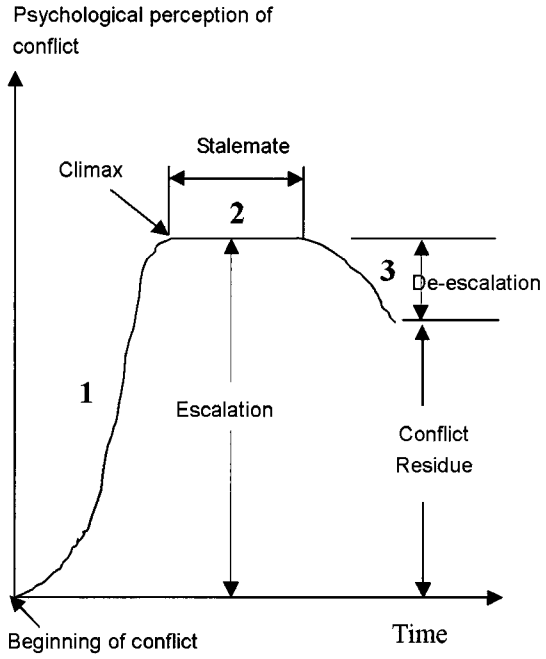

Fig. 1 Conflict Curve(from Ock et al. 2003)

construction problems (and the resulting disputes) occur because of poor project management practices (and these problems are happened to be minor in the beginning, but they take on mountainous proportions if not addressed quickly by the contracting parties as shown in Fig 1. Disputes result not only from destructive or unhealthy conflict, but also when claims are not amicably settled says Kumaraswamy (1998). If disputes are not resolved promptly, they tend to drag on and escalate and can cause project delays, lead to claims, require litigation proceedings for resolution, and ultimately destroy business relationships (Cheung, 2002).

In another view, it is believed that most of the disputes and conflicts have been originated when the contracting parties trying to protect their risks and threat factors and transferring those risks to other parties. Loosemore (1999) has viewed that a risk should be given to the party who best can control it; if it occurs and not adheres to this principle increases the likelihood of conflict.

The category and scale of risks may be varied from one project to another by various project attributes e.g., scope of projects, where they are located etc. A building project may have less conflicting issues, where as mega projects like power generation plants, high-speed express highways etc. may have more conflicting issues. In this regard, some of the owners' usual concerns (worries) are: i) selection of conflict- reputed (smart) or incompetent (passive) contractor, ii) time and cost overrun, iii) late handover of constructed facilities iv) high bidding/low bidding v) use of inferior quality materials (Barrie et al., Kartam et al.,1992; Long et al, 2004; Rahman et al., 2004).

Accordingly, the contractors' main worries, which could enforce them to take a defensive approach from getting losses in the work are (Barrie et al., 1992; Chan, 2005; Kartam et al., Long et al, 2004; Rahman et al., 2004;): i) no payment and late payment ii) frequent interruption from client side iii) frequent scope/ design changes iv) negligence and late decision by the owner v) excess quantities variation vi) new types of work (new technology) vii) shortages of construction materials/equipment viii) unavailability of specified materials and skilled workers ix) late handover of the site x) small construction site area xi) ambiguities in drawings and specification xii) unpredictable sub-soil condition xiii) market fluctuation (price of materials and wages of labor) xiv) workers' strikes/protests xv) subcontractors' inefficiency and passiveness xvi) natural disasters (force measures).

Usually, the owner or the client happens to be the main actor in the construction business. The owner invests the money, initiates the project, determines requirements and sets the goals and scopes. Any proceedings going against the owner mean losses and disadvantages to him or her.

Table 1 Conflict Avoidance Modes

Avoidance factors	Bacal (2005	Brag (2001)	Kerzner and Adam	Kirchof and Yu (1989)	Leung (2003)	This study (2005)
1. Consideration(accommodation)					√	√
2. Consolation (avoidance)	√	√		√	√	√
3. Compromise	√	√	√	√	√	√
4. Coercion (forcing)	√	√	√	√		√
5. Convince (smoothing)			√	√		√
6. Coordination (problem solving)				√		√
7. competition					√	
8. Collaboration (confrontation)	√		√		√	

On the other hand, contractors are the businessmen, who always desire some profit from their involvement in projects. When they perceive losses from the project, then they might look for alternate ways to cover up those losses in the form of delays, poor quality of works and a list of claims. Therefore, all of the project participants should try to achieve the project objectives e.g. timely completion, quality of work, satisfied owner, and profits for the contractors by avoiding small conflicting matters right from the beginning of the project. The subsequent sections focus about keeping the construction problems within the reach of contracting parties and solving the problems in a proper way before these turn out to be difficult matters or sore problems.

4. Identification and Weighting of Conflict Avoiding factors

Conflict should always be a matter of avoiding. Here avoidance does not mean as to neglect, rather it is expressed in the terms of prevention. We should not work as preparing ourselves for dispute. However, if one of the low bid, greedy and smart contractors engaged in the project, then the owner should always be careful from them. As mentioned in previous paragraph, low as well as greedy and smart contractors always look for flaws and loopholes in the contract.

If the project management body did not apply a good management tools then there could be project disorder. A degree of disorder existed among the existing approaches to management of projects, and significant implications of project failures for stability and prosperity of affected organizations (Cicmil, 2000). Therefore the owner shall act various management principles and subjective decisions during preconstruction as well as construction phase.

Several researchers have discussed about empirical methods of conflict resolution. Bacal (2005) has outlined 4 approaches - avoidance, collaboration, power-based and compromise as different modes of dealing with conflict. In this approach each of these may fit a certain situation better than the others. Samuel (1998) has stressed on speaking the same language and maintaining control for managing success, whereas Mah (2004) has suggested maintaining the trust and keeping the promises as very much important to manage the relationship between the two parties like a marriage. Bragg (2001) has explained three basic approaches to deal with conflicts in workplaces. The three approaches are i) avoiding conflict, ii) suppressing conflict and iii) turning conflict into positive outcome. Out of these three approaches, he withheld the first two approaches as these will not work successfully. Kirchof and Adams (1989) and Groton (1997) have described five conflict resolution approaches from a project manager's viewpoint: withdrawal, compromise, forcing, smoothing, and problem solving (cited in Ock et al., 2003).

Leung and Yu (2003) have explained five conflict resolution styles, which include competition, collaboration, avoidance, accommodation and compromise.

In order to derive conflict avoiding factors applied in the construction sites, 30 professionals worked for the owner, consultants and contractors were approached. The professionals were presented with the 8 modes of conflict avoidance as shown in Table 1. These probable conflict avoiding factors were identified from the study of related literatures as explained in above paragraphs. The professionals were asked to rate the avoidance modes on a Likert scale of 1 to 5 (1 as 'not useful' and 5 as 'very

Table 2 Pairwise comparison matrix

		Normal Values						Normalized Values						Total	Importance weightings	Rank
	6'C's	A	B	C	D	E	F	A	B	C	D	E	F			
Conflict avoiding factors	Compromise(A)	1	0.20	0.17	0.33	5	3	0.06	0.02	0.09	0.03	0.19	0.16	0.57	0.09	IV
	Coordination(B)	5	1	0.17	3	3	3	0.32	0.12	0.09	0.31	0.12	0.16	1.13	0.19	II
	Convince(C)	6	6	1	5	7	6	0.39	0.73	0.54	0.52	0.27	0.33	2.77	0.46	I
	Consideration(D)	3	0.33	0.20	1	7	5	0.19	0.04	0.11	0.10	0.27	0.27	0.99	0.16	III
	Coercion(E)	0.20	0.33	0.14	0.14	1	0.33	0.01	0.04	0.08	0.01	0.04	0.02	0.20	0.03	VI
	Consolation(F)	0.33	0.33	0.17	0.20	3	1	0.02	0.04	0.09	0.02	0.12	0.05	0.34	0.06	V
	Total	15.53	8.19	1.85	9.67	26	18.3	1.00	1.00	1.00	1.00	1.00	1.00	6.00	1.00	

useful). Only those factors with mean ratings above or equal to 3 were included in this study. In this regard, six 'C' factors were finally selected (Fig. 2) as the best conflict avoiding factors. The initial of "C" for all identified conflict avoiding factors has been maintained to show logical identical format. These six 'C' factors are: Compromise, Coordination, Convince, Consideration, Circulation and Consolation.

A pair-wise comparison technique was applied to determine the weight of each factor. This technique is based on constructing a matrix with the same factors in rows and columns (Serpell, 1999). All the elements in the rows are compared to the elements in the columns. A typical scale 1 to 7 was used to create weight (1 being as 'equal importance' to 7 as 'very strong importance').

In this matrix, if the row element is more important than column element, then a number between 1 and 7 is assigned. If the column element is more important than the row element, the number assigned is the inverse of the assigned in the first case. After all the cells are filled, the matrix is normalized by dividing each number in the cells by the sum of the corresponding column. Finally, the normalized cells for each row are summed up and the total is normalized again on base 1 to obtain the weight of each factor.

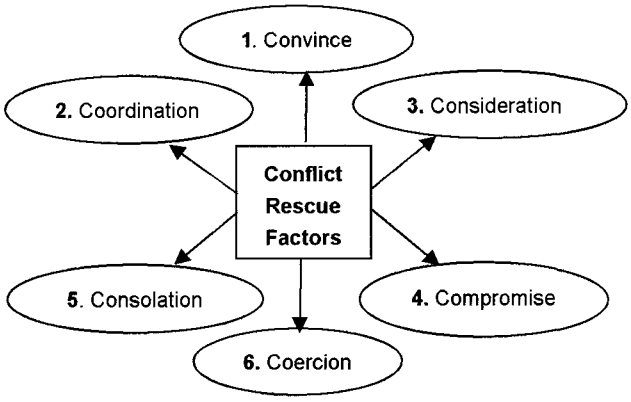

Fig 2 Six 'C' factors with importance ranking

After identifying the factors, the respondents were again approached for weighting of the factors. Table 2 summarizes the results of this survey and also illustrates the calculation and ranking of importance weightings of factors. The set of importance weightings for the six conflict avoidance modes represents the degree of relative importance among them, and the sum of the weightings is unity.

This result reveals that 'Convincing' mode is number one important factor (46% importance weightings) among the conflicts avoiding factors, which suggest that the project participants prefer to apply 'Convince' approach most likely to avoid conflicts in their construction sites. This mode is then followed by Coordination (19% importance weightings) and Consideration (16% important weighting) at number 2 and 3 respectively. Other three factors Compromise (9%), Consolation (6%) and Coercion (only 3%) are least preferred measures to rescue the construction conflicts. The result is shown in Fig. 2 (serial number in figure represents the ranking of conflicts avoiding modes).

This importance weighting suggests that the project implementers first try to apply the convincing strategy against other contracting parties. This is the best way to run the project without having any hassles, because it does not allow growing conflicts. If this approach could not be successful; only then Coordination (or problem

solving approach) and Consideration (or smoothening the relation) should be executed. Coercion is the least preferred measure; however, it is still necessary to be applied in the cases when a quick decision must be made, relationship is unimportant and for short term basis (Kertzner, 2003).

The following sub-sections here deal about these Six 'C' factors briefly.

Factor1: Convince

Convincing to other parties is really a difficult task but still a powerful tool to avoid conflicts in construction. This mode is the most preferred measures perceived by the respondents. By explaining consequences and presenting proof to unsatisfied parties, a consensus can be made. For example, in a bill of quantities of a contract document, the description of item of Steel reinforcement work was stated like this' "Laying steel reinforcement bar in correct position…". In this stated description, there was no word of 'supply'; so, the contractor had argued that the responsibility of the supply of material falls under the owner. But the spirit (not the language) of contract does not show anywhere that the provision of supply of material is from the owner. The contractor was convinced for his responsibility of both supply and laying of steel reinforcement and also presented him proofs that he had considered the material cost in the rate analysis of steel work during bidding. In this case, legally it was probably a contractor favorable matter; however, from convincing strategy, a certain conflict issue was avoided successfully.

Factor 2: Coordination

This is the second ranked conflict avoidance measures. Coordination term is a broadly and frequently exchanged term in management field. Obviously, it is necessary to have a smooth coordination and joint problem-solving maneuvers among the project participants to obtain the project goals. It is important to the contracting parties that the relations between the interacting individuals are kept co-operative and that the perceptions of unfairness are avoided (Kadefors 1997).

A regular meeting between the project participants eases the friction by sitting together and understanding each other. The minutes of the meeting are the reliable proof of coordination work.

Factor 3: Consideration

In some instances, contracting parties cannot be convinced for a generalization of statement of work. For instance, in a bill of quantities, description of earthwork in excavation was stated as "Earth work in excavation in all types of soils…" It was deemed in the contract that the contractor would assess the sub-soil of construction site and bid the rate accordingly. As a result, the contractor bided low rate to get the contract award overlooking this condition. Later, hard soil was encountered in the site, and then the contractor started to argue that he could not execute the work in quoted rate. The contractor also argued that he had no time to investigate the site and bided the rate assuming soft nature of soil by experience of the site surroundings. To ease the friction, the owner took the consideration strategy and had revised the contractor's rate and paid as per the new rate. In this case, the owner showed the flexible attitude to solve the problem without having any hassles. In this matter, the owner cannot be blamed for being favorable to the contractor. The owner should not be rigid in all the cases.

Factor 4: Compromise

Compromise deals with the give and take approach, which leads to a "win-win" position (Kertzner, 2003). Compromise can be in effect between an owner and a contractor without impeding performance of the project. For example, if required thickness of Iron sheet, say 6 mm is not available, whereas 5 mm thick sheet is readily available in the market, and it is still acceptable from design consideration, then the contractor might be allowed to use 5 mm sheet. The difference of cost of material (payment to contractor) can be adjusted

proportionately as per the market rate. This approach reduces the friction between contractor and supervising parties. If the contractor told to get 6 mm thick sheet wherever it is available, then the contractor might take long time to find it or might reluctant to perform that item resulting hindrance in project progress.

Factor 5: Consolation

Sometimes being passive or not reacting fiercely also might work as a medicine for conflicting issues. If either contracting parties do not want to consider the claim of other party, then it would be best just to assure them that the case would be considered later, rather giving negative indication or decision. It might be advantage sometimes to encourage the differing parties just to do the works by giving assurances. After finishing the works, the issues could be diverted and related with other unresolved issues. This type of strategy does not work always in long term and often regarded as temporary solution (Kertzner, 2003).

Factor 6: Coercion

This factor relates to the forceful action of owner to the other project participants or vice -versa to follow the spirit of the contract and project scope. Letters of awareness, notices etc. are also parts of coercion and when delivered in timely basis offers opportunity to the parties to assess their activities in advance in order to prevent from the probable problems. Court verdict in litigation cases and binding resolutions of arbitration, mediation, adjudication etc are the examples of coercion.

Generally, coercion approach creates a win-lose situation in which one party wins at the expense of the other (Kertzner, 2003). Coercion strategy is useful when there is do-or-die situation exists or when a party is stronger or to gain power.

5. Case study: TEVT Project

General conflict issues in construction projects have been analyzed from a case study carried out in a Technical Education and Vocational Training (TEVT)

Table 3. TEVT project Information

S.N.	Name of Project	Project cost ($ Million)		Completion time/delayed (Months)	Cost over run by	Time overrun by	Slection Procedure	Tendered rate
		O	R					
	1	2	3	4	5	6	7	8
1	HQ-I	0.57	0.56	30/15	-1.7%	50%	Prequalify	10% high
2	HQ-II	0.33	0.48	33/18	45.4%	54.5%	Open	21% below
3	RTS-I	1.11	1.17	27/9	5.4%	33%	Prequalify	8% high
4	RTS-II	0.05	0.05	9/0	0	0	Open	16% below
5	LTS-I	0.24	0.24	18/6	0	33%	Open	4% high
6	LTS-II	0.16	0.15	12/3	-6.25%	25%	Open	18% below
7	DTS	0.40	0.58	30/12	45%	40%	Open	29.99% below
8	PTTC	0.34	0.41	17/5	20.6%	29.4%	Open	14% below
9	BTS-I	1.01	1.27	32/14	25.7%	43.7%	Open	22% below
10	BTS-II	0.19	0.21	12/3	10.5%	25%	Open	12% below
11	STS-ZI	0.36	0.43	24/6	19.4%	25%	Prequalify	10% high
12	STS-Z2	0.38	0.44	28/14	15.8%	50%	Prequalify	9% high
13	STS-Z3	0.22	0.25	28/14	13.6%	50%	Prequalify	5% below
14	STS-Z4	0.33	0.40	17/5	21.2%	29.4%	Open	29% below

Notation : O=Original, R=Revised, (-)sign = Under spending

improvement Project in Nepal. The project was implemented during 1989-1998 (but most of the construction works were carried out during 1993-1998). It was one of big projects in contemporary period in Nepal implemented under Asian Development Bank loan proceedings. A major component of the project was to construct and establish 5 new technical schools (TS) and the Head Quarter (HQ) of the project implementing organization; and substantial renovation and additional workshops for one TS. Table 3 exemplifies project information of 14 different construction packages within these 7 construction sites.

This TEVT project was executed under traditional procurement method. In the beginning of the project as per the sponsors' guidelines, contract packages were procured under prequalification method. Table 2 (col. 8) depicts that almost all tendered rate under the prequalification method are significantly higher than the estimated cost. It shows the contractors' cartel in the tendering process. It is one of the major disadvantages of prequalification method. That is why, for later contract packages, the project office (Owner) with the consent of sponsor had adopted open tendering method. Surprisingly, in this process almost all contractors bid price found to be significantly less than the project estimate cost (see table 3, col. 8). This method was proved to be much economical to the project office. However, as a bad effect of the process, the project office had to face few problems, like difficult to quality control, contractors' different approaches to make up the losses etc. later on in few construction sites.

6. Application of Six 'C' Factors

Table 4 shows the various conflicting issues emerged in 7 construction sites; however, those problems were found to be solved before they were reached at climax by application of conflicts avoidance factors stated in above sections. Most of the sites were suffered from low bid, time overrun and increased cost as illustrated in table 3. From the nature of the problems like frequent design change, excessive difference in contract item quantities, language of contract etc. as shown in table 4 might be considered as minor type, yet they were having greater potential to erupt as conflicts.

Examining minutely conflicting issues, what we found is that almost of these issues are related to the design consultants. It is so because, the consultant happens to be the leader in the construction site in a traditional procurement method. Therefore, obviously they are more susceptible to commit mistakes in the project proceedings. The contractor also takes a hard stance to the consultants in traditional contract method (Jefferies et al,. 1999). That is why construction disputes usually crop up in this method. However, even these problems existed in construction sites, Jefferies et al. (1999) has reported that the consultants prefer for traditional method than other procurement method in order to take control of the project.

The projects undertaken in the case study are in the range of moderate to large building construction project in the context of developing countries. The construction problems encountered in these projects are common by nature in any construction sites around the world (for example, see Kangari 1996; Ogunlana et al. 1996). Therefore, the conflict avoiding measures described in this study are reasonably applicable anywhere in the world.

During solving the construction problems (conflicts), dealing with an over ambitious contractor is a very difficult task. In this case study, the contractor of HQ I site was a difficult but a professional contractor. The contractor had a number of complaints against the Owner and Consultant. However, the project office succeeded to get the project finished by compromising and considering time extension without levying penalty and reimbursing price of excess quantities over than contracted quantities by new rates. Still the contractor was not convinced with escalation calculation method, but in this case the Project office (Owner) adopted consolation technique; that is just assuring to look that one at final stage of the project.

One can observe in Table 4 that the Project Office had taken plenty of soft approaches as what we have

described here as six 'C' factors. These facts support as evidence that it is possible to make a project as a conflict free, if the project implementers apply the fundamental management factors like coordination, compromise, convince, consideration, coercion, and consolation in a best way. The Project Manager as well as project staffs (supervising engineers, account officers, procurement officers etc.) of TEVT project had applied the above described conflict avoidance factors skillfully to make this construction project as a conflict free project.

In previous section, it has been mentioned that the consultants take a lead role in traditional procurement method. However, in this TEVT project, the Project Office (Owner) had taken a lead role during construction phase. The Project Engineer and his assistants (Overseer) monitored the construction work full time and had coordinated the Consultant and Contractors in the construction site. That is why, effective application of conflict avoiding six 'C' factors was possible.

This TEVT project was awarded as a 'best project' by the project sponsor organization (Asian Development Bank) among the projects executed under the bank in Nepal later in 1997.

7. Conclusions

Conflict is aroused when different people having different interest work together for fulfilling the same objectives. As the construction field is large and requires tremendous capital, there always exist dispute risks. The owner invests money to the project, so he desires the work be completed with good quality and within the budget, whereas the contractor desires some return from his investment and involvement. Therefore, the best construction management practice is to resolve the problems before these cultivate as conflicts.

This paper has deduced six conflict avoidance factors: convince, coordination, consideration, compromise, consolation, and coercion through a field survey using *Likert scale*. The factors have been further ranked by importance weightings using pair-wise comparison matrix process. First letter of these conflict avoiding factors have been labeled by "C" initial letter to demonstrate identical feature among them. These conflict management tools have been verified in a TEVT project implemented in Nepal.

The paper has reported various construction problems encountered in the case study project and application of six "C" factors to solve them. Although, the consultants happen to be the leader of construction site, in traditional procurement method, this paper recommends taking a leading role by Owner's technical team to apply 'C' factors for controlling the project problems effectively.

This study shows that six 'C' conflict avoidance factors are capable in implementing the building construction projects as a conflict free project. However, the tools are not limited to building construction projects only; these can be applied significantly to any other civil engineering projects.

Finally, it is hoped that the six 'C' factors identified by this study would be conducive to .the Owners or the Consultants or the Project Managers to accomplish their construction projects as a conflict free project.

Acknowledgements

The authors are grateful to the anonymous reviewers for their comments, which have contributed to improving the quality of the paper.

References

1. Ahmed, S. M.; Salman A.; Kappagantula P., and Gollapudi, D. (2003), "Delays in Construction: A Brief study of the Florida construction industry," ASC Proceedings of the 39th Annual Conference. Clemson, South Carolina.
2. Bacal, R. (2005), "Is conflict prevention the same as conflict avoidance," Work911/Bacal &Associates business and management supersite,〈http://www.work911.com /conflict /carticles/conav.htm 〉 (April 15, 2005).
3. Barrie, D.S. and Paulson, B. C. Jr. (1992), Professional Construction Management (3rd Ed.), McGraw-Hill Inc.

4. Chan, E.H.W., and Suen, C.H. (2005), "Disputes and dispute resolution systems in Sino-foreign joint venture construction projects in China," Journal of Professional Issues and Engineering Education and Practice (ASCE), Vol. 131 (2), 141-148.
5. Bragg, T. (2001), "Three ways to deal with conflict in organizations," Peacemakers training, USA, <http://www.terrybragg. com/article_Organizational Conflict.htm> (April 15, 2005).
6. Chan, P.C., and Chan, A.P.L. (2004), "Key performance indicators for measuring construction success," Benchmarking: An international journal, (Emerald), Vol. 11 (2), 203-221.
7. Cheung, S. O., Henry C.H.S., and Lam, T. (2002), "Fundamentals of Alternative Dispute Resolution Processes in Construction," Journal of Construction Engineering and Management (ASCE), Vol. 128 (5), 409-417.
8. Cicmil, S. (2000), "Quality in project environments: a non conventional agenda," International Journal of Quality and Reliability Management, Vol. 17 (4/5), 554-570.
9. Gould, F. E. (2002), Managing the Construction Process, 2nd Edition, Prentice Hall.
10. Harmon, K.M.J. (2003), "Resolution of Construction Disputes: A Review of Current Methodologies," Leadership and Management in Engineering (ASCE), Vol. 3 (4), 187-201.
11. Jefferies, M.C., Chen, S.E., and Mead, J.D. (1999), "Project team performance-Managing individual goals, shared values and boundary roles," Profitable partnering in construction procurement, Edited by Ogunlana, E & FN Spon, UK, 47-59.
12. Kadefors, A. (1997), "Client-contractor relationships in building projects: cooperation, conflict and social influence," Department of building economics and construction management, Chalmers University of Technology, Goteborg, Sweden.
13. Kangari, R. (1996), "Risk management perceptions and trends of US construction," Journal of construction engineering and management (ASCE), Vol. 121 (4), 422-429.
14. Kartam, N.A. and Kartam, S.A. (2001). "Risk and its management in the Kuwaiti construction industry: a contractors' perspective," International Journal of Project Management, Vol.19 (6), 325-335.
15. Kerzner, H. (2003), "Project management: A systems approach to planning, scheduling, and controlling" (8th Ed.), John Willey and Sons, Inc.
16. Kumaraswamy, M. M; (1998), "Consequences of construction conflict: A Hong Kong perspective," Journal of Management in Engineering (ASCE), Vol. 14 (3), 66-74.
17. Leung, M., and Yu, R.K.T. (2003), "An investigation of conflict resolution in the construction industry," Journal of construction procurement (CIB Publication), Vol. 9 (1), 5-14.
18. Long, N.D., Ogunlana, S., Quang, T., and Lam, K.C. (2004), "Large construction projects in developing countries: a case study from Vietnam," International Journal of Project Management, (Elsevier), Vol. 22 (7), 553-561.
19. Loosemore, M. (1999). "Responsibility, power and construction conflict," Construction management and economics (E & F.N. Spon), Vol. 17, 699-709.
20. Mah, M. (2004), "Outsourcing insights: Managing the relationships," Cutter consortium, <http://www.qsma.com/html /OutsourcingInsights VolIII.html> (April 15, 2005).
21. Ock, J.H., and Han, S. H. (2003), "Lessons learned from rigid conflict resolution in an organization: Construction conflict case study," Journal of Management in Engineering (ASCE), Vol. 19 (2), 83-89.
22. Ogunlana, S.O., Promkuntong, K., and Jearkjirm, V. (1996), "Construction delays in a fast-growing economy: comparing Thailand with other economies," International journal of project management (Elsevier), Vol. 14 (1), 37-45.
23. Pinnel, S. (1999), "Partnering and the management of construction disputes," Dispute resolution journal, American arbitration association, Vol. 54 (1), 16-22.
24. Rahman, M.M. and Kumaraswamy, M.M. (2004). "Contracting Relationship trends and Transitions,"

Journal of Management in Engineering, Vol. 20 (4), 147-161.
25. Samuel, P.B. (1998), "Managing for success," Outsourcing journal, Everest partners, January issue, .http://www.outsou rcing-journal.com/jam 1998 - insight.html
26. Serpell, A.F. (1999), "A structured methodology for improving the owner-contractor relationship in construction projects," Profitable partnering in construction procurement, edited by Ogulana, E&FN Spon (Routledge), 169-178. .

논문제출일: 2005.01.05
심사완료일: 2005.12.13

Table 4. Conflicting Issues and measures taken in TEVT project

S.N	Project	Conflicting Issues	Effect	Measures taken to solve and prevent the conflicts
1	HQ I	1. Late payment of progress bill 2. Late handover of full construction site 3. Deduction of material advance money 4. Considerable difference in quantity of BOQ items 5. Frequent design change 6. Escalation amount calculation method not satisfactory. 7. Contractor did not accept final bill 8. Over ambitious contractor	1. Contractor could not mobilize the work. 2. Progress of work jeopardized, work stopped frequently 3. Contractor claimed for excess unused material purchased in advance 4. Contractor did not accept escalation amount 5. Contractor got opportunity to claim for every changed condition.	1. Out of 24 months time overrun, 15 months time was (6 months formally and 9 months informally) excused and 9 months only penalized **(Compromise).** 2. Consultant was instructed to take initiation for quick running bill payment **(Coercion).** 3. Assured to revise the escalation calculation method, and asked to accept whatever money comes out in final bill **(Consolation).** 4. All extra items rate were calculated as per the actual expenditure of the contractor **(Consideration).** 5. Price rate for each item of work having quantity variation more than 25% was revised and new rate given as per the current market rate **(Consideration/Compromise).** 6. Fortnightly site meeting were conducted including Project Manager, Consultant CEO, Chief Engineer of Project, Site Engineers and contractor to monitor progress of the project. All the decisions were minuted and implemented accordingly **(Coordination).** 7. Letters reminding the contractor for application of important clauses (liquidity damage, termination etc.) were regularly dispatched when the project progress seemed to be slow **(Coercion).**
2	HQII	1. Low performance in quality 2. Low bid 3. Less competitive contractor 4. Auditor General's (AG) objection 5. Government Inspection Bureau investigate suspecting inferior work 6. Design revised and Scope of project modified	1. Contractor used cheap quality material 2. Construction time overrun 3. Difficult to get quality of work 4. Excessive extra items 5. Excessive quantity variation in BOQ 6. Account Auditor General questioned about the frequent time extension and payment of extra works by new rate.	1. Item rate was revised proportionately as per cheap material rate **(Compromise).** 2. Extra items rate were calculated as per the actual expenditure of the contractor **(Consideration/Compromise).** 3. Price rate for each item of work having quantity variation more than 25% was revised and new rate given as per the current market rate **(Consideration/Compromise).** 4. New works (extra items) contracted **(Consideration).** 5. Construction time extended without penalty **(Consideration/ Compromise).** 6. AG and Inspection Bureau convinced through having regular meetings and site inspections **(Convince).**
3	RTS I	1. Contract language for scope of work. 2. Superiority complex of Consultant 3. Design error (roof leakage) 4. Interruptions from School administration	1. Contractor tried to claim extra money from double meaning of specifications 2. Double expenditure to correct the roof leakage 3. Time overrun 4. Account Audit General listed the roof leakage as an irregularity work	1. Contractor's bid price was analyzed and convinced for not to claim **(Convince).** 2. All extra items' rate were calculated as per the actual expenditure of the contractor **(Consideration).** 3. Price rate for each item of work having quantity variation more than 25% was revised and new rate given as per the current market rate **(Consideration).** 5. For major changes Project manager, CEO of consultant, Project Engineer, Resident Engineer and Contractor meetings' decision were minuted and implemented accordingly **(Coordination)**

S.N	Project	Conflicting Issues	Effect	Measures taken to solve and prevent the conflicts
3	RTS I	5. Frequent change in design as per user's (technical school) need	5. Prestige of owner, consultant and contractor jeopardized 6. Internal tussle between Project Engineer (owner) and School administration	6. Consultant confessed the leakage problem was a design error **(Convince).** 7. Construction time extended without penalty **(Consideration).** 8. As the Project professionals and School administration were under the same umbrella, School administration was instructed strongly not to interfere in the construction activities **(Coercion).** 9. The Auditor General was convinced for the leakage was due to the design error **(Convince).**
4	LTS I	1. Incomplete design and drawings 2. Specified materials not easily available 3. Late recommendation of running bill payment from the consultant	1. Frequent work stoppage 2. Low quality work delivery 3. Time overrun	1. Regular meeting between Project Engineer, Consultant and Contractor **(Coordination).** 2. Specification changed as per local available condition **(Compromise)** 3. Consultant reminded for his responsibility **(Coercion).** 4. Construction work monitored closely **(Coordination).** 5. Construction time extended without penalty **(Consideration).**
5	DTS	1. Site condition differ 2. Low bidding (29.99% less) 3. Unclear contract language 4. Design consultant's objection to ward a low bid contractor 5. Difficult working condition (Remote mountain area) 6. Auditor general (AG) objection about creation of some new items and specification	1. Project delayed in the beginning to assess the low bidding 2. Design consultant did not recommend lowest bidder. 3. Design consultant withdrew himself from the project 4. Excessive extra items & quantities 5. Construction time and cost overrun 6. AG refused to endorse the specification change decision and new items	1. Design consultant contract terminated and new supervising consultant appointed **(Coercion).** 2. Specification changed as per local available condition **(Compromise)** 3. Price rate for each item of work having quantity variation more than 25% was revised and new rate given as per the current market rate **(Consideration/Compromise).** 4. Construction time extended without penalty **(Consideration/ Compromise).** 5. New items' rate fixed as per prevailing market rates **(Consideration)** 6. A high level expert team formed to investigate the validity of extra items and excess quantities **(Consideration/Compromise).** 7. AG was convinced about the compulsion of change of specification and creation of new items due to geographical location of site **(Convince)**
6	PTTC	1. Language of contract (generalization of scope of work definition) 2. Supremacy of Consultant 3. Delay payment recommendation from consultant	1. Contractor delayed the work 2. Due to low bidding and delay payment, contractor could not mobilize the resources in time 3. Time overrun	1. Scope of work definition changed **(Consideration)** 2. Price rate for each item of work having quantity variation more than 25% was revised and new rate given as per the current market rate **(Consideration).** 3. New items' rate fixed as per prevailing market rates **(Consideration)** 4. Consultant was instructed to furnish the running bill as per contract clause **(Coercion)** 5. Construction time extended without penalty **(Consideration).** 6. Extra package of works (supplementary) awarded to the contractor **(Consideration).**
7	BTS I	1. Language of contract for temporary facilities provided by the Contractor 2. Language of material specification. 3. Frequent change in design and drawing as per user's (technical school) need.	1. Account Auditor General objection for return of paid temporary facilities (termed as leased items in bill of quantities) 2. Suspension of work due to different interpretation of specification.	1. Account auditor was made convinced for the spirit of contract clause **(Convince).** 2. Item rate was reduced **(Convince)** 3. Price rate for each item of work having quantity variation more than 25% was revised and new rate given as per the current market rate **(Consideration).** 4. New items' rate fixed as per prevailing market rates **(Consideration)** 5. For major changes Project manager, CEO of consultant, Project Engineer, Resident Engineer and Contractor meetings' decision were minuted and implemented accordingly **(Coordination)** 6. Construction time extended without penalty **(Consideration/ Compromise).**