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Ng, S. Thomas; Skitmore, R. Martin

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Contractor Risks in Design, Novate and Construct Contracts

*S. Thomas Ng*¹
*Lucas J. Ctercteko*²
*R. Martin Skitmore*³

¹ *Department of Civil Engineering, University of Hong Kong, Pokfulum, Hong Kong.*

² *Department of Building, University of Newcastle, University Drive,
Callaghan, NSW 2308, Australia.*

³ *Queensland University of Technology, Gardens Point, Brisbane, Q4001, Australia.*

Please contact:

Dr. Thomas Ng
Flat C, 18/F., 161 Tin Hau Temple Road, North Point, Hong Kong.

Tel/Fax: Int+ (852) 2564 4274
E-mail: bdtm@cc.newcastle.edu.au

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CONTRACTOR RISKS IN DESIGN, NOVATE AND CONSTRUCT CONTRACTS

Abstract

The Design, Novate and Construct (DN&C) system is becoming an increasingly popular method of construction procurement. In the DN&C system, the contractual rights and liabilities of the design team are transferred to the contractor once appointed. This makes DN&C a very attractive procurement option for the client but leaves contractors with the problem of identifying and managing the extra risks involved. The aim of this paper is to identify these risks.

The results are described of a series of interviews with construction projects managers experienced in DN&C work. These show that the major risks to contractors in DN&C are concerned with (i) the novated design team's ability to perform, (ii) the lack of design team fees allocated to the post-novation phase, (iii) the working relationship with the novated design team, and (iv) the timing of the novation. It was also found that contractors had insufficient time during the bid preparation period to check the design produced by the novated design team.

Keywords: Contractor's risk, design, novate and construct, procurement system

INTRODUCTION

Procuring a construction project within the designated time, cost, quality and risk is the prime objective of clients (Flanagan, 1990). Despite the increasing complexity and quality standards of construction projects, less and less time and cost is being allocated to designing, bidding, planning and construction. Clients are also striving to minimise their risk exposure. These factors, together with the need for a greater degree of financial planning and a lesser amount of contract administration, have brought pressure to explore new options for construction procurement (Chan, 1994).

One such option is Design, Novate & Construct (DN&C). Research studies indicate DN&C to be increasingly popular in the construction industry. According to Akintoye (1994), 21% of private clients in the UK use the Design and Build (D&B) system, of which 42% commonly use DN&C for their projects. DN&C has also been widely adopted in other countries, including Australia (Chan, 1994) and Hong Kong (Chan, 1998).

DN&C essentially evolved out of the D&B/Design and Construct (D&C) systems. Novation is the process that distinguishes D&C and DN&C systems. Novation is a mutual agreement which substitutes an old obligation for a new one (Waters, 1997). Where the process of novation encompasses a contract in its entirety, the new contract replaces the original one completely and may result in one or more of the original parties being substituted. Through the novation process, responsibility to the client is transferred from design team to contractor. Novation usually occurs after the design team completes the initial design, i.e. when the design is sufficiently clear about the client requirements for contractors to tender realistic bids. The benefits of DN&C to clients include (1) the opportunity for clients to have more

input into the project design during the pre-novation phase, and (2) the transfer of all the design risks to the contractor in the post-novation phase.

The advantages of DN&C to clients, especially in terms of risk alleviation, have been widely documented (eg. Chan, 1994, 1998; Gibson, 1997; Speed, 1995; Waters, 1997). However, the risks brought by DN&C to contractors have not been examined. An understanding of the contractor risks in DN&C may help improve project success. The aims of this paper are to identify the additional contractor risks produced by the novation process, to examine contractors' perceptions on the usage of DN&C, and to investigate the future of DN&C from the contractor's perspective.

PRINCIPLES OF DESIGN, NOVATE AND CONSTRUCT SYSTEM

In D&B systems, contractors are totally responsible for design liability, including the selection and management of design teams. The DN&C system is very similar to the D&B system, except that the design team is selected by the client and subsequently novated to the contractor. Novation is therefore a legal agreement that occurs when a client transfers the contractual obligation with the design team to a contractor (Howden & Billiard, 1992). According to Chan (1994), DN&C is most appropriate when (1) the time for completing the project is 'of the essence', (2) the budget for the project is fixed and extra resources of funding are very limited, and (3) the project involves special design and technical requirements.

Figure 1 depicts the processes involved in a DN&C project. A design team is first appointed by the client to conduct the initial design to the point where the client's requirements are

clearly identified and documented for the prospective contractor (*pre-novation phase*). The initial documentation amounts to 30-80% of the overall design (Chan, 1998). On the basis of this initial design and documentation, contractors are then invited to bid for the project.

Figure 1: Processes in a design, novate and construct project

The contractual relationship between client and design team is transferred once a contractor is appointed to the project. The client novates to the contractor the design team's rights and responsibilities for the project in its entirety until project completion (*post-novation phase*). The new contract between client and contractor replaces the original contract between client and design team entirely. Once a contractor is appointed, the design team's appointment is assigned to that contractor and for whom they are required to produce any outstanding information required for construction. The contractor is therefore contractually responsible to client for both the design and construction once novation has taken place.

The DN&C system is a very attractive procurement option for the client as it transfers all the design risks to the contractor (Waters, 1997). DN&C also ensures a greater consistency in design as the design team originally appointed remains throughout the project. The contractor's construction experience may be useful during the design stage, which may help improve the buildability of the project. The DN&C system also encourages a less adversarial relationship than does the traditional procurement system. There are likely to be fewer conflicts between clients and contractors because contractors no longer need to seek claims through variations. In contrast with the D&B system, on the other hand, clients have a greater degree of control over design and quality in novation contracts since contractors are

appointed after the initial design is developed (Chan 1998). Since the preliminary design should have evolved during the bidding phase, the bids obtained will not be based on completely different designs. This makes bid analysis much more objective than is usually possible with the D&B system.

However, the DN&C system is not without disadvantages. The success of DN&C largely depends on the professionalism, maturity and competence of the three participating interests, i.e. the client, contractor and design team (Howden and Billiard 1992). The major risk is that the relationship between team members may fail due to their incompatibility (Waters, 1997). Chan (1998) also observes that the novation process can be very complex, and it is important that design contracts are carefully novated to the contractor to avoid possible conflicts or disputes. In addition, research studies have revealed the DN&C system to be disliked by most contractors, 96% of contractor respondents in a recent UK study indicating they would prefer not to have to use the system.

RESEARCH METHODOLOGY

To allow an in-depth analysis of the additional contractor risks produced by the DN&C system, a series of semi-structured interviews were conducted with. Semi-structured interviews were conducted to ensure that specific aspects of construction projects being studied were addressed by each interviewee as well as their perception of the risks created by DN&C. The semi-structured interviews also allowed the interviewees to discuss and develop their own ideas, and provide an opportunity to cover wider issues, elaborating on points of interest and importance.

A set of protocols was developed for the interviews. A literature survey helped to identify the major relevant issues. From these issues a list of interview questions were compiled to examine how the DN&C system affected the project from the contractors' perspective. The questions were designed to clearly identify the effect of the novation process on specific aspects of the projects. Additional risks to the contractors produced by the novation process were covered in the interview. A pilot study was conducted with the managing director of a medium sized construction firm experienced with the DN&C system before finalising the list of questions (Patton, 1990). The pilot study verified that (1) the questions were worded correctly, (2) the questions covered all the major issues involved in the novation process, and (3) the interview would not take up too much time.

To locate contractors with experience of the DN&C system, the major architectural practices in two major cities in New South Wales, Australia, i.e. Sydney and Newcastle, were first contacted by telephone. They were asked to advise on the contractors who had used DN&C. From this, a list of eleven contractors with DN&C experience was compiled, and the names of the relevant project managers obtained. The project managers were then contacted by telephone, and the nature and scope of study explained to them. Their interest in taking part in a face-to-face interview was sought and six agreed to participate.

Table 1 gives the profiles of the interviewees, coded for anonymity. Of the interviewees who participated, *A* and *C* worked for medium construction companies while *D*, *E* and *F* were employed in large construction companies. *B* was formerly employed by a large construction company but now owned a medium-sized consultancy firm. All the interviewees had worked in the construction industry for over 10 years and had experience with both DN&C and D&B systems. The interviewees' first involvement with DN&C contracts was around four to 5

years ago. The DN&C projects managed by the interviewees ranged from AUS\$2 million to AUS\$200 million, and included residential, commercial, industrial, hospital and shopping centre projects.

Table 1: Details of interviewees

CONTRACTOR'S RISKS IN NOVATION PROCESS

Figure 2 shows the four major risk related factors identified from the interviews. These comprise (i) the novated design team's ability to perform, (ii) the lack of design team's fees allocated to the post-novation phase, (iii) working relationships with the novated design team, and (iv) the timing of novation.

Figure 2: Contractor risks in the DN&C system

Novated Consultant's Ability to Perform

Almost all the interviewees (i.e. *A, B, C, D* and *F*) suggested that the most significant risk to contractors surrounded the ability of the novated design team to perform satisfactorily. The major elements of this risk factor are depicted in Figure 3.

Figure 3: Risk elements related to the design team's ability to perform

Inferior initial design: The quality of the design team's initial design has a significant effect on project success. At the post-novation phase, the contractor inherits all the weaknesses in the original design. During the bidding stage, contractors may not be able to fully appreciate the quality of the design developed during the pre-novation phase.

Unsuitability of the design team: It is necessary to ensure that the design team that has the appropriate experience to design the particular project. For instance, a small architectural firm may not be able to handle a huge project, as they may not have the suitable resources and amount of time to complete the design tasks. Unlike the D&B system, contractors do not have the opportunity to select their own design team for the project. The design team is appointed by the client. Some public clients prequalify design consultants before they are selected for the project design (HKHA, 1998). In other cases, the suitability of the design team may be in question, or at least uncertain as far as the contractor is concerned and therefore represents a significant risk.

Poor performance of design team: Being responsible for design, the performance of the design team is a major risk to the contractor. The interviewees suggested that the only way to prevent or reduce this type of contractor risk is to include a clause in the novated contract defining the required performance level of the design team.

Inheritance of design errors: Ambiguities or errors in design can be expensive to rectify. Errors in design and poor design coordination may also affect time and quality standards. It is difficult, however, for contractors to anticipate this in advance. Checking design information for ambiguity or errors is simply not possible at the time of bidding.

Unfamiliarity with local statutory requirements: Design team members may have been recruited from overseas or other cities, and therefore may not be aware of the local statutory requirements, latest authorities, codes, council requirements, etc. Again, it is not possible for contractors to check this possibility at bidding stage.

Lack of Design Team's Fees for Post-Novation Phase

As indicated by interviewees *E* and *F*, another major risk factor in the novation process is that the design team may use up the majority of their fees during the pre-novation phase, leaving little left for the post-novation phase (see Figure 4).

Figure 4: Risk elements related to the lack of fees for the design team

Inadequate fee left for completing the design: The risk is that the design team will have used up its fees before being novated to the contractor. If the client has spent more money than budgeted on the design process, insufficient money will be left to compensate the contractor for the cost of subsequent design completion and modifications.

Poor quality of work due to lack of fee: There is a risk of poor design quality if the design team have overspent in the initial design stage, as the design team may try and cut back their services to the contractor to try and save the money.

Poor morale of design team due to tight budget: When clients have a very tight budget for the design component and the design team has spent most of its fee, the risk is that its members can become slack on design and documentation. They might even rely on variations to cover their fees.

Working Relationships with the Novated Design Team

Interviewees *C* and *F* indicated that the working relationship with the novated design team was another risk factor to the contractor. The elements of this risk factor are illustrated in Figure 5.

Figure 5: Risk elements related to working relationships with the novated design team

Loyalty of design team to client: Since the design team is selected by the client and its members work very closely with the client during the pre-novation phase, there is a risk that the design team will be more loyal to the client than the contractor.

Poor previous working experience: It is possible that the novated design team has worked with the contractor before and that a one or more members of the team had a poor working relationship with the contractor.

Lack of previous knowledge of the design team: The contractor may not have worked with the design team before in which case it is likely to take time for the design team and contractor to

strike up a harmonious relationship. Four interviewees (i.e. *A*, *B*, *C* and *F*) believed that projects run smoother when the parties involved have worked together previously. Only interviewees *D* and *E* considered that having a previous working relationship would not necessarily improve the successfulness of the project, as design teams may vary from project to project.

Timing

Waters (1997) suggests that, in comparison with the to D&C and traditional systems, there may be more conflicts and problems in work relationships within the DN&C system because the contractor cannot choose with whom to work. According to interviewees *A* and *E*, the design team is rarely novated as early as the initial design stage. If the novation occurs late in the design stage then the risks to the contractor greatly increase. Figure 6 outlines the elements related to this risk factor.

Figure 6: Risk elements related to the timing of novation

Alternatives not carefully explored and examined: The interviewees thought that clients tended to novate later because they want to have more input into the design and obtain a firmer price while still transferring the majority of risks to the contractors. However, the shortage of time for bid preparation leaves very little room for contractors to explore alternatives if novation occurs late in the design stage. It is also more difficult for the contractor to identify and rectify design errors in such a limited amount of time.

Poor relationships with the client: The later the novation takes place, the greater is the risk of the contractor and client having a poor relationship, especially if the design completed during the pre-novation phase is erroneous or problematic (Waters, 1997).

DISCUSSION

The majority of the interviewees (*A, B, C, E* and *F*) had worked well with the novated consultants throughout the duration of the project. These contractors acknowledged the importance of establishing a good working team environment in DN&C projects.

Conflicts

Most interviewees were able to resolve conflicts arising directly from the novation process. Interviewees *A, B, C, E* and *F* claimed there were no serious conflicts arising as a result of the novation process which could not be resolved. However, according to interviewees *A, C* and *F*, it was essential for contractors to establish a cooperative teamwork relationship with the design team. This helped to prevent serious conflicts from arising or getting out of control.

Interviewees *C* and *F* had had minor conflicts with novated consultants. As suggested by interviewee *C*, the design team was not used to being told what to do by a contractor. Interviewee *F* also intimated that problems can arise when the design team has not previously worked under a contractor as the design team are used to telling the contractor what to do instead of the other way around.

Only interviewee *D* had experienced a poor relationship with the design team, due to the client not allowing sufficient fees for the design team. Consequently, the design documents were poor, so that the contractor had to make continual requests for information over the course of the project. In this case, the relationship deteriorated because the consultants realised there was insufficient finance to meet their continued involvement in the job.

Complex Projects

All interviewees agreed that larger and more complex DN&C projects attract higher contractor risks. Interviewee *D* believed that, from a contractor's perspective, DN&C is more appropriate for simpler projects. The more complex the project design, the greater the opportunity for errors to occur. If the project is complex, more design risks are inherited from the client. Interviewee *C* suggested that, when used for a complex project, DN&C generates more administration work in terms of coordinating and finalising the design and drawings.

Overall, DN&C contractor risks increase as project complexity increases. All the interviewees believed that DN&C creates more contractor risks than does the D&C system. It is difficult for the contractors to anticipate the design problems associated with complex projects considering the short bid preparation period, especially if the novation has occurred late in the design stage.

Timing

The timing of the novation is very important to the contractor, enabling time and cost savings to be made in the construction stage through improving the buildability of the project in the design stage. There is no doubt that from the contractors' perspective the timing of the novation is important to the performance of the project. All six interviewees suggested that the earlier the contractor be involved the better. They proposed that the novation should take place as early as possible to enable the contractor to have the maximum amount of effective input into the buildability of the project. According to interviewee *D*, contractors would have better knowledge and control over the project design if the novation process occurred earlier. Interviewee *B* asserted that, ideally, the contractor should be involved in the design process before the novation takes place.

Identifying and Minimising Risks at Bidding Stage

The current practice is to allow approximately two to four weeks for bid preparation. Often this is insufficient time to detect all the errors in the drawings especially when there is a lot of detail, the project is complex or the novation is late. One way to minimise the contractors' exposure to the risk of errors in the drawings because of the consultant's poor performance is by providing more time at the bidding stage for inspection of the drawings. The risk of not realising that consultant's fees have been disproportionately spent in the development stage can be minimised. As suggested by interviewee *F*, given sufficient time contractors could identify from the design team what exactly what design work has been done, what is yet to be done, and the proportion of the fee that has been spent.

Benefits

All interviewees believed that the DN&C system has benefits over the traditional system, and that the advantages of DN&C are similar to those of the D&C system. The benefits of the DN&C system to contractors include:

- It is less costly at the bidding stage than the D&C system
- Design has been outlined by the client
- Contractors do not have to go through various design layouts of a building as they do for the D&C system
- Contractors can save time and effort identifying the client's needs
- Contractors should have more knowledge of the project as they have been involved with it since the conceptual stage.
- Project delivery time can be saved in the time leading up to the start of construction, as well as during the construction, if the contractor was involved early enough in the design stage to have an input into the buildability of the project.

CONCLUSIONS

This study investigated the risks of the DN&C system from the contractor's perspective. The major risks to the contractors as identified in this study included those associated with (1) the novated design team's abilities to perform, (2) the amount of the design team's fees used up in the development stage, (3) the working relationships with the novated design team and (4) the timing of the novation.

The only procedure that separates the DN&C and D&C system is the novation process. Through the novation process, client risks related to design are passed to the contractor. However, all the interviewees unequivocally agreed that the DN&C system has benefits over the traditional delivery system, as time and costs can be saved.

Large building contractors see a great opportunity with the increasing usage of DN&C system as they believe that novation allows them to display their superior management skills and thereby gain a market edge over many of their competitors (Chan 1994). Not only are contractors provided with the opportunity to demonstrate their competency to fulfil the role of design manager to specialised consultants but they can also create cost savings on the project through the use of innovative design techniques. These cost savings may be found in the type of materials or construction systems used.

On the other hand, small to medium sized building contractors may have greater concern over the imposition of additional risks of design warranty, and cost and time management involved in the DN&C system. Owing to the lack of in-house professional design expertise, it is difficult for small or medium sized contractors to anticipate and assess the risks associated with the design during the bid preparation stage. They may require the employment of specialist consultants to conduct an audit on the design – a virtually impossible task considering the short bid preparation period allowed. This can also be a costly exercise, thereby increasing the overhead burden.

At the end of the day, it is not surprising that all the contractors surveyed (interviewees) preferred to use the D&C system to the DN&C system – an observation similar to the

findings of Akintoye (1994). As one interviewee pointed out, the DN&C process is more difficult to manage than the D&C process. However, timing is a crucial aspect and it is clear that contractors are happy with the DN&C system provided that novation takes place early enough in the process and that they are allowed sufficient time and opportunity to review the documents thoroughly prior to bidding.

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LIST OF CAPTIONS

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Figure 2: Contractor's risks in design, novate and construct procurement system

Figure 3: Risk elements related to design team's ability to perform

Figure 4: Risk elements related to the lack of fees for design team

Figure 5: Risk elements related to working relationship with novated design team

Figure 6: Risk elements related to the timing of novation

Table 1: Details of project managers participated in the interview

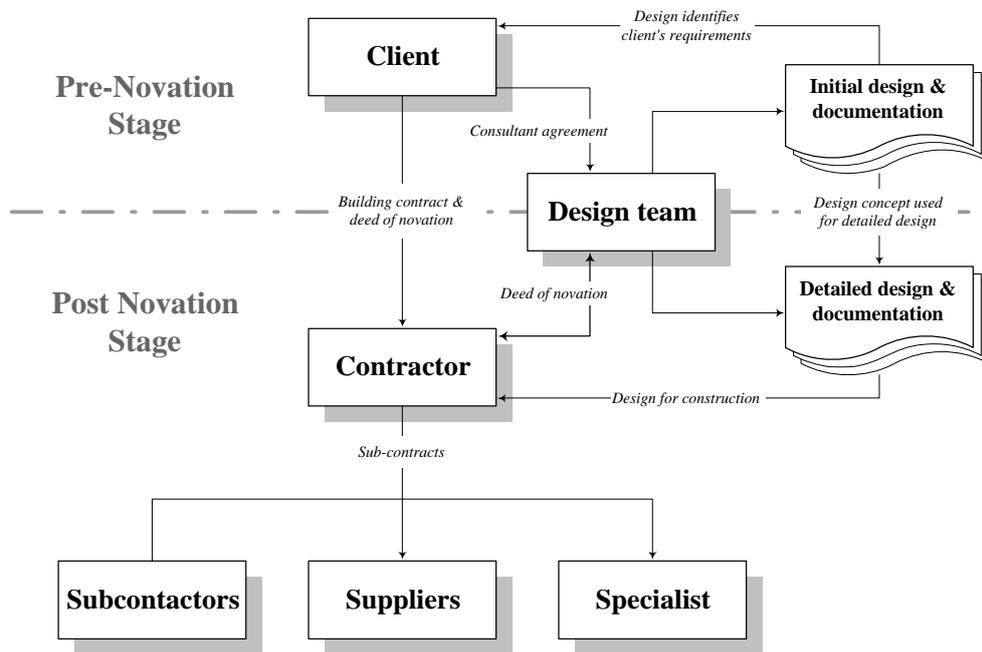


Figure 1: Process in a design, novate and construct project

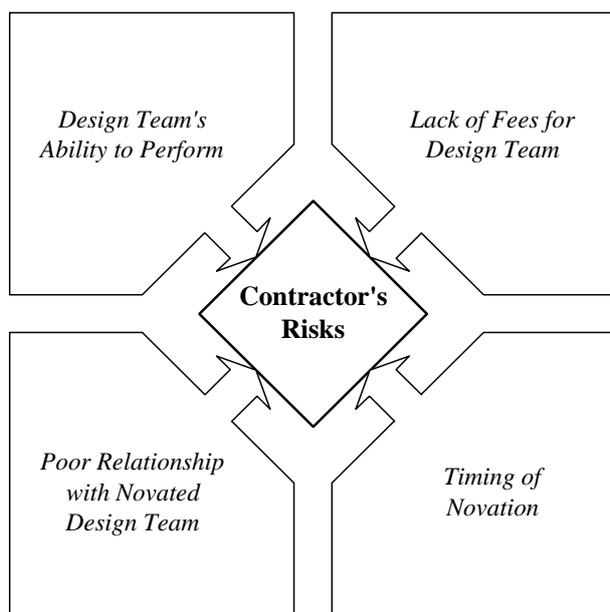


Figure 2: Contractor's risks in design, novate and construct procurement system

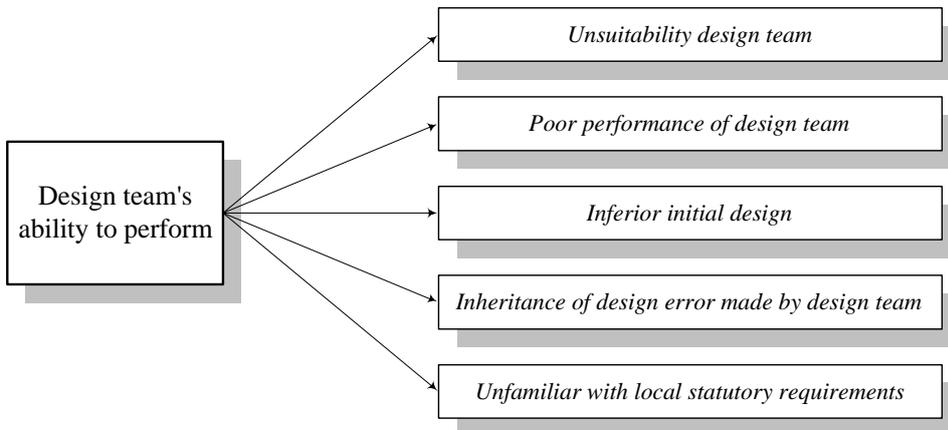


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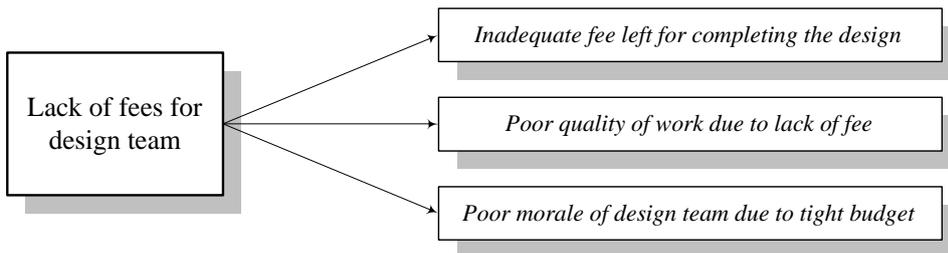


Figure 4: Risk elements related to the lack of fees for design team

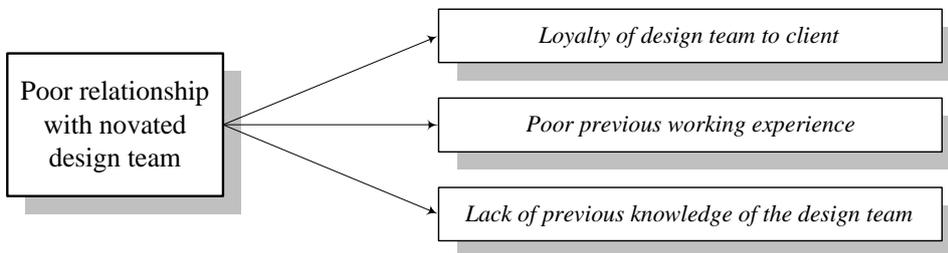


Figure 5: Risk elements related to working relationship with novated design team

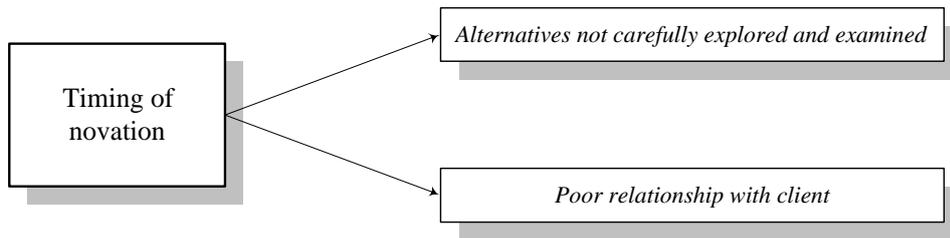


Figure 6: Risk elements related to the timing of novation

<i>Interviewee</i>	<i>Experience on DN&C system (years)</i>	<i>Size of firm working for</i>	<i>Size of project using DN&C</i>	
			<i>Minimum (AUS\$ million)</i>	<i>Maximum (AUS\$ million)</i>
<i>A</i>	4	Medium	2	9
<i>B</i>	5	Left large construction firm 3 years ago & now own a consultancy firm	4	100
<i>C</i>	4	Medium	2	6
<i>D</i>	4	Large	30	150
<i>E</i>	5	Large	75	200
<i>F</i>	5	Large	75	125

Table 1: Details of project managers participated in the interview