

IMPLEMENTATION AND BENEFITS OF NEC3 FORM OF CONTRACTS IN INDIAN CONSTRUCTION INDUSTRY

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ABSTRACT:

India is one of the fastest growing economies of the world in the present scenario. The Indian construction industry has highly contributed in economic growth and development of the nation. In India construction industry is the second largest economic activity after agriculture. The topic “Implementation and Benefits of NEC3 Contract on Construction Industry” is chosen for the research topic because of its relevance and benefits for the construction industry. The research topic would help to identify various key issues and concerns in Indian construction industry. The study for this paper has been carried out in two primary ways; firstly a literature review was carried out to give a deeper understanding of the topic and the nature of the problem (theoretical) and secondly interviews through sample questionnaire took place with those within the industry (practical) to give a more real world view of the issues at hand. The results of the study conclude that the NEC3 is a departure from the traditional approaches that have existed in the form of other contracts as well as previous versions of the same contract. The usage of clauses, that too in simple language, paves the way for basis of a range of construction contracts covering different pathways for procurement of materials. After a thorough analysis of the data, following areas have been found which can be useful subjects for future research. More parameters, both specific to NEC3 and the other general contracts in the construction industry can be worked upon

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to find specific platforms where these contracts can be suitable and most appropriate in terms of usage and effectiveness.

Keywords: NEC3, Collaborative form of contract, Early warnings.

1. Introduction

India is one of the fastest growing economies of the world in the present scenario. The Indian construction industry has highly contributed in economic growth and development of the nation. In India construction industry is the second largest economic activity after agriculture (Rowlinson, 2011). The construction industry is further expected to grow in India. The implementation of NEC3 contract has brought many benefits to the Indian construction industry by developing a collaborative and partnering approach which helps in completing projects within given deadlines and without costs overrun risks (Gerrard, 2005).

1.1. Background of the Study

The NEC3 contract stands to be the basis of the current construction Industry in India. It however, is under scrutiny as far as its implementation applicability, benefits and drawback, effectiveness and future is concerned. The background of the study entails the fact whether the contract has been and is being able to achieve the goals that it had originally been framed for. Weddell (2006) says it is important to understand and find out whether an even improved and comprehensive version is required in future

The NEC is a major attempt to draft a simple and a standard direct form contract involving first principles and is also an attempt not to build upon the standard forms that are already in use in the market or else do already exist (Forward, 2003). Principally Dr Martin Barnes led the authors of NEC gathered under the auspices of Institute of Civil Engineers (ICE) in 1987. The specifications made out in 1987 aimed at the following.

1. Achieving a higher degree of clarity when compared to other existing contracts.
2. Using simply and commonly used language so as to bestow on the user comfort of use by avoiding any legal jargon.
3. Repetition of identical phrases if possible so as to make clearer the idea to laymen users.
4. Using core conditions and deleting any customizable and contract or project specific data to avoid the need for any changes that will have to be made when implementing the contract.

5. To set out very clearly the duties and responsibilities of the parties involved.
6. To aim at fairness to large extent for all parties involved.
7. To avoid using and including any details that can be more adequately covered in a separate technical specification.

2. Literature Review

The literature review chapter will be focused on implementation and benefits of NEC3 contracts in Indian construction industry. The literature on NEC3 contract will also focus on various benefits of NEC3 contract to Indian construction industry. The literature on NEC3 contract further attempt to analyse that Indian construction industry is able to achieve its desired goals with the help of this form of contract. According to Baghel and Pendse (2008) the construction industry is identified as the most controversial industry in India with a large history of dissatisfaction within this industry. The major reasons for the disputes identified in this industry are the financial and time pressures to complete the projects within given deadline. Hence, the implementation of NEC3 contract has emerged out as a solution for the majority of disputes in the construction industry.

2.1. Overview of the NEC3 Contract

The New Engineering Contract (NEC) is an attempt by Institute of Civil Engineers with purpose of drafting a direct and simple contract rather than modifying the existing contracts in the construction industry. The authors who drafted NEC3 contract under the ICE were given directions and leaded by Dr Martin Barnes. He prepared the specifications of NEC in the year 1987. The first edition of the NEC contract was introduced in the year 1993. The first edition of NEC contract was simply based on guiding and management principles. The first edition was not able to resolve the concerns, which occur during various phases' in construction industry like starting from pre-tendering process to completion of project. In this regard, the need of a more effective contract was felt which could guide through all phases of a construction project. In order to meet these requirements, the NEC2 contract was introduced in the year 1995. The NEC3 contract also includes the new ECC (Engineering and Construction Contract). The NEC3 form of contract has wider approach as compared with the first edition of the contract. The NEC2 contract was not restricted to engineering project but unlike NEC contract it was applicable to all

construction projects. The third edition of NEC contract –NEC3 came into existence in the year 2005. The general approach of the NEC3 contract was same as that of NEC2 contract but it includes some key clauses in the contract. These key clauses make NEC3 contract more effective for construction industry. The key clauses added in NEC3 contract includes: the core responsibilities of contractors, testing and defects, payments, compensation events, risks and insurance, termination, title, time, and general clauses (Gerrard, 2005).

The main objectives, which were planned to be achieved by this form of contract, are mentioned below.

- The NEC3 form of contract provides high level of clarity in construction projects as compared with other contracts.
- In this contract simple language is used to describe various terminologies instead of using legal jargons.
- Repetition of same kind of phrases if required.
- Rules and responsibilities are set for both parties involved in the project more precisely and concisely.
- To keep clarity above fairness, and
- The NEC3 contract avoid including details, which can be more specifically covered in technician guidelines (Eggleston, 2009).

On the basis of above-mentioned guiding principle, it can be said that fundamental principles guiding NEC3 contracts are simplicity, flexibility, and the clarity in guidelines.

Introduction of Dr. Martin Barnes: Dr. Martin Barnes is currently the president of Association of project management. He worked as a leading consultant in project management in UK. Dr. Martin Barnes travelled through various countries in US, UK, and Canada and talk to different professional in construction industry. He asked the various concerns and practices followed by people in construction project management. In this way, Dr. Martin developed a deep knowledge regarding construction project management. After gaining vast experience in project management, he led the team, which conceived, designed, and wrote the New Engineering Contract (NEC) (Dunne and Dunne, 2011).

2.2. Need for NEC3 contract in the Indian Construction Industry

India is one of the fastest growing economies in the world. The construction industry is the most crucial part of the Indian economy. Construction industry is the second largest industry in India after agriculture. The construction industry accounts for more than 65% of the total investments made in the infrastructure sector of the country. It is estimated that around ₹239.68 will be invested in the construction industry in India in the next 10 years. There are many organizations, which are involved in construction projects in India, which involve large as well as small and medium enterprises. A few of the large companies operating in the construction industry in India include Larsen and Toubro, DLF Limited, Tata Projects, Gammon India, and Nagarjuna Construction Company (Fiegen, 2010).

The conflicts and disputes occur in almost every industry. According to Fiegen (2010) there are several issues that arise in the Indian construction industry due to construction procurement methods as well as due to lack of collaboration and association between members associated with any particular project. Chappell (2010) has deeply analysed the inefficient project execution in the Indian construction industry. The author further states that the project execution level in the Indian construction industry is far below as compared with other developing countries like China. It is revealed with the help of data from government agencies and industry experts that each Indian project is completed by 20-25% of time delay. In addition to this, the data collected from agencies also suggest that the overall costs of projects also increase by an average of 25%. The author further suggests that members associated with engineering, procurement, and construction usually fail to deliver their assigned duties as per their initial commitment. In addition to this, members associated with the Indian construction industry are also supposed to be reluctant to take advantage of opportunities which can help in reducing the time and budget of construction projects.

There are a few factors, which generally cause disputes and concerns in the Indian construction industry, which signify the need for NEC3 contract in India. A brief description of these factors is given below.

Challenges in Tendering Phase Impact Viability of Projects

The delays and disputes in the tendering phase highly impact the capabilities of projects, which result into delay in tendering as well as in construction phases. According to Jenkins and Stebbings (2006) project plans in the Indian construction industry suffer from poor planning which

do not cover the entire requirement in detail. In this way, there are frequent scope changes and variations occur in project execution causing disputed and delays in the completion of construction project. In addition to this, there is a lack of adopting a valuable engineering mind-set which usually increases the project costs. Frank (2010) highlighted that there is a significant amount of unavailability in projects in national highways sub sector. The author further highlights the three reasons, which usually hamper the viability of projects in construction industry. It included planning of projects much beyond their scope, inadequate viability gap funding (VGF), and increase risk to service provider due to contractual terms like termination of given concessions.

Challenges in Construction Phase in Indian Construction Industry

Plunkett (2007) identified reasons, which cause disputes in construction phase of the project. These reasons include delays in land acquisition of the project and weak performance of the management involved in the construction process creates concerns in construction projects. According to the worldwide practices in constructions industry, the land acquisition should be completed before the allotment of projects. However, in India generally the projects are tendered with only a part of the land is physically acquired. The delays in land acquisition further cause the delay in completion of infrastructure projects.

Brickner and Traister (2004) mentioned that disputes resolution process in Indian construction industry is ineffective in India. The ambiguity of Arbitration and Conciliation Act of 1996 lacks enforceability. The weak management performance and low transparency in works results into high public pressure.

Skill Weakness across the Value Chain in Construction Projects

In addition to this, factors identified above causing issues in Indian construction industry, there are some other factors like lack of appropriate procurement practices, and lack of construction principles followed in the Indian construction industry (Brickner and Traister, 2004). The focus of the majority of the players in Indian construction industry is on the maximum procurement of resources but their procurement practices are not up to the required standard. According to Beaumont (2009) the procurement practices followed all across the globe includes demand consolidation, development of new vendors, relationships with the help of frame contracts as well as joint cost reduction. Most of these practices are not followed in India, which results, into the increase of 5% to 10% of the total costs for the project. Additionally, the

global construction industry highly values the lean construction principles. In an interaction with leading organization in Indian construction industry helps to know that lean construction principles are not followed in India. It results into increase in total costs of the projects by 20 to 30 per cent on a general basis.

The main challenges identified in Indian construction industry are further presented in tabular form below:

Challenges in the Indian Construction Industry

Issue	Problem identified
Poor quality of project plan and lack of attention in project designing.	It creates delays in completion of projects as frequent variation occurs in projects (Gupta et al, 2009).
Low performance transparency and lack of meaningful financial incentives.	It results into management related problems (Gupta at al, 2009).
Lean construction principles are not strictly followed.	It results into increased budget and time of projects (Caletka, 2008).
Weakness in value chain	Chances of costs overrun in the project (Gupta et al, 2009).
Land acquisition system and management is weak	It results into disputes in construction projects (Mitchell and Trebes, 2005).

Table 1: Source (Author, 2012)

2.3. Evaluation and implementation of the NEC3 Contract

According to Gerrard (2005) NEC3 contract can be defined as a unit of contract that is helpful in implementation of sound management principles, work ethics and principles along with defining legal relationships among members associated with construction projects. The NEC3 contract is suitable for various functions in construction industry like purchasing of goods, timely supplies, and cost savings and in timely completion of the project (Frank, 2010).

In order to resolve the issues and concerns in the Indian construction industry there was a need to some contract, which can ensure high co-ordination between all members associated with the construction project. In addition to this there was a high need of implementation of lean construction principles in the construction industry. With a purpose of resolving disputes related with construction industry, the Institute of Civil Engineers formalized the New Engineering contract (NEC) in 1993, which was later modified in the year 1995 and in the year 2005. The third modified contract is a known as NEC3 contract in construction industry. The NEC contract gives the guideline for different phases in a construction projects like process of obtaining tenders, and implementation of contracts. In this way, it can be said that NEC3 contract defined the responsibilities of both employers (who provides work) and contractors (who accomplishes the work). The main purpose of NEC3 contract is to achieve the excellence in construction projects (Frank, 2010).

It is well evident with the help of literature mentioned above in the chapter, that there are some critical issues related with tendering phase and construction phase in the Indian industry. In this regard, the implementation of NEC3 contract is extremely effective in resolving all these disputes in an effective manner. The NEC3 contract is implemented in Indian construction industry with the help of various stages. This stage ensures the effective implementation of the contract in the construction projects. A brief description of various stages in implementation of NEC3 contract in Indian construction industry is given mentioned below.

Establishing the target Price

The NEC3 engineering and construction contracts (ECC) can establish the target price of projects with the help of two options; the prices can be set either by activity schedule or the method for establishing target prices is bill of quantities. These methods in the NEC3 contract facilitate the contractors by allowing him/her to fix up a price for the works to be accomplished by them. The prices for the work are based on the level of work and it also included the prices which also covers the risks which may occur while completing the project. The both methods to target the prices; activity schedules and bills of quantities are extremely helpful in deciding the target price as well as in breakdown of various tender components which is further helpful in comparisons and assessments of tenders (Greenhalgh and Squires, 2011).

According to Potts (2008) the activity schedule is the total price for all activities required to complete the project until and unless the changes are not suggested in the initial contract. In

this phase, the contractor is supposed to inform regarding the various activities necessary to complete the project and the relation of these activities with the project. In this way the project team which comprises of contractor, employer, and project manager to effectively supervises the work to ensure that it gets completed with forecasted budget of the project. Mitchell and Trebes (2011) mentioned that bill of quantities option in the NEC3 form of contract; the target price of the project is calculated by multiplying the rates of quantities for the items. This option generally results into errors while calculating the final rates of the project so it is not widely implemented in construction projects.

Assessment of Financial offers in Tender Evaluation

Speaight (2009) mentioned that in order to implementation NEC3 form of contract in Indian construction industry, the tenderers are evaluating certain basic things before the final allotment of contracts. The tenderers are required to consider the total prices of activity schedule to complete the project. In addition to this, tenderers are also required to consider certain parameters like prices of listed equipment's, fees related percentage including hourly rates for off-site fabrication and professional design services. Once the target price for the work is fixed along with the scope of the work it is followed by the tender assessment schedule focuses on estimating the costs and time duration in completing the various components of SCC and SSCC. It is helpful in calculation of total prices for comparison purposes.

Monitoring of Target Contract

The open book accounting is required for the NEC3 form of contract. This form of contract requires that contractor allow the project manager to monitor and inspect the accounts and other necessary record related with the project at any time during working hours. Apart from this, contracts in NEC3 form of contract contractors use CCS (Construction computer Software) to complete monthly evaluation report which helps in detecting any chances of costs overruns in the project. In addition to this a few other software like Build Smart are also used by contractors to monitor work with actual expenditures and wages provided to workforce employed in the work. The audit department further reviews the assessment of work, which is helpful in rectifying the errors if any missed by the project managers. Contractors use elemental cost model to allocate costs to certain elements if it is required. This model is useful in estimating the costs, which occurs in design development of future projects (Yulek, 2012).

In this way, the implementation of various elements of NEC3 form of contract is extremely useful in controlling disputes as well as in costs overrun in Indian construction industry. The various methods and procedures used in this contract ensure high level of coordination between contractors and employers associated with the construction projects. This contract ensures the comprehensive monitoring of the various costs projects and their estimation, which is important to minimize the costs overrun chances in a construction project. The literature also suggests that the continuous monitoring of the project suggested in NEC3 form of contract also helps in timely completion of the project.

In Indian construction industry, a lot of issues are identified in tendering phase as well as in construction phase of a project. The NEC3 contract is helpful in tenderers to allocate the projects after acquiring appropriate information regarding the contractors and proper calculation of estimated costs in the project. In this manner, the tenders are allocated to more effective contractors, which are important to complete the project in given deadline as well as in given costs. The well-defined procurement process in the contract also facilitates the timely completion of construction project. Thus, it can be interpreted on the basis of above literature that implementation of NEC3 contract is quite helpful in resolving the main concerns leading to disputes in Indian construction industry.

2.4. Collaborative Approach of the NEC3 Contract

The NEC3 contract is applicable to construction industry during different phases. The NEC3 contract defines different phases in a construction project like works, services, supply, and other activities in a construction project. In this way, the NEC3 contracts comprehensively ensure the successful completion of construction project within given deadline and without any chances of costs overrun. Loots and Charrett (2009) have defined various forms of NEC3 contract applicable in Indian construction industry. A brief description of all these contracts is given below.

NEC3 Contracts for Works

1. NEC3 Engineering and Construction Contract (ECC): The ECC contract is applicable when a contractor needs to be appointed for a construction project. The contractor is responsible for any level in a construction design.

2. NEC3 Engineering and Construction Short Contract (ECSC): This contract is generally used as an alternative for ECC contract and is applicable for projects which do not require highly complex management techniques for project completion. This type of NEC3 contract is applicable for straightforward work and consists of low risks for both clients and contractors.
3. NEC3 Engineering and Construction Subcontract (ECS): In a construction project ECS contract is used for a subcontractor for the same project. It has to be noted that a subcontractor in a construction project is bounded by same set of terms and conditions, which are applicable for contractors.
4. NEC3 Engineering and Construction Short Subcontract: This contract in a construction project is applicable as a subcontract for ECC or ECSC. This type of contract is applied when there is no requirement of sophisticated management techniques. Apart from this, ECC or ECSC contract are applicable where there is a low risk for both contractors as well as clients (Ramsey, 2007).

NEC3 Contracts for Services

1. NEC3 Term Service Contract (TSC): The term service contract is used for appointed for supplier for manage and provide effective services in a construction project. There is a requirement of different kinds of services in a construction project. The supplier may require providing services related with elements of design or services related with facilities management. The suppliers appointed with the help of TSC contract may have separate packages of their responsibilities in a construction project. However, the successful completion of the project highly depends in the efficiency of these suppliers.
2. NEC3 Term Service Short Contract (TSSC): The TSSC contract is most often used as alternative for TSC contract. This contract is usually applied for project, which so not requires complex management techniques. TSSC contract is further implemented in projects, which involve low risks for both contractors and client involved in the project.
3. NEC3 Professional Services Contract (PSQ): This form of NEC3 is applied when there is a need of appointment of suppliers for providing professional services required in a project. These professional services include engineering services, design services, or some kind of consultancy advice required for the project. This contract is entirely different from TSC, which is related with maintenance of assets. This contract is more applicable on situations when professional and technical assistance are required to complete the project (Caletka, 2008).

NEC3 Supply Contract

1. NEC3 Supply Contract (SC): The NEC3 contract mentions special terms and conditions for procurement process. In this regard. The SC contract is applicable for both national and international procurement process in a construction project. The procurement of high value goods and services are regulated with the help of supply contract of NEC3.
2. NEC3 Supply Short Contract (SSC): This form of NEC3 contract is applicable when single order or batch order basis procurement is followed for national or international goods procurement. However, this contract is used in project which does not require sophisticated management techniques along with low risks for both the contractors as well as for the clients (Woodward, 2008).

Apart from the above-mentioned NEC3 contracts, this form of contract also involves a few other contracts, which are equally important for the success of a construction project. The description of these contracts is given below.

NEC3 Adjudicator's Contract (AC): The NEC3 contract is highly focused that conflicts and issues do not occur among different members involved in construction projects. In case conflicts occur between members, NEC3 contract resolves it in an effective manner. The Adjudicator contract under the family of NEC3 contract resolves the disputes in the construction project. Under this contract an Adjudicator is appointed to resolve the conflicts between members.

NEC3 Framework Contract (FC): This type of NEC3 contract is used for the appointment of one or more than one suppliers for the construction project (Almeraris, 2009).

It is evident with the help of above literature that NEC3 contracts comprehensively covers all activities in a construction project. The literature clearly suggests that NEC3 contracts directly controls all the important activities like work, supply and resolution of disputes in a construction project. The implementation of this entire contract ensures the disciplined behaviour from all members associated with the project. The contracts in the NEC3 family motivate all members in a construction project to accomplish their desired activities in an effective manner and to maintain co-ordination with all members associated with the project. In this way, the committed efforts from all members' results into timely completion of project without any chances of costs overrun. In the Indian construction industry, the NEC3 contract has ensured the timely completion of the project.

In addition to the above-mentioned points, the NEC3 contract has six core clauses, which are implemented in construction projects. The six options differ with each other on the basis of risk

allocation and modern procurement process implemented in a construction project. The sic-basic clauses in a NEC3 form of contract are mentioned below:

- Option A: Activity Schedule along with priced contract.
- Option B: Bill of quantities along with prices contract.
- Option C: Activity Schedule with target contract.
- Option D: Bill of quantities along with target contract
- Option E: Contract related with cost reimbursement
- Option F: Cost reimbursement contract where high risk is taken up by the employer (Salmon, 2012).

The NEC3 contract is effective in project management during various phases in a construction project. The NEC3 form of contract defines clauses during various phases like works, services, and supply or procurement. The NEC3 contracts for works define contracts, which are applicable in different scenarios in a project, manage process. The contracts are appointed with the help of ECC contract. At the same time, ECSC co0ntract is applicable for simple projects which do not have high risks. The ECS work contract is applicable for contractors and bound them under terms and conditions related with the projects. With the application of ECS contract contractors feel more responsible for the projects, which results into effective project management (Loots and Charrett, 2009).

The work contract is applicable for contractors to define their responsibilities in a project management. The service contract in NEC3 form of contracts defines the contracts, which are related with the different services provided in a construction project. The supplier for different facilities in project is bounded by TSC contract. In case of suppliers, which provide professional services like design, services or some other kind of consultancy services are bounded by PSQ form of NEC3 contract. The NEC3 contract defines spate contracts for procurement process in a project. The procurement process if regulated with the help of SC contract. In order to ensure that there should be no issues and disputed among contractors and clients, the NEC3 contract appoints Adjudicator who resolves all disputed among the concerned parties in a contract. In this it has become well evident that NEC3 contracts adopt collaborative approach by implementing different types of contracts for various phases in a construction project (Ramsey, 2007).

2.5. Benefits of the NEC3 Contract

The benefits of NEC3 form of contract are deeply evaluated by many scholars. The different scholars have different viewpoints regarding the benefits NEC3 form of contract to the Indian construction industry. The opinion expressed by Gibson (2008) helps in identifying a few key benefits of this contract in effectively managing Indian construction industry. The author states that in Indian construction industry where there is a high scope for improvement in management practices, NEC3 contracts can be of great help in maintaining better relationships between two parties in a construction project. In addition to this, NEC3 contract can be useful in many commercial situations in a construction project. The most important fact regarding this contract is that it is an extremely simple document, which is easy for both to implementation and to understand.

In the words of Eggleston (2009) it is not easy to say that which form of contract in construction industry is better than other. However, the author further states that in Indian construction industry, NEC3 form of contract adds high value to construction projects in India. However Chappell (2010) has slightly different opinion about the benefits of NEC3 contract to Indian construction industry. The author explained that the structure of NEC3 contract is highly flexible which ensures its acceptance by both client and contractors. NEC3 form of contract apart from being clear and simple, it is also flexible to implement in construction projects.

The benefits of NEC3 contract in management of construction project are further focused by Plunkett (2007). The author has mentioned that NEC3 contract generates new kind of thinking among members associated with the project. This form of contract requires proactive management approach from all associated members in a construction project which leads to highly effective suite administration. The author further mentions the benefits of NEC3 form of contract by mentioning that the appointment of Adjudicator ensures quick resolution of issues and disputed in construction projects. The fast resolution of disputes helps in more effective project management.

Beaumont (2007) has different opinion regarding the key benefits of NEC3 contract for Indian construction industry. The author highlighted the challenges faced by Indian construction industry and the role of NEC3 contract in resolving those issues and challenges. A few of the practices adopted in construction industry are extremely helpful in controlling disputes and

managing well coordination between project members. The author has defined these benefits of NEC3 contracts as below.

1. It is extremely important to educate the entire team associated with project regarding the importance of their role in effectively completing the project. Apart from providing trainings, the NEC3 contracts also ensure regular reminders to team members regarding their job role in a construction project.
2. The NEC3 contract encourages effective communication and high transparency in the implementation of construction project. The most important advantage of NEC3 contract is that it enhances open communication between all members associated with the project. The open communication between associated members helps in identifying and realizing the time and costs risks in the construction project.
3. The most important part of NEC3 contract is that it restricts blame culture, which can be seen as major hindrance for resolution of disputes. In this way, NEC3 form of contract demands honesty and cooperation from all members associated with the construction project.

2.6. Goals Achieved by Implementation of NEC3 Contract in the Indian Industry

The construction industry has a great role to play in Indian economy. The vision of the country to become a complete developed nation cannot be achieved without the development in infrastructure system of the nation. According to Baghel and Pendse (2007) there are several issue identifies in the civil engineering contracts in India. There are great concern related with costs and timely completion of the project between client and contractor. In this scenario, the NEC3 form of contracts has resolved this issue in Indian construction industry to a greater extent. The NEC3 contract suggests deep planning and investigation of reports, which help in proper forecasting of budget and duration of a project. NEC3 contract is equally fair to all parties in the contract, clearly defines all aspects of the job to parties, which is helpful in removing any chances of uncertainty regarding the work. Brickner and Traister (2007) mentioned that most important drawback in Indian construction projects is time and costs overruns. It is a fact that highly discourages contractors to take up the new projects as it involves high degree of risk. Any kind of delay in completion of projects or costs overruns causes financial risks for the contractors. The NEC3 form of contract efficient project controls, which decreases the chances of time and costs, overruns in the project.

According to Jenkins and Stebbings (2006) the greatest benefit of NEC3 from of contract to Indian construction industry is that it implements a partnering approach. In addition to this, NEC3 contract also highly emphasize on proactive project management. The proactive management for construction project is clearly mentioned in three ways in NEC3 form of contract. The first approach for proactive management is related with the warning system, which is drafted at initial phase of the project. The warning system is concerned with the identification of issues in for the parties, which will be working together in the construction project. The early resolution of issues would result into a better coordination at later stages of the project. The early warning system facilitates contractor that he will only be compensated after a warning given by him at a fixed date in the contract. This warning system will not allow contractors to be paid for expenses, which are generally, materialize during later stages of the project. The second approach for proactive management is related with holding the employee responsible for the risks, which are not responsibility of the contractors. The last and the third approach for proactive management states that target cost option reflects the proactive management of construction project, which affects the financial bottom line of parties, associated with the construction projects.

The benefits of NEC3 form of contract to Indian construction industry are further analysed by Speaight (2009). The author views and opinion expressed by the author are slightly different from opinion expressed by other scholars in the literature. Potts (2008) has explained that the addition of risk register has great advantages to construction industry. The risk register contains all records of the risk that may occur in a construction project. However, the number of risks is added to the register as the project proceeds further. The risk register worked in tandem with both early warning processes as well as with the proactive management process of a project. The risk register help to identify three types of risks associated with a project. These three types of risks include; identification of risks associated with the project, procedure to manage these risks, and the identification of time and costs associated with the management of these risks. The author further mentioned that the key role of risk register is to not limited to identification of risk at an early stage but it is also related with resolution or managing risks in an proactively manner i.e., before they occur or impact the construction project. In case parties in a project are able to properly maintain the risk registers then it can improve the financial outcome of the project in a greater extent along with timely completion of the project.

On the basis of this discussion, the benefits of NEC3 form of contract can be underlined as below.

Benefits of NEC3 Contract

Benefits in NEC3 Contract	Benefit to Indian Construction Industry
Early Warning	NEC3 contract recommends both buyer as well as seller to warn each other if something in the project can cause delay in the project, increase the price, and impact the performance of the construction project. It helps the other party in taking timely action to rectify the situation.
Accurate Scheduling	NEC3 contract ensures an obligation for accurate scheduling of all deliveries, timely inspections, factory tests, and properly maintenance and monitoring of realistic programmes
Regularly Correction of Defects	The NEC3 form of contract adopts an effective process for managing defects in a construction project. This process also includes defection correction period as well as defect access period. In this way all the possible defects of projects are managed in a well-defined manner.
Agreement Regarding Compensation	The compensations agreement between the two parties regarding the price variations, claims as well as other contract are included in NEC3 contract to avoid any chances of ambiguity in the contract.
Success Sharing	NEC3 contract ensures development of partnering approach. This contract promotes incentives objectives in case client's objectives for the project are met effectively (Loots and Charrett, 2009).

Table 2: Source (Author, 2012)

According to Woodward (2008) in a highly complex Indian construction industry NEC3 contract has improves the functioning of this industry. It has brought mutual benefits for both contractors as well as for clients associated with the project. The author states that with the help of early warning both contractor and client can warn each other in case of any issue like increase in price or any reason which impact efficiency of the project.

At the same time Gerrard (2005) has the opinion that this contract not only resolves disputes between contactors and but also help in timely completion of the project within given budget. The author states that accurate scheduling with the help of NEC3 contract ensures the timely completion of all project with the implementation of accurate scheduling of all tasks like deliveries, timely inspection, and various tests required in a construction project. According to Chappell (2010) mentioned that regular correction of defects and agreement regarding compensation are the major benefits of NEC3 contracts to Indian construction industry. Potts (2008) did not agree with benefits mentioned by Chappell regarding the NEC3 contract. Potts mentioned that accurate scheduling and early warnings are not that much effective in Indian construction industry where most of the disputes are related with compensation and defects in projects.

2.7. Conclusion

It can be concluded on the basis of the above-mentioned literature that NEC3 contract play a crucial role in the success of a construction project. The opinion and views expressed by different authors in the literature review helps to understand that main purpose of drafting NEC3 contract is to provide a simple, flexible, and clear contract. The NEC3 contract is drafted by using simple language and terminology. The use of law jargons is avoided so that all parties associated with project can understand it in a well-defined manner. In addition to this, the literature review outlines the need of NEC3 form of contract in Indian construction industry.

It is evident with the help of literature review that the Indian construction industry is facing many challenges in the completion of projects related with costs overrun and projects are not completed within give deadline.

It is evident with the help of literature review that Indian construction industry is facing issues related with viability of projects in tendering phase, challenges in construct which delays the completion of projects, and issues related with skill gap of workers involved in the project. Hence, the partnering approach mentioned in NEC3 form of contact not only allow in timely completion of projects but also within given costs. NEC3 form of contract defines standards for various phases in a construction project. There are different contract for various activities in construction projects like works, supply, services, and other significant activities important in a

construction project. Hence, the literature review help to understand the importance of NEC3 contract in the success of a construction project.

In addition to this, certain research gaps are also identified in this chapter. The literature on implementation and benefits of NEC3 contract suggests that this contract ensures no disputes in a construction project. Apart from this, the literature in the chapter also mentions that NEC3 contract also ensures timely completion of projects without any chances of costs overrun. However, in real practices disputes and issues occur in construction projects even after implementation of NEC3 contract. The projects are not completed in time which results into costs overrun. The result behind costs overrun and disputes is that even after implementation of NEC3 contract, the parties involved in the project do not strictly follow the guidelines given in the project. Hence it results into critical issues in construction projects.

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Structured Abstract:

1. Statement of the Issue

The issue relates to implementation and benefits of the NEC3 contract in the construction industry. The present research has been built on the foundation of importance, implementation, benefits and advantages, its drawbacks, problems faced by stakeholders while its implementation and the future of the viability of the contract.

1.2 Aims and Objectives of the Present paper

Aims

The aim of the paper is to analyze the implementation and benefits of NEC3 form of contracts in Indian construction industry.

Objectives

1. To understand the need for NEC3 contract in Indian construction industry.
2. To analyze and evaluate the role of NEC3 contract in controlling dispute and ensuring timely completion of construction projects.
3. To understand how NEC3 contract are more effective than traditional methods in resolving disputes in construction industry.
4. To investigate the goals to be achieved by implementation of NEC3 contracts in Indian construction industry.
5. To analyze and evaluate how collaborative approach can be achieved by implementing NEC3 contract.

1.5. Research Questions

Some of the research questions that have been tried to answer through this study include:

- **Understand by NEC3 contract** that the user, participants and the stakeholders of the construction projects have about it, its implementation, its usefulness, effectiveness, drawbacks and future.
- **The help and support that the interactive methods of NEC3 contract** offers in controlling dispute and ensure timely completion of construction projects: Since the major goal of the NEC3 seems to be effective enough for solving disputes, checking cost and bestowing time management into the project schedule and structure, it is important the research questions include the understanding of such methods.

- **Effectiveness of NEC3 contract performance** as compared to traditional methods: Since NEC3 is not the first of its kind, many contracts, including previous versions of NEC itself have been in play for a long time in the construction industry. A comparative analysis of such inclusions is important for this study so as to understand whether the stakeholder find this of much use and of deeper support of development of management principles in the construction industry.
- **Problems faced by Indian construction industries for implementation of NEC3 contract:** Since our construction industry is not developed enough in terms of usage of lean principles of management as well as in usage of advanced principles of technology, it is inevitable that the adoption on NEC3 would be faced with technical, administrative and data management problems. It is in inclusion of this study to understand the problems, which the stakeholders face while implementation and administering NEC3.
- **Drawbacks of the NEC3 contract:** Nothing in this world comes without a fee, same being applicable to the NEC3 contract. There would be some or the other problems or negative areas of the contract which the stakeholders would want to get removed, altered or improved. The research also aims at finding out those weak and shadowy areas and the extent of improvement they expect to be made and are willing to accept.
- **Key points make NEC3 better than traditional method** is also an important question in this research study. The importance lies in the fact that had traditional methods been applicable and effective enough, the need to replace them would never have risen. The question is why the industry stakeholders find NEC3 better than its earlier versions and the other contracts.
- **Future scope of NEC3 in construction industry:** Industry keeps evolving all the time. Newer strategies keep changing ways businesses and relationships are conducted and that is where future scope of contracts becomes an important aspect of study and is importantly included in the scope of the present study too.