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Research Article

Identifying Challenges of Construction Industry in India

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Abstract

The construction industry ubiquitously faces challenges and problems. Though, in the developing countries like India these complications and challenges are present along with a general situation of socio-economic stress, chronic supply deficiencies, institutional weaknesses and a general incapability to deal with the significant problems. Being a composite, fragmented and planning driven industry, construction industry is commonly subject to challenges that constrain their accomplishment. This paper summarises the conclusions of a study and survey that targeted finding challenges of construction industry in India. The study was conducted through one fifty-eight survey responses of construction experts like Contractor, Supervisor, Site Engineer, Office Engineer and Project manager in India. The study identified twenty-one challenges categorised into five factors causing complications in the industry and ranked them both categorically and all together. Prior research efforts in the field of construction challenges have been limited to the investigation of how a single or a few specific challenges affects the construction project. The main contribution of this analysis and research is to assemble the challenges and problems of construction industry underneath one platform for effectively managing the process and to boost the performance of the construction industry.

Keywords: *Construction industry, Challenges, Socio-economic stress, Planning driven industry.*

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Introduction

In the past fifty years, the construction industry of India has modified enormously in terms of size and complexity of the projects. Project completion on time, customary of quality and within the assigned budget are the common goals of construction projects[1]. Construction project is a very important part of any country's economy, commercial, infrastructure and industrial growth. In most of the projects, there'll be delays and also their impact level varies on every project that depends on many factors like nature and the design of construction, importance of the project etc. Once the project gets delayed, either the delivery time of the project are extended or the progress of the project are accelerated heavily so as to deliver it on time. The previous can cause arbitration, litigation, and penalties etc. and also the later can cause incur extra price, each can find yourself with loss of money. In worst case, fast the method of the project also will have an effect on the standard of the output that sacrifices client's satisfaction[2]. Construction projects in India facing varied issues, delay in construction is one amongst the most important problems. It's outlined as "the time overrun, either on the far side the completion date per a contract or on the far side the date that the parties prescribed for delivery of a project". It's thought of as a typical downside in construction projects.

Construction industry is one of the largest leader in comparison to agriculture, textile, IT and other industries in India. Throughout the globe, the construction space of engineering is one amongst the foremost dangerous industries. The figure of fatal accidents happening at sites is sort of horrendous and the main root was found to be fall of peoples from elevation and openings. In the present situation, the Indian industry is sort of massive and sophisticated involving latest technology additionally as workforce. Indian construction industry downsides in terms of safety, health and security aspects. The Indian construction industry labour force is 7.5% of the whole world workforce and it subsidizes to 16.4% of fatal world incidents. Within {construction industry} the likelihood of a fatality is 5 times more doubtless than in a manufacturing industry, whereas the chance of a significant injury is 2 and a 0.5times higher. India has the world's maximum accident proportion among construction workforces in line with a recent study by the International Labour Organization (ILO) that parroted one inspection by a neighbourhood aid collection showing that a 160.5 out of each 1000 workers are dislocated on the work. Construction employees don't seem to be the sole sufferers of accidents however additionally the general public including youngsters are affected. These accidents weaken the image of the growth and as a result there's scarcity of proficient workforce[3].

Today's construction projects become a lot of advanced in nature. The advanced, relative and drawn-out method of planning, designing and building makes construction a method within which disputes are virtually ensured. Moreover, the involvement of multidisciplinary within the construction project conjointly ends up in conflicts among the parties. It looks that conflict and disputes are unavoidable to the infrastructure industry particularly and most of the construction projects face numerous uncertainties. Construction disputes that are mostly associated with written agreement matters as well as discrepancy, delay of time, payment, quality of technical requirement, availableness of information, administration and

supervision, impossible client's expectations and determination. Conflicts might develop because of restricted resources like not enough time, currency, labour, supplies, equipment.[4]

Construction is a labour-intensive trade, the scarcity of labour has become the critical risks that clogging the development project in achieving sustainability. A productive economy desires skilled labours to provide prolific services. The construction industry setting is influenced by the provision and property of skilled and productive labours as a result of it's a labour-intensive industry that depends heavily on human capital. Thus, everybody used among the development method makes a right away contribution not solely to the community generally however conjointly to the state at giant. The scarcity of labours within the industry can offer adverse impression towards the country's development.[5]

Delays are common in construction industry all around the globe. As an example, over four thousand construction projects from United Kingdom and Europe determined that projects were infrequently completed on schedule time. Similar outcomes were determined in several different nations correspondingly. There are several causes for such project delays, of that shortage and delay in materials supply are among the foremost notable in several studies. The causes of delay in massive building projects in India are known about materials, including causes associated with shortages and delivery of materials. The late delivery and sluggish mobilization of resources is that the leading factors contributes to causes of non-excusable construction delays in India.[6]

Lıterature Revıew

A separate study evaluation of the presentation of international development projects in India, China, Bangladesh, and Thailand contained by which they outlined that construction projects in India showed the most nasty schedule performance. The study establishes that in India average schedule overrun is that the highest (55% of actual schedule) compare to the opposite nations[7]. The construction projects surrounded by the developing nation suffer supplementary delay than the developed countries due to lack of technology surrounded by the developing countries. Bandra-worli ocean link sufficiently demonstrate the state of project delivery system surrounded by the country. It was planned as Rs 300 crores large digit project to be finished by 2004, however had truly value of Rs1600 crores with the delay of 5 years. Unsuccessful conniving & encoding of project, delays in site mobilization and delay in sub-contractor's work are 3 most critical factors caused by the contractor, disturbing the project performance, followed by client's favourable factors like delay to furnish & transfer the site, delayed in reviewing & approving design documents.

Design changes are always inflicting considerable cost of construction projects. Construction industry is in continues chase in the direction of achieving cost-effective construction management techniques which will remove the wastage and non-value calculation activities. Some researchers have evaluated the causes of design changes supported the expansion stages like pre-planning, planning, design and construction while only some researchers have categorised the sources of design alteration from the angle of clients, consultants and contractors. Clients, Consultants, and Contractors are thought-about to be the necessary

players during a construction project. Most of the times, design changes impacting the price overrun occur because of intentional, unintentional or negligence of either one or a combination of a number of the highest players[8]. Construction projects are full of the mystification of cost, schedule delays and loss of efficiency because of changes surrounded by the design at later on stages.

Coordination is one among the key issues in managing building projects and an important contributor for project success and objectives accomplishment. Coordination factors in construction projects will be outlined as a body of procedures like detailed procurement set up, resources priorities for crucial tasks and task dependencies identification and elements like plans, meeting and reports of an efficient coordination method to supply a harmonious operating environment. A number of these activities need support from numerous parties to boost the project progress with a high satisfaction standing e.g. coordination meeting. The recognized harmonization factors were, well developed relationships surrounded by key functioning parties, sharing vision surrounded by the operators and service providers for project preparation activities, testing and confirming performance following each action conclusion, self-confidence, belief surrounded by agencies and conferences to switch over ideas and managing conflicts. The key factors represent the milestone of coordination framework and a solid platform for coordination method in building project were classified below five main teams. The teams are (i) Planning and Scheduling, (ii) Resource Management and Contacts, (iii) Records and Documentation, (iv) Contract Implementation, and (v) Quality and worth Engineering[9].

Deficiency and delay in materials offer is argued to be one surrounded by the leading essential factors that cause delay in construction project delivery globally. However, the major fundamental reasons differ from country to country. Delays are very common in construction projects in India and globally, for e.g. over four thousand construction projects from United Kingdom and Europe are discovered that projects were rarely completed on schedule time.[10] There are several causes for such project delays are shortage and delay in materials supply are among the foremost notable in several studies. It completely was in addition to bare that shortage and delay of construction materials were the foremost causes of project delay. Six major causes area unit accessibility of materials, Poor estimation of materials amount, Poor craftsmanship, Quality of material, Special materials, Labour productivity, Inclement weather, Government restrictions, Poor designing and scheduling, Variations and changes. Clearly, all the delay-causing factors originated either from the following: consultant’s pressure, contractor’s struggle, design changes, instrumentality/equipment connected, peripheral factors, human resources, material constraints, non-cooperation, project complexities.

The construction industry could be a terribly dangerous industry. The presentation of the industry in health and safety is very poor. The value of professional health and safety is even poorer in developing countries. In Asian countries Infrastructure industry OHS(occupational health and safety) has never been given prime importance. Even if in India Infrastructure industry is significantly booming, there aren't any right initiatives undertaken by the government to execute OHS rules and regulations. Accident caused because of fall of

employees at construction sites happened at elevations of less than 9.15,occurring totally on new construction projects of business buildings and residential buildings of comparatively low construction price[11]. There are several problems from that the foremost range of accidents happens are No health and safety coaching, Manual handling, Attention, Alcohol use, Hazard awareness. Cut and fall were the foremost causes of injury. Therefore, health and safety trainings need to be taken place to aware employees concerning activity injury and issues of safety. Regular work oversight and provision of PPEs also are required to forestall activity injury.

Skilled labour deficiency is that the shortage of workers in specific industry or shortage of workers with essential skills. Skilled labour adequacy and convenience still be a serious challenge within the business. The present image of skilled labour shortage within the region shows that there's imbalance between offer and demand. Shortage of skilled labour had serious penalty on construction productivity and therefore the common health of construction Industry[12].

Bidding performance issues the link between bids submitted by completely different bidders during a competition. Bid and procurement problems are widely associated with the development business and its participants, so as to enhance procurement of construction it's necessary for both parties to think about bidding method. Bid Awards discreetly done in Indian construction industry are usually supported financial criterion i.e. Lowest bidder is allowed to work award system commonly referred to as L1 sort bidding. Award of work on financial basis in construction results in lower quality of work . Conjointly generally results in arbitration that additional delays the schedule thereby inflicting increase in cost because of price escalations. preparation of subsidisation contracts to a lowest bidder was established to verify lowest value for finishing a project. Publicly construction works, this practice is nearly universally accepted since it not solely ensures a low worth however conjointly provides how to avoid fraud and corruption. Government of India has made it mandatory to own of spirited bidding for construction projects, this needs public organizations to award such contracts to the lowest sociable bidder. Primarily progress in most of the projects is behind as intended schedule. this might ensue to schedule delays ensuing as a result of inaccessibility of materials, any socio-political disturbance current of work and different ineluctable delay. Secondly, lack of funds is because of rise and inappropriate obsession of allowance for increase[13]. The construction industry has complexity in its nature because it contains a huge number of parties as clients, contractors, consultants, stakeholders, shareholders, regulators and others but in government projects the work deal happens with contractor and government. Any party forms government for 5 years and they plans every work accordingly to finish within those 5 years but many projects they inaugurate but couldn’t finish in time and when the next party forms the government, this has seen many times that they stops the construction and the many cases like corruption starts to play. Corruption cases of government employees working in reputed organisation has been caught many times during taking bribe[14].

Definition of Conflict is doubt or questioning, opposition, incompatible behaviour, arguing or antagonistic interaction and disputes is one among the vary of events thought-about as

conflict. A dispute will be aforementioned to exist once a claim or assertion created is created by one party is rejected by the opposite party and that rejection isn't accepted. This shows that disputes is additional doubtless occur once the conflicting parties shows conflicting action or arguments to an issue. There are maybe as several definitions of conflict as there are occasions for its incidence. Some well-known causes of construction disputes caused by clients includes failure to reply in timely manner, poor connections surrounded by members of the team, insufficient tracing mechanisms for request of data, imperfect management, superintendence and management efforts on the part of the project, least possible worth approach in appointment of contractors and designers, the absence of union among the participants, unwilling to observe for constructability, clearness and completeness, failure to assign a project manager and additionally discrepancies or ambiguities in contract documents[15].

Research Methodology

We have used Google Forms in a survey (for a research project). It comprised over 21 questions and aimed at gathering data from specific construction experts like Contractor, Supervisor, Site Engineer, Office Engineer, Project manager. The survey link was disseminated through email to the respected organisations both government and private. We have over 150 responses in a spreadsheet, which are being organised and analysed for data analysis. We decided to use Google Forms since it seemed pretty easy to shape the questionnaire. Overall, the team thinks it is a decent source and worked just fine for what we desired. The following section explains the steps involved in using *Google Forms* for web-based survey.

The Google Forms allow data analysis and graphical demonstration online. Once the web surveys crammed online, automatically the data will be chronicled in Google spreadsheet in an analysable arrangement and allow for tabularization and graphical diagram of data. The responded data comes in a graphical arrangement as well in descriptive figures. Graphics and Descriptive statistics can be easily introduced into another arrangement like MS Word etc[16].

Questionnaire design

A questionnaire survey was designed aiming to get the opinion and understanding from the experienced respondents regarding to the construction challenges and problems in India. The questionnaire consists of two sections. The first included the characteristics and backgrounds of the participants who contributed to the survey. Such questions were: name of the respondents, job title of the respondents, education of the respondents, years of experience.

The second section included the challenges that may have considerable impact on the construction industry. The total number of factors/challenges considered is 21 grouped into five categories. These are:

Table-1.21 Challenges grouped into five categories

Category	Challenges
Time related challenges	• Increase of Additional quantity of Works • Delay in Mobilization by contractor • Unavailability or shortage of workforce • Lengthy period between bidding time and contract grant • Poor procurement procedure (Long period or procedure in bidding) • Late and slow material, equipment delivery to construction site • Absence or scarcity of materials in the local market on required time
Cost related challenges	• Variation and escalation in prices of Material, Equipment, Labour etc. • Financial difficulties of Construction authorities
Quality related challenges	• "Design Changes" during construction phase • Poor Supervision and Project Management on Construction site • Inadequate Contractor Experience (Poor Performance)
Productivity challenges	• Complex administrative and governmental procedures • Political issues - Changes in governments • Conflict between people at the site due to different reasons • Delay in work due to equipment/machinery problem
Health, safety and environment challenges	• Poor and unforeseen site condition (Location, Ground geological condition, events, Security) • Sewer weather problems (Warm, Cold, Snowy, Rainy, Cyclone...) • Lack of basic facilities at the site • Safety risks on construction site that can lead to serious casualties • Lack of safety equipment's like safety glasses, welding shields, chemical splash goggles, dust goggles, Protective gloves etc.

Dear Sir/Madam

I have taken up a small survey on "Challenges faced on construction site & Industry" to understand the problems occur in industry. What are the major factors contribute to them and how a civil engineering perspective should plan for those problems will be analysed by the questionnaire attached.

Through this I kindly request you and your members of organisation who have good experience in construction industry to participate in this survey. Participation in this survey will be very helpful for us.

Following link will lead you to the survey: https://forms.gle/aUacdg2DY6T2D5LR8

This survey is very brief and takes 4-5 minutes to complete. If you have any questions about the survey, please contact me at: michalchowdhary500@gmail.com

Please complete the survey by March 20, 2021. Your assistance in providing invaluable information about this topic is much appreciated.

Thank you.

Figure-1.Request Sent via email for Participating in the Survey

Data analysis

The Relative Importance Index method (RII) is used here to determine Contractor, Supervisor, Site Engineer, Office Engineer, Project manager perceptions of the relative challenges in Indian construction projects. Relative importance index analysis allows identifying most of the imperative criteria based on participant's replies and it is also an suitable tool to prioritise challenges rated on Likert- type scales. The Relative Importance Index (RII) is computed as in equation-1

$$\mathbf{RII} = \Sigma W / (A*N) \quad \ldots\ldots\ldots 1$$

Where, W is the weighting given to each challenge by the respondents (ranging from 1 to 5), A is the maximum weight (i.e. 5 in this case) and total number of respondents is represented by N. Higher the value of **RII**, more important is the cause or the challenge faced in construction industry.

Results And Dıscussıon

The survey results

Characteristics of the respondent's

All of the respondents have engineering experience in civil engineering and public construction projects in India. The respondent included in this survey were from different government and private construction organisations while the contractors were selected from the top two classes only.

Respondent's profiles and percent.

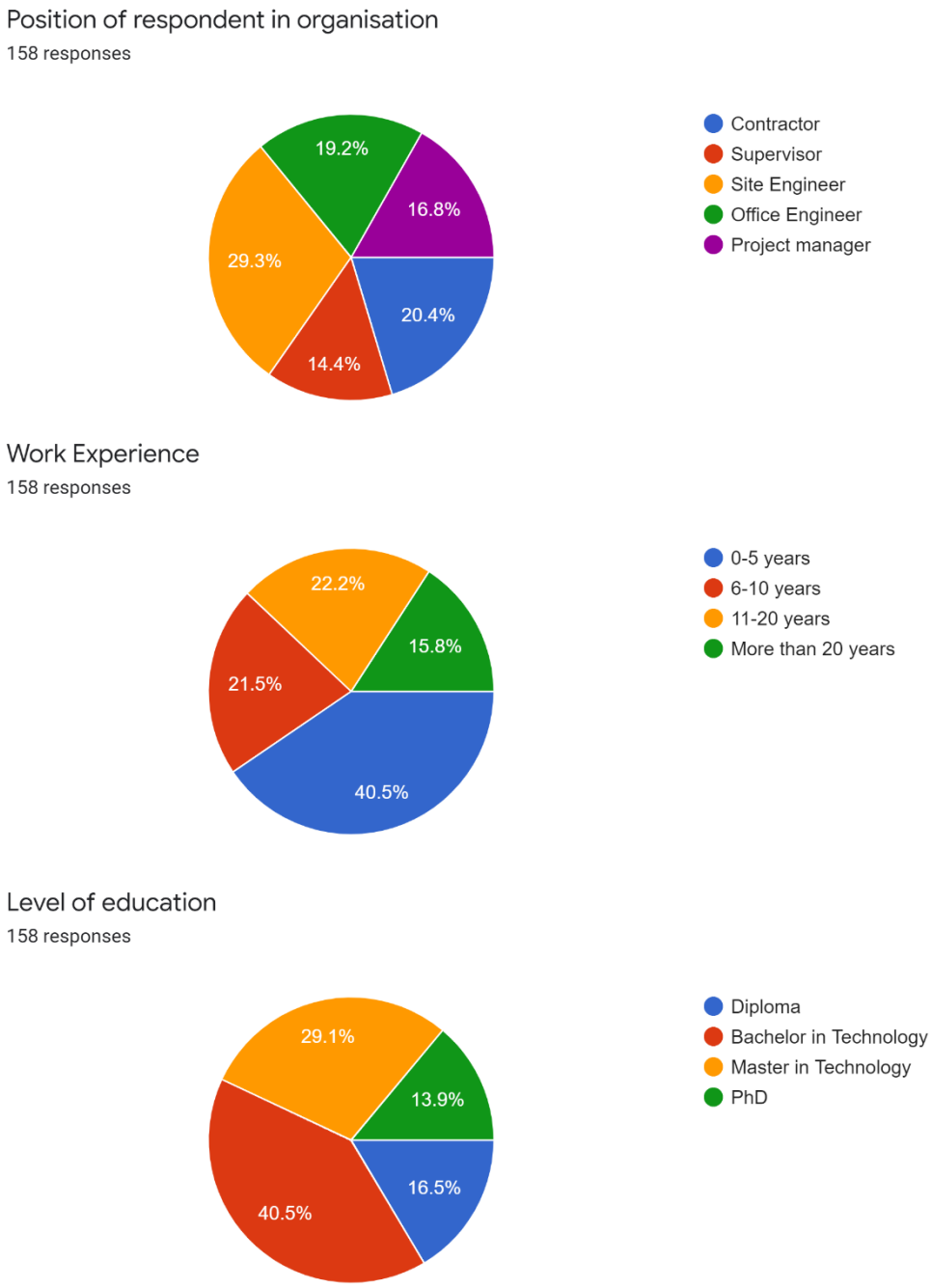

Figure-2.Respondent's profiles and percent.

Challenges affecting the construction projects

Time related challenges

The average relative importance index (RII) for this group is 0.764. Table-2 shows the (RII) and rank of the significant challenges faced in the Indian construction projects according to survey responses. It can be noticed that the most important challenges affecting the projects time in India are Increase of quantity of work (Additional Works), Delay in Mobilization by contractorwith overall RII of 0.8 and 0.777 respectively. M is the mean value of scale rating we got in survey.

Table-2. Time related challenges

Challenges	M	RII	Rank
Increase of Additional quantity of Works	4	0.8	1
Delay in Mobilization by contractor	3.886	0.777	2
Poor procurement procedure (Long period or procedure in bidding)	3.841	0.768	3
Lengthy period between bidding time and contract grant	3.835	0.767	4
Late and slow material, equipment delivery to construction site	3.753	0.750	5
Absence or scarcity of materials in the local market on required time	3.727	0.745	6
Unavailability or shortage of workforce	3.715	0.743	7

Health, safety and environment related challenges

The average RII of this group is 0.747. Table-3 shows the five challenges are included in this category. The first is Safety risks on construction site that can lead to serious casualties on site in organization with RII of 0.758.

Table-3. Health, safety and environment related challenges

Challenges	M	RII	Rank
Safety risks on construction site that can lead to serious casualties	3.791	0.758	1
Lack of basic facilities at the site	3.778	0.755	2
Poor and unforeseen site condition (Location, Ground geological condition, events, Security)	3.772	0.75	3
Lack of safety equipment's like safety glasses, welding shields, chemical splash goggles, dust goggles, Protective gloves etc.	3.702	0.740	4
Severe weather problems (Warm, Cold, Snowy, Rainy, Cyclone...)	3.670	0.734	5

Cost related challenges

The average relative importance index for this group is 0.787. Table-4 shows the (RII) and rank of the significant challenges affecting the performance in India according to cost related challenges. It can be noticed that the most crucial challenges are Fluctuation and escalation in prices, Financial difficulties of Construction authorities and there RII is 0.801 and0.773 respectively. These challenges include payment delays, project overtime cost, waste rate of materials, material and equipment cost, escalation of material prices, and project labour cost.

Table-4. Cost related challenges

Challenges	M	RII	Rank
Variation and escalation in prices of Material, Equipment, Labour etc.	4.006	0.801	1
Financial difficulties of Construction authorities	3.867	0.773	2

Quality related challenges

The average RII for the group is 0.750. Table-5 shows that there are three significant challenges related to quality affecting the performance. These are: "Design Changes" during construction phase, Inadequate Contractor Experience, Poor Project Management.

Table-5. Quality related challenges

Challenges	M	RII	Rank
"Design Changes" during construction phase	3.898	0.779	1
Poor Supervision and Project Management on Construction site	3.696	0.739	2
Inadequate Contractor Experience (Poor Performance)	3.670	0.734	3

Productivity related challenges

The average RII for the group is 0.766. Table-6 shows the most significant and ranking of the productivity related challenges. This significance is based on the overall results obtained. These challenges are: institutional problems, Delay in work, Conflict between people, Political issues.

Table-6. Productivity related challenges

Challenges	M	RII	Rank
Complex administrative and governmental procedures	3.981	0.796	1
Delay in work due to equipment/machinery problem	3.879	0.775	2
Conflict between people at the site due to different reasons	3.803	0.760	3
Political issues - Changes in governments	3.683	0.736	4

The most significant ranking of all challenges - all the categories

Table-7 shows summary of ranking of the most significant challenges in Indian construction industry based on the answers of the survey conducted.

Table-7. Ranking of all the categories

Challenges	M	RII	Rank
Variation and escalation in prices of Material, Equipment, Labour etc.	4.006	0.801	1
Increase of Additional quantity of Works	4	0.8	2
Complex administrative and governmental procedures	3.981	0.796	3
"Design Changes" during construction phase	3.898	0.779	4
Delay in Mobilization by contractor	3.886	0.777	5
Delay in work due to equipment/machinery problem	3.879	0.775	6
Financial difficulties of Construction authorities	3.867	0.773	7
Poor procurement procedure (Long period or procedure in bidding)	3.841	0.768	8
Lengthy period between bidding time and contract grant	3.835	0.767	9
Conflict between people at the site due to different reasons	3.803	0.760	10
Safety risks on construction site that can lead to serious casualties	3.791	0.758	11
Lack of basic facilities at the site	3.778	0.755	12
Poor and unforeseen site condition (Location, Ground geological condition, events, Security)	3.772	0.754	13
Late and slow material, equipment delivery to construction site	3.753	0.750	14
Absence or scarcity of materials in the local market on required time	3.727	0.745	15
Unavailability or shortage of workforce	3.715	0.743	16
Lack of safety equipment's like safety glasses, welding shields, chemical splash goggles, dust goggles, Protective gloves etc.	3.702	0.740	17
Poor Supervision and Project Management on Construction site	3.696	0.739	18
Political issues - Changes in governments	3.683	0.736	19
Inadequate Contractor Experience (Poor Performance)	3.670	0.734	20
Sewer weather problems (Warm, Cold, Snowy, Rainy, Cyclone...)	3.670	0.734	21

In this study, 100% civil engineering background respondents participated in the questionnaire survey. The target groups in this study are different project leading respondents from site engineer to Office engineer. Of the participants in the survey, 20.4% were Contractor, 14.4% were Supervisor, 29.3% were Site Engineer, 19.2% were Office Engineer and 16.8% were Project manager. 40.5% of the respondents had less than 5 years of

experience, 21.5% of the respondents had 6 to 10 years of experience, 22.2% of the respondents had 11 to 20 years of experience, 15.8% had more than 20 years of experience respectively. The professionals have rated these challenges, which indicates that all the factors and constraints of construction projects and therefore, all these factors were considered for further analysis.

Variation and escalation in prices of Material, Equipment, Labour etc. was identified as the prime challenge of the construction industry with MEAN-4.006 from the project's perspective, whereas Increase of Additional quantity of Works rated as second most challenge, Complex administrative and governmental procedures rated it as the third most important factor/challenge of construction industry in India.

Conclusıon

A structured questionnaire survey method was considered to study challenges affecting construction industry of India. The questionnaire assists to study the problems that are faced on site and other factors like bidding were also included to check there effect on construction industry. Twenty-one challenges were considered in this study and were listed under five groups based on literature review. These groups give a comprehensive summary of all the constraints faced by industry. The challenges were summarized and collected according to previous studies and others are added as recommended by experts. The main groups considered in this study are time, cost, quality, productivity, health-safety and environment.

The target groups in this research are construction experts like Contractor, Supervisor, Site Engineer, Office Engineer and Project manager in India. Number of sets collected was from 158 respondents representing 34 Contractor, 24 Supervisor, 49 Site Engineer, 32 Office Engineer and 28 Project manager and all respondents have the engineering background. The results were analysed, discussed to obtain the rank of challenges affecting industry. The relative importance index method (RII) was used here to determine the respondents perception of the relative order of challenges and problems of construction industry.

In the survey, the top ten significant challenges are: Variation and escalation in prices of Material, Equipment, Labour etc., Increase of Additional quantity of Works, Complex administrative and governmental procedures, "Design Changes" during construction phase, Delay in Mobilization by contractor, Delay in work due to equipment/machinery problem, Financial difficulties of Construction authorities, Poor procurement procedure (Long period or procedure in bidding), Lengthy period between bidding time and contract grant, Conflict between people at the site due to different reasons.

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