

Analysis of Delays in Works under Jalyukt Shivar Campaign

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Abstract— Jalyukt Shivar (JYS) Campaign is a flagship programme of Government of Maharashtra, aims to bring water empowerment to the drought-affected villages to make Maharashtra Drought Free by the year 2019. This Campaign is first of its kind organized action plan wherein many departments are collectively & collaboratively working towards a common goal i.e. 'Water for All'. The Campaign is mainly a combination of various pre-existing schemes related to water conservation but with certain fine tuning. The targets in the first phase of JYS Campaign, which were having a time frame of a year, could not be achieved even after two years. The Government of Maharashtra has initiated several measures to expedite the campaign but these initiatives have only focused on reducing cycle time of particular stage. Also; the government is only monitoring a construction phase of project cycle whereas delays in pre-construction activities are not being taken into account. The aim of this study is to optimize the cycle time by highlighting all such areas where substantial delays are occurring and proposing measures to reduce such delays thereby reducing the overall project cycle time for the JYS works. For data collection interview method and field visit approach has been adopted. From the collected data, projects cycle time of JYS works has been grouped under 7 stages and idealistic time cycle has been developed which then compared with case studies, to highlight the delaying events. Results from case studies showed that major portion of project cycle time is being consumed by project initiation, formulation, and approval phases than actual construction phase.

Key words: Jalyukt Shivar Campaign; Cycle Time Optimization; Monitoring & Control of Government Projects

I. INTRODUCTION

Jalyukt Shivar is one of the key steps initiated by Government of Maharashtra towards making 'Water for All - Drought Free Maharashtra by 2019'.

Jalyukta Shivar Campaign aims to bring prosperity to its land and farmers through water conservation. The scheme has become a mass movement. The ambitious integrated water conservation and management initiative of Maharashtra Government has started to bear fruits in various water-scarce districts of the State.

This 'Jalyukta Shivar' campaign started to implement in the drought prone locations on priority. Also, provisions are being made such that water scarcity situation is not created in future in the remaining part of the state. Therefore, government has started the implementation of Jalyukta Shivar campaign in all districts of the state, in order to permanently overcome drought situation by convergence of funds approved for schemes under various departments and through MREGS / MLA / MP Fund / District - level Fund / Non - governmental Organisations / CSR and public participation. This government's integrated water management scheme aims to make the state drought-free by 2019 and rid 5,000 villages of water scarcity every year.

Fourteen different schemes for water conservation have been clubbed together and measures are being implemented as per the requirement of a particular village. The government is putting substantial focus on the rejuvenation of old structures and the policy has now shifted from constructing big dams to smaller de-centralized water structures.

Many important initiatives have been introduced under JYS Campaign, which were missing in earlier government schemes. This includes Water Village Level Water Budgeting, Concurrent Evaluation of Works, Third Party Checking, Geo Tagged Photographs etc. The concepts like sustainability is first time being addressed in JSY Campaign.

Various schemes of water conservation have been brought under the umbrella of the scheme, which helps villages retain rainwater, create decentralised water storage units and increase groundwater level for use in irrigation.

II. LITERATURE REVIEW

While searching for the literature with respect to study area, there was no research work done or any book published which is directly related to this field. Although there are some research papers which indirectly touches the issues which are under the consideration of this study.

Khaled Al-Reshaid, Nabil Kartam, Narendra Tewari and Haya Al-Bader (2005) share the lessons learned during implementation of Kuwait University projects. The authors have found that fundamental problems in failing to achieve the project goals (timetable and budget) originate from: Ignorance of what other team members are doing; Poor reactivity to sudden changes in the project environment; and Lack of discipline in design change-control. The authors concluded that the pre-construction methodology ensures smooth and successful implementation during construction phases of the projects as they are generally executed in a fast-paced, deadline-driven and cost-conscious environment.

Dinesh Kumar R. (2016) conducted a research work which aims to find out the most significant factors causing delays in Indian construction projects through literature review and questionnaire survey. The Author has shortlisted the top 20 significant factors with respect to Indian context and finally recommendations are given to avoid delays in construction project.

Igbokwe-Ibeto & Chinyeaka Justine has highlighted issues and challenges in local government project monitoring and evaluation in Nigeria. The authors stated that the success of a project depend on how it is managed. The authors have also suggested remedial measures viz. adherence to due process in all facets of project planning and management involving the people of the grassroots in project initiation, formulation and execution, insistence on continuity on government projects irrespective of change of government or its personnel, availability of visionary and missionary leadership.

Odo, L.U. (2014) interrogated what challenges have constrained the effective performance of the local government in grassroots development and to suggest measures to address such challenges. The study attempted to offer suggestions that are capable of improving the performance of local governments in grassroots development of Nigeria. The author mentioned need of Community Participation in the development Process. The author highlighted the issue of misplacement of priorities & mentioning the need of autonomy to local bodies which will respond effectively to the demands for efficient services delivery at the grassroots level.

As far as JYS Campaign is concern, Government Resolutions and Government Circulars by Government of Maharashtra are the lone and authentic sources for information.

III. PROBLEM STATEMENT

The JYS campaign is running behind the schedule with respect to year wise plan. In spite of the great efforts are being initiated from the Government, still the projects have not been able to complete before the schedule they should have to. But these measures are not giving results in a large extent.

Project monitoring & controlling by the Government is only focusing certain stage(s) of project cycle and rest of the stages of project cycle are remain unaccountable as far as schedule is concern.

IV. TECHNIQUES AND METHODS USED IN RESEARCH

To study the project cycle of a Jalyukta Shivar work, the works which are being carried out by Small Scale Irrigation (Water Conservation) Department have been considered.

Techniques and methods used in this research work are explained in Table I.

Type	Methods	Techniques
Literature Research	1) Analysis of historical records	Recording of notes, Content analysis,
	2) Analysis of documents	References & abstract guides, Content analysis.
Field Research	1) Interviews	Used as a survey technique for information and for discerning opinion
	2) Case Studies	Analysis of Case study with respect to the data provided during interview and site visit to verify actual physical condition of works

Table 1: Research Method & Techniques

V. WORK COMPONENTS IN JYS CAMPAIGN

All the components (or works) are categorized based on the principal work arena of the respective implementing agency. For various works, the respective implementing agencies are listed in Table II.

Sr. No.	Description of Activity	Implementing Agency
1	Watershed Development Works – compartment bunding / flux maintenance,	Agricultural Dept., Forest and Social Forestation

	Farm Ponds, Earthen Nalla Bandh, Contour Trenches etc.	
2	Cement Nalla Bandh (CNB) in Series / Nalla Deepening / Nalla Straightening / Widening	Agricultural Dept., SSI(WC), WRD, ZP
3	To reinstate old water structures	SSI(WC), WRD, ZP
4	Repairing of Existing Water Conservation Structures, KT Weir, Storage Tank	Agricultural Dept., SSI(WC), WRD, ZP
5	To increase utility of large and medium projects	WRD
6	Linking of Small Rivers / Nalla	WRD
7	Desilting of MI Tank, PT, ST, Gaav Talav, Britishkalin Talav,	Agricultural Dept., SSI(WC), WRD, ZP
8	Strengthening of Drinking water sources	Water Supply, GSDA, ZP
9	Recharging of Wells / Bore wells	Agricultural Dept., Water Supply & Sanitation, GSDA, ZP
10	Efficient use of available water / Changing in cropping pattern	Agricultural Dept., Water Resources Department
11	Implementation of Dry land Farming Campaign	Agricultural Dept.
12	Empowerment of Water Users Associations	SSI(WC), WRD
13	Canal Cleaning	SSI(WC), WRD
14	Public Awareness	Agricultural Dept.

Table 2: Activity-Wise Implementating Agencies under JYS Campaign

To study the project cycle of a works under JYS Campaign, the works of construction of New CNB which are being undertaken by Small Scale Irrigation (Water Conservation) Department have been selected. For study purpose, the cases from Ghansawangi Taluka in Jalna District have been considered.

VI. STAGES INVOLVED IN THE WORKS UNDER JALYUKTA SHIVAR CAMPAIGN

The sequence of activities under project cycle may vary from department to department, based on the guidelines & procedure laid by and for the respective department. Each of these departments, doing works under Jalyukta Shivar Campaign has their own procedure to execute the any work or component. All the work under these respective departments has to go through sequential procedure as per the guidelines of Government of Maharashtra.

All the works which are being carried out by Small Scale Irrigation (Water Conservation) Department has to follow the procedure as discussed below. The project cycle has been divided in stages as shown in Fig.1.

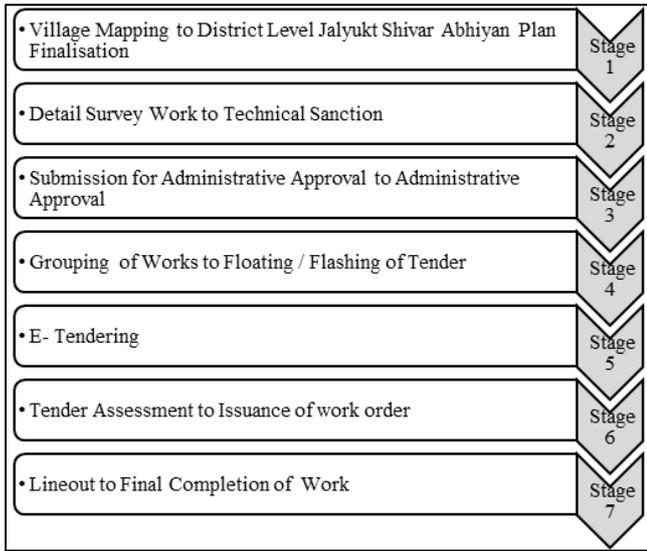


Fig. 1: Stages involved in JYS Campaign works

Out of all the stages mentioned below, Stage no 1 & Stage no 3 are same for all works under JYS Campaign irrespective of the department.

Each of the work under JYS Campaign follows sequence of activities. All such activities are grouped in following seven major stages. Each of these stages involves sub-activities in it.

VII. IDEALISTIC PROJECT CYCLE TIME FOR JYS WORKS

From the data collected from field, idealistic Project Cycle Time with specific context to CNB works has been developed, as shown in Table III.

As per the idealistic time estimates, around 224 days (i.e. 32 weeks) are required for a completion of JYS Works; whereas the GoM guidelines considers a year wise (52 weeks) plan for JYS Works. It is pertinent to note that inspite of having 20 weeks' margin still in majority of the cases; the targets for a year are not being achieved

VIII. ANALYSIS OF PROBLEMS IN JYS CAMPAIGN WORKS

From the analysis of case study(s) problems in the works of JYS Campaign have been identified. The probable reasons for those problems also have been identified. At the same time probable measures to reduce such problems also have been discussed in Table IV.

Stage / Step No.	Activity	Idealistic Time Estimate		Agency(s) Involved
		Stepwise	Stagewise	
1	Village Mapping to District Level Jalyukt Shivar Campaign Plan Finalization		30	Agriculture Dept, Revenue, WRD, WCD, GSDA, ZP, Gramsabha
1.1	Village Mapping by field Visit	2		Agriculture Dept, Revenue, WRD, WCD, GSDA, ZP
1.2	village-wise Water Budgeting by Agricultural Department	5		Agriculture Dept, Revenue, WRD, WCD, GSDA, ZP
1.3	Suggestions & Proposals from Gramsabha for the works to be done as per Water Budget Calculations	4		Agriculture Dept, Revenue, WRD, WCD, GSDA, ZP
1.4	Approval for the proposed works from Gramsabha	2		Gramsabha
1.5	Submission of Agency wise Plan for Works	7		Agriculture Dept, Revenue, WRD, WCD, GSDA, ZP
1.6	Approval for Taluka Level Jalyukt Shivar Plan by Taluka Level Committee	3		Taluka Level JYS Committee
1.7	Approval for District Level Jalyukt Shivar Plan by District Level Committee	7		District Level JYS Committee
2	Detail Survey Work to Technical Sanction		24	WRD, WCD, GSDA, ZP
2.1	Detail Survey work at Proposed work Location	10		Sub Div.(WRD, ZP, WCD)
2.2	Preparation of Detail Estimates at Subdivision Level	5		Sub Div.(WRD, ZP, WCD)
2.3	Submission of Detail Estimate for Technical Sanction	3		Sub Div.(WRD, ZP, WCD)
2.4	Scrutiny of Detail Estimate	3		Division (WRD, ZP, WCD)
2.5	Technical Sanction by Executive Engineer	3		Executive Engineer (WRD, ZP, WCD)
3	Submission for AA to Grant of AA		15	District Level JYS Committee
3.1	Submission of Proposal for Administrative Approval	3		District Level JYS Committee
3.2	Prioritizing the works as per availability of Funds	5		District Level JYS Committee
3.3	Administrative Approval by District Level Jalyukt Shivar Campaign Committee	7		District Level JYS Committee
4	Grouping of Works to Floating / Flashing of Tender		17	Division (WRD, ZP, WCD)
4.1	Grouping / Clustering of Works	2		Division (WRD, ZP, WCD)
4.2	Preparation of Draft Tender Paper (DTP)	3		Division (WRD, ZP, WCD)

4.3	Approval to Draft Tender Paper by Superintending Engineer	7		Superintending Engineer
4.4	Uploading of Tender	3		Division (WRD, ZP, WCD)
4.5	Floating of Tender / Flashing of Tender	2		Division (WRD, ZP, WCD)
5	E- Tendering		20	Division (WRD, ZP, WCD)
5.1	Flashing of E-Tender on Website	5		Division (WRD, ZP, WCD)
5.2	Downloading of E-Tender	5		Bidder
5.3	Submission of E-Tender	5		Bidder
5.4	Opening of E-Tender	5		Division (WRD, ZP, WCD)
6	Tender Assessment to Issuance of work order		28	Division (WRD, ZP, WCD)
6.1	Tender Assessment / Scrutiny	3		Division (WRD, ZP, WCD)
6.2	Preparation of Work wise list of Contractors (who has submitted Lowest Proposal & satisfying the criteria as per Tender conditions)	2		Division (WRD, ZP, WCD)
6.3	Approval to the List of Contractors by Superintending Engineer	5		Superintending Engineer
6.4	Approval to the List of Contractors by District Level Jalyukt Shivar Committee	5		District Level JYS Committee
6.5	Issuance of Letter of Intent to Contractor by EE	3		Executive Engineer (WRD, ZP, WCD)
6.6	Submission of Security Deposit by Contractor	7		Contractor
6.7	Issuance of Work Order to Contractor by Executive Engineer	3		Executive Engineer (WRD, ZP, WCD)
7	Lineout to Final Completion of Work		90	Sub Div. (WRD, ZP, WCD)
Total Idealistic (or Realistic) Time Estimate for Project cycle of Jalyukt Shivar Campaign Works			224 Days	

Table 3: Idealistic Project Cycle Time

Sr No	Description of Problem	Probable Reasons for the Problem	Probable Measures to reduce such Problem
A Problems in Stage 1			
01)	Improper Village Mapping	Unequal Distribution of Water bodies & Population No public participation while mapping	Realistic & Scientific Approach of Water Budgeting Involvement of Peoples Participation
02)	Lack of Scientific & Realistic method for Preparation of Water Budgeting	Method based on theoretical calculations Non-involvement of Technical Staff	Involvement of Technical Staff Adopting Scientific & Realistic method for Preparation of Water Budgeting
03)	Reluctance of agencies to submit the agency wise plan	Insufficient manpower availability with respective departments Lesser time being given for estimate preparation and allied activities Works-wise responsibility is not well defined (for e.g.- Works of CNB are being executed by ZP, WCD, WRD and even by Agricultural Department)	Assigning work-wise distribution to each of the departments (or Agency) Fixing the time bound responsibility Provision of punishment in case of non-compliances within a schedule
04)	Delay in Approval of Taluka Level Plan	Pre-Existing workloads of the personnel who are members of Taluka Level Committee Delay in submission of agency wise plan of works Political interference for selection of works	Fixing the time bound responsibility Compulsion of conducting a fortnightly meeting and this should be reflected on monitoring & controlling formats
05)	Delay in Approval of District Level Plan	Pre-Existing workloads of the personnel who are members of District Level Committee Delay in Approval of Taluka Level JYS Plans by respective Taluka Level Committee Political interference	Fixing the time bound responsibility Provision of punishment in case of non-compliances within a schedule
B Problems in Stage 2			

01)	Lack of Unique and standard Estimate format which is complete in all respects	Standard Estimate formats have not being specified by Govt. Therefore, style of Estimate preparation changes with the person to person Lack of computer literacy amongst the technical staff. Therefore; they are sometimes outsourcing the estimate preparation job.	Develop Standard and user-friendly formats of estimate. Provision for online estimate submission would be the best solution so as to avoid variety of formats and to avoid delays in preparation of it.
02)	Delay in submitting Estimates by Subdivision office	Less Manpower availability at subdivision level, especially technical manpower Time required for acquiring submittals required with Estimate (NOC From Farmers, GSDA Certificate, etc) Concurrent responsibilities of the subdivision office	All the vacant posts (both Technical & Non-technical) at sub divisional office level shall be filled on topmost priority. Fixing the time bound responsibility Provision of punishments in case of delayed compliance or non-compliance
03)	Delay in Scrutiny of Estimates	Less Manpower availability at Division Level & concentrated load at a certain point of time No Unique or Standard formats of Estimates.	All the vacant posts (both Technical & Non-technical) at divisional office level shall be filled on topmost priority. Fixing the time bound responsibility Provision of punishments in case of negligence
04)	Delay in giving Technical Sanctions	Delay in scrutiny of estimate due to Less Manpower availability at Division Level Non-adequacy of estimates up to the requisite standards Concurrent responsibilities of the division office	All the vacant posts (both Technical & Non-technical) at divisional office level shall be filled on topmost priority. Fixing the time bound responsibility punishments in case of delayed compliance
C	Problems in Stage 3		
01)	Delay in deciding priority of works as per availability of funds	Lesser Fund- More Works Political Interference Burden of maintaining regional balance	Allocation of Separate, assured and sufficient funds in the annual state budget
02)	Delay in giving Administrative Approval	Lesser Fund- More Works Administrative Approval on the basis of availability of funds Pre-Existing concurrent workloads of the personnel who are members of District Level Committee Non-adequacy of estimates up to the requisite standards	Fixing the time bound responsibility Provision of punishments in case of delayed compliance or non-compliance Separate & dedicated agency to monitor JYS Campaign in Collector's office
D	Problems in Stage 4		
01)	Improper Grouping (or Clustering) of Works	No guidelines restricting the no. of works per cluster Indirect interference of contractors	Fixing of Minimum and Maximum limits with respect to Cost and Number of JYS works per cluster
02)	Delay in preparation of DTP	Lesser Manpower, concentrated load at a certain point of time	Fill the vacant posts Fixing the time bound responsibility
03)	Delay in Approval of DTP	Lesser Manpower, concentrated load at a certain point of time	Fill the vacant posts Fixing the time bound responsibility
04)	Delay in Uploading of Tender	Lesser Manpower, concentrated load at a certain point of time	Assure high speed internet connectivity for the person who is doing uploading of tender Fill the vacant posts Fixing the time bound responsibility
05)	Delay in Flashing of Tender	Unforeseen reasons like Restrictions due to Model Code of Conduct with respect to Elections	Plan your work schedule considering the most likely dates of announcement of Model Code of Conduct with respect to Elections Fixing the time bound responsibility
E	Problems in Stage 5		

01)	Method of submission of EMD	Submission of EMD in terms of DD	Provision for EMD submission through online transactions only
02)	Traditional Tendering Problems	Formation of Ring of the contractors outside the tendering process Submission of Too Low or to high tender offers	Strict punishment provisions in case of any malpractice
F	Problems in Stage 6		
01)	Delay in Tender Scrutiny & Assessment	Lesser Manpower, concentrated load at a certain point of time Non-uploading of necessary data or required documents and uploading of unnecessary data while submitting the tender. This increases the time required for scrutiny. Indirect Political Interference	Fixing the time bound responsibility Modifications in the document submission portal while submitting the e-tender to avoid unwanted or unnecessary document uploading
02)	Delay in Preparation of work wise list of Bidders	Lesser Manpower, concentrated load at a certain point of time Indirect Political Interference	All the vacant posts (both Technical & Non-technical) at divisional office level shall be filled on topmost priority.
03)	Delay in Approval to List of Bidders by Superintending Engineer	Lesser Manpower, concentrated load at a certain point of time Pre-Existing concurrent workloads of the office of Superintending Engineer	This step can be deleted or avoided for faster decision making by fixing responsibility towards the Executive Engineer for any irregularity thereof.
04)	Delay in Approval to List of Bidders by District Level JYS Committee	Pre-Existing concurrent workloads of the personnel who are members of District Level Committee	This step can be deleted or avoided for faster decision making by fixing responsibility towards the Executive Engineer for any irregularity thereof.
05)	Delay in Issuance of Letter of Intent to the successful eligible bidder	Lesser Manpower, concentrated load at a certain point of time Indirect Political Interference	Fixing the time bound responsibility Provision of punishments in case of delayed compliance or non-compliance Communications through e-mails shall be encouraged
06)	Delay in submission of security deposit by successful eligible bidder	Unforeseen reasons related to Bank Non-availability of funds to submit security deposit	Allow e-transaction option for submitting Security deposit
07)	Delay in Issuance of work order	Lesser Manpower, concentrated load at a certain point of time Indirect Political Interference Delay in submission of Security Deposit by the successful eligible bidder	Fixing the time bound responsibility Provision of punishments in case of delayed compliance or non-compliance Communications through e-mails shall be encouraged to save the time
G	Problems in Stage 7		
01)	Delay in giving lineout	Lesser Technical Manpower at Subdivision Level Request for shifting location of proposed works	Fill the vacant posts (especially technical) Fixing the time bound responsibility
02)	Site Specific Problems	Objections of adjoining farmers Access problem to reach work location	Obtain necessary NOCs at the time of site survey Provision of strict actions against persons obstructing
H	Problem in overall JYS Campaign System as a Whole		
01)	Lesser budget More Work planning	Lesser budget allocation as compared to the planned works	Allocation of Separate, assured and sufficient funds in the annual state budget
02)	More works in a single cluster	No specific guidelines for grouping of works in a single cluster	Fixing of Minimum and Maximum limits with respect to Cost and Number of JYS works per cluster
03)	Irregular visits of the agencies involved for concurrent evaluation	Reluctance for additional work load	Fixing the time bound responsibility Provision of punishments in case of delayed compliance or non-compliance
04)	Monitoring Construction schedule in Water Scarce phase of year	The pre-construction activities are getting delayed such that the actual	Planning of yearly JYS plan such that all the preconstruction activities shall be ready before end of monsoon. So construction

		construction phase is getting started in the months of water scarcity.	activities at work location can be started immediately after the monsoon.
05)	Involvement of Non-Technical personnel to take decisions where Technical expertise is expected	Delayed decisions	Decentralised delegation of authorities Separate and dedicated team for managing JYS Works Involvement of experts and retired officials in the decision making process

Table 4: Problem Identification in JYS Campaign & Reasons for Problems

IX. CONCLUSION

The JYS campaign is running behind the schedule with respect to year wise plan. In spite of the great efforts are being initiated from the Government, still the projects have not been able to complete before the schedule they should have to. But these measures are not giving results in a large extent.

Project initiation, planning, formulation and other pre-construction activities involve many complex stages. Most of the activities under these stages can either be avoided or can be done concurrently so as to expedite the cycle time of JYS works.

The activities in Stage 1 & Stage 2 of project cycle shall be done well in advance. Any delay in these stages will result in overall delayed project cycle. All the activities upto Stage 6 shall be completed well in advance such that the contractor will get enough time to complete the works under his scope.

There is a great difference between the actual cycle times being followed by the case studies under consideration and the idealistic project cycle time. Idealistic Project Cycle time of CNB works is of 224 days (i.e. 32 weeks); but hardly any JYS works are being completed in this time frame. Instead, the works are not able to complete even after 2 years of their initiation.

Lack of accountability in pre-construction phases, lesser technical & non-technical staff division and subdivision offices, Inadequate fund allocation than required, concurrent or pre-existing day-to-day duties of the personnel involved in the JYS works are some of the common reasons why the targets of first two years have missed.

Cycle time optimization can be achieved by doing concurrent activities, fixing time bound responsibilities, filling vacant posts at division & sub division office levels. Use of computer based technologies will help in better project monitoring & control.

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REFERENCES

- [1] Al-Reshaid Khaled, Kartam Nabil, Tewari Narendra, Al-Bader Haya, "A project control process in pre-construction phases - Focus on effective methodology", Engineering, Construction and Architectural Management, Vol. 12, No. 4, pp. 351-372, 2005.
- [2] Chan Daniel W. M., Kumaraswamy M. M., "Comparative Study of Causes of Time Overruns in Hong Kong Construction Projects", International Journal of Project Management, Vol. 15, No. 1, pp. 55-63, 1997.

- [3] Chitkara, K.K. (2011), "Construction Project Management - Planning, Scheduling and Controlling", 2nd Edition, Tata McGraw Hills.
- [4] Dinesh Kumar R., "Causes and Effects of Delays in Indian Construction Projects", International Research Journal of Engineering and Technology (IRJET), Vol. 03, Issue 04, pp. 1831-1837, Apr-2016.
- [5] Ibeto Igbokwe, Justine Chinyeaka, "Issues and challenges in local government project monitoring and evaluation in Nigeria: The way forward", European Scientific Journal, Vol. 8, No.18, pp. 180-195
- [6] Odo, L.U., "Local government and the challenges of grassroots development in Nigeria", Review of Public Administration and Management, Vol. 3, No. 6, pp. 204-213, December-2014.
- [7] T.Subramani, P S Sruthi, M.Kavitha, "Causes of Cost Overrun in Construction", International Organization of Scientific Research (IOSR) Journal of Engineering (IOSRJEN), Vol. 04, Issue 06, pp. 01-07, June-2014.

Abbreviations:

AA	Administrative Approval
AE 1	Assistant Engineer Grade 1
CNB	Cement Nalla Bandh (or Bandhara)
CE	Chief Engineer
CSR	Corporate Social Responsibility
DTP	Draft Tender Paper
EE	Executive Engineer
GR	Government Resolution
GSDA	Groundwater Survey and Development Agency
GWT	Ground Water Table
IWMP	Integrated Watershed Management Programme
JYS	Jalyukta Shivar Campaign
K T Weir	Kolhapur Type Weir
MI Tank	Minor Irrigation Tank
MNREGA	Mahatma Gandhi National Rural Employment Guarantee Act
MoM	Minutes of Meeting
MRSAC	Maharashtra Remote Sensing Application Center
NOC	No Objection Certificate
PT	Percolation Tank
SAO	Sub Divisional Agricultural Officer
SDE	Sub Divisional Engineer
SDM	Sub Divisional Magistrate
SE	Superintending Engineer
SSI	Small Scale Irrigation

ST	Storage Tank
TCM	Thousand Cubic Meter
TS / TA	Technical Sanction / Technical Approval
WCD	Water Conservation Department
WRD	Water Resources Department
ZP	Zilla Parishad

