

SOCIO-CULTURAL PERSPECTIVES FOR POST DISASTER SOCIAL INFRASTRUCTURE RESTORATION MANAGEMENT IN INDIA

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Social infrastructure restoration after natural disasters in India is a recurring challenge. Often natural disasters like cyclones, storms and floods strike India causing irreplaceable damages to different infrastructures and assets. The social infrastructures, such as schools, houses and community centres particularly in not so developed areas are observed to be worst hit. Restoration of such assets takes long time despite the availability of various measures such as availability of finances, work forces and construction and restoration guidelines. Therefore, the objectives of this investigation are to examine the restoration management challenges of the disaster hit social infrastructures; and to provide a theoretical socio-cultural perspective to enhance efficiency of the restoration management process. Using three Community Development Blocks of Odisha state in India as the case study area, a survey was conducted among the stakeholders to ascertain the influential causes that hamper restoration. Besides, the stakeholders engagement and interaction and their influence on the success of the restoration process were examined. Findings suggest that unavailability of resources (finance, materials and equipment) in time, influence of local political and bureaucratic hierarchy, and non-effective or marginal involvement of appropriate stakeholders are the major impediments in the restoration process. However, general provision of finance; materials, equipment, and availability of human resources do not necessarily ensure smooth and efficient restoration process. Concurrently, it is also revealed that projects where deliberative constructive engagement and trade-offs among the various stakeholders have occurred are found to be more successful. Therefore, it is advocated that an active and constructive engagement among the relevant actors would essentially generate the dynamics and cohesion that would essentially enhance the efficacy of the restoration management of the disaster hit social infrastructures.

Keywords: Constructive engagement, Disaster, Infrastructure, Restoration, Socio-cultural, Stakeholders

1. INTRODUCTION

Natural disasters are recurrent challenges in India, particularly in the Eastern region. Storms, cyclone and floods occur almost every year and most of the coastal region along the Bay of Bengal used to get engulfed by them. Consequently, large scale damages are experienced regularly, particularly in the rural areas of the region. Experiences suggest that social infrastructures, such as schools, houses (made of mud walls, thatch or asbestos roofs) and community centres particularly in rural or not so developed urban areas are found to be worst affected. Restoration of such assets poses irrepressible challenge. The restoration works often observed to take long time despite

the availability of various measures such as availability of finances, work forces, technology, construction methods and restoration guidelines from the government, philanthropic organizations and willing sponsors. Some of the reasons of slow restoration were observed to be lack of appropriate planning, lack of preparedness, top down centralized restoration work management system, and lack of stakeholders' engagement and ownership apart from bureaucratic bottlenecks and iniquitous interests from certain section of the stakeholders. However, it is seen that certain projects have found to be successfully completed in time amidst the various challenges. Therefore, the objectives of this investigation are to examine the restoration management challenges of the disaster hit social infrastructures; and to provide a theoretical socio-cultural perspective to enhance efficiency of the restoration management process. Using three Community Development Blocks of Odisha state in India as the case study area, a survey was conducted among the stakeholders to ascertain the influential causes that hamper restoration. Besides, the stakeholders engagement and interaction and their influence on the success of the restoration process were examined. The study revealed that unavailability of resources (finance, materials and equipment) in time, interference of local political leaders and lack of adequate and committed support from the bureaucratic hierarchy, and non-effective or marginal engagement of appropriate stakeholders are the major impediments in the restoration process, although normal provision of finance; materials, equipment, and availability of human resources do not necessarily ensure smooth and efficient restoration process.. However, it is also revealed that projects where stakeholders were effectively involved through deliberative constructive engagement, and reached compromises through trade-offs and concessions are found to be more successful.

2. LITERATURE REVIEW

Storms, cyclone, floods are among the most impart climate change engendered natural disaster phenomena, which cause large scale damages to infrastructure (Abi-Samra and Entriken, 2010; Blake, Davison, Greenwood, Neal, 2015). The variability of such events is expected to further increase (Hueging, Haas, Born, Jacob, and Pinto, 2013), which calls for preparedness and also planning to recover and restore the damaged infrastructure back to normalcy (Chapman 2015).

Among the many challenges, restoration and redevelopment of infrastructure are the most important challenges in recovering from a disaster (IECD, n.d; Olshansky, 2005). While the importance is given to the economic, environmental and technical implication in planning and implementation of the restoration works in the post disaster periods, usually social considerations are undermined. Often, resource allocation is considered as the prime restoration policy, and adopted in general in the post disaster period (Tatano, Homma, Okada, Tsuchiya, 2004). However, arguments have emerged that consideration needs to be given to social vulnerability, and the different social solidarities and stakeholders should be given due importance (Lucas and Pangbourne, 2012; Chapman 2015). Although, it is a very complex issue, yet, according to some scholars' sustainability and success can only be achieved if people and stakeholders

play a key role in the governance and management process (Greene and Wegener, 1997; Chapman, 2015).

Literature suggests that post-disaster restoration has been a subject of significant investigation particularly in developing countries, which includes issues relating to disaster management process, restoration management, preparedness and recovery, social, economic and environmental implications (Haige, 2006). However, the issues relating to stakeholders engagement and community participation in restoration projects have been undermined. Although, the role of stakeholders' constructive engagement has already been established in sustainable urban development, planning and management of transportation systems, reengineering of infrastructure to name a few (Kim and Dikey, 2006; Hays, 2007; Taylor 2007; Beck, Thompson, Ney, Gyawali, and Jeffrey, 2011), due to lack of appropriate thrust on the process, it is observed to be undermined particularly in India, which thus requires further investigation.

3. METHODS

3.1 Study Area and Project Profiles

Three community development blocks such as Balipatna (Block 1) and Baliana (Block 2) of Khurda district and Kishorenagar block (Block 3) of Angul district of Odisha state of India were taken as the case study areas. The investigation was conducted by considering three types of community development projects, such as primary schools, community centres and government aided residential houses in the three mentioned Community Development Blocks of Odisha state in India. Table 1 presents the profile of projects in the study areas. The projects constitute restoration and construction of 144 partially damaged primary schools, 31 new school buildings, 110 government aided houses and 43 community centres. The estimated durations of the projects vary between 3 and 6 months for restoration of schools, 12-18 months for construction of new school buildings, 6-12 month for community centres and government aided houses respectively. The respective Block Development Offices were the executive agencies. The projects were mostly funded by the Government; however some projects were sponsored by public/private companies or philanthropic organisations through the Government.

Table 1 Profile of projects

Type of projects	Project characteristics			Total	Estimated project cost (USD) range	Estimated project duration (months)	Contractor
	Block 1	Block 2	Block 3				
Schools Restoration projects	78	46	20	144	1000-2500	3- 6	Selected from community
Schools new construction	15	10	6	31	5500	12-18	Selected from community
Community centres	19	14	10	43	1000-2500	6-12	Selected from community

Government aided houses	50	35	25	110	1000- 1200	6-12	Beneficiary
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3.2 Survey, Data and Analysis

Project profiles and status of the projects were collected from archival records of the executive agencies located at the block level and physical survey. A stakeholder’s survey was conducted to collect primary data by using pretested questionnaires to ascertain the influential causes that hamper restoration. The survey was administered by employing systematic random sampling process. The samples include contractors, supervising engineers, administrative personnel, local political leaders, beneficiaries of the houses, school teachers of the damaged schools, NGOs officials, and common citizens of the villages. The questionnaire include parameters relating to awareness about the projects, finance availability, cost of projects, contractor selection process, estimated and actual duration of projects, issues relating to materials, equipment, skill and supervision of projects, execution and project management issues, and general challenges encountered in the projects. A sample size of totalling to 310 (120 from Block 1, 105 from Block 2 and 85 from Block 3) was used. Besides, informal meetings were conducted by inviting stakeholders and engaging them in discussions to understand the stakeholders’ engagement and participation in restoration projects and their influence thereof on the success of the restoration process. The stakeholders’ discussion and engagement was conducted through semi-structure interviews and informal group discussions.

Quantitative descriptive statistics analysis and Cronbach’s alpha test of the data collected were conducted to observe the reliability of the data. Perception index based on average index method and significance test (t test for $\alpha \leq 0.05$) for 95% confidence level were conducted to observe the relationship among the variables. Perception index was calculated by considering the weighted average of the perceptions of stakeholders assigned by the respondents on a particular variable in a scale ranging between 0 and 1. The formula used for calculating perception index is given in Equation (Eq.1).

$$\text{Perception index} = \text{PI} = \frac{\sum w x_i}{\sum x_i} \dots\dots\dots \text{Eq. (1)}$$

x_i = number of respondents assigning a particular index value

w_i = index values assigned by respondents.

Significance student (t test) was conducted between failure of projects to complete within the estimated duration and influential independent variables (stakeholders engagement, poor contractor choice, bureaucratic bottlenecks, interference of political leaders, timely unavailability of finance, materials and equipment to understand their contribution to the impediments in completion of the projects. Similarly, significance test was also conducted between completion of projects and the influential variables to examine which variables conclusively contribute to the successful completion of the projects in time. While conducting t tests for failure of projects to complete, individual category of projects were considered; however in case of the successful completion of

projects, projects completed in aggregate were considered as the number of completed projects were found to be relatively less and assessment on each category may not provide significant results. The relationships between incomplete projects and the influential independent variables were established based on the level of completion of projects and index values assigned to the variables by the respondents during the survey. However, while establishing the relationship between completed projects and the influential variables, actual duration of projects and index values assigned to the various variables by the respondents were considered. Besides, qualitative analysis of the information gathered from the meetings, informal interviews and group discussion was done to extract the excerpt of stakeholders' views and opinions.

4. RESULTS, FINDINGS AND DISCUSSIONS

4.1 Completion Rate of Projects

Table 2 presents the status of the completion of projects within their estimated period. It revealed that about 16.67% of the school restoration and repair projects, 19.35% of the new school buildings, 25.58% of the community centre projects and 26.36% government aided houses were completed leading to an average successful completion rate of 21.54% of the restoration projects. About 50.62% of the total number of projects were less than half complete which constitute about 54.84% of school projects (both repair and new) and 53.49% of community centres. However, only 40.0% of the government houses were less than half complete. Contrary to this, overall the construction or restoration works of about 27.84% of the total number of projects was completed from a level of 51.0% up to 99.0%. This includes 33.64% of government aided houses, 20.93% of community centres, 25.81% of new school buildings and 29.17% of restoration of school projects. Thus, it is found that the completion rate of the projects is very meagre and school projects (for both repair and new) were the most suffers followed by community centres. However, the government aided houses have a better completion rate.

Table 2 Status of projects within estimated period

Projects	Total number	Status of projects within the estimated period		
		Complete	<50% complete	51%-99% complete
Schools (restoration and repair)	144	24 (16.67%)	78 (54.17%)	42 (29.17%)
Schools (new building replacing old damaged buildings)	31	6 (19.35%)	17 (54.84%)	8 (25.81%)
Community centres	43	11 (25.58%)	23 (53.49%)	9 (20.93%)
Government aided houses	110	29 (26.36%)	44 (40.00%)	39 (33.64%)
Total	328	68 (21.54%)	162(50.62%)	98 (27.84%)

4.2 People's Perception on the Influence of Variables on the Impediments of the Projects

A set of variables, which cause disruptions and delay in the projects was emanated from the discussions with the stakeholders. The variables include lack of planning/ poor planning, cost of projects, under estimation of the projects compared to market rates, unavailability of finance, timely unavailability of fund for construction, lack of adequate materials, lack of appropriate equipment, lack of human resources, lack of skill, choice or appointment of contractors, inability of beneficiaries (in case of houses), bureaucratic bottlenecks and lack of support from executive agencies, interference of local leaders, conflict between community, contractor and executive agencies, lack of beneficiary (individual or community benefited from the projects) involvement, and lack of other stakeholders engagement. The variables and perception indices are presented in Table 3. The results suggest that lack of involvement of beneficiaries in the projects is the most influential variable that impede the projects followed by lack of stakeholders' engagement, conflict among the community, contractor and executive agencies, timely unavailability of fund for construction and bureaucratic bottlenecks and lack of support from the executive agencies. Cost of projects, underestimation of projects, choice of contractors, inability of contractors, and interference from local leaders influence the delay of projects moderately. However, lack of planning, unavailability of finance, lack of adequate materials, lack of appropriate equipment and lack of human resources and skill are the least influential variables.

Table 3 Influence of variables on the impediments of restoration works

Variables	Impediments in restoration works (Perception Index)				Influence
	Schools	Community centres	Government aided houses	Average	
Lack of planning/ poor planning	0.34	0.25	0.30	0.30	Less influential
Cost of projects	0.56	0.42	0.65	0.54	Moderately influential
Under estimation of projects	0.65	0.52	0.73	0.63	Moderately influential
Unavailability of finance	0.24	0.45	0.54	0.41	Less influential
Timely Unavailability of finance	0.72	0.75	0.74	0.74	Highly influential
Lack of adequate materials	0.43	0.45	0.48	0.45	Less influential
Lack of appropriate equipment	0.26	0.34	0.32	0.31	Less influential
Lack of human resources	0.44	0.42	0.38	0.38	Less influential
Lack of skill	0.32	0.37	0.30	0.33	Less influential
Choice/ appointment of contractor	0.78	0.56	0.52	0.62	Moderately influential

Contractors/ beneficiary inability	0.72	0.68	0.62	0.67	Moderately influential
Bureaucratic bottlenecks and lack of support from executive agency	0.76	0.75	0.68	0.73	Highly influential
Intervention from local leaders	0.67	0.78	0.42	0.62	Moderately influential
Conflict between community, contractor and executive agencies	0.80	0.82	0.62	0.75	Highly influential
Lack of involvement of beneficiary	0.82	0.84	0.66	0.77	Most influential
Lack of stakeholders engagement	0.85	0.78	0.64	0.76	Highly influential

($PI < 0.5$ less influential; $0.5 < PI < 0.7$ moderately influential; $PI > 0.7$ most influential)

Beside, discussions with the stakeholders through informal meetings and group discussions revealed that beneficiaries form the major stakeholder of the projects. In case of schools, the school management at the community level, parents of students and teachers; and communities for community centres are the direct and indirect stakeholders; and in case of houses, the owner of the houses are the direct beneficiaries and have direct stake on the houses. However, as obtained from the discussion it is revealed that the role of beneficiaries is undermined. As some community level beneficiaries puts it

“.....the beneficiaries irrespective of the type of projects were not taken in to confidence while appointing the contractor, in aspects with regards to planning, layout, and execution of projects. So many a times conflicts between the contractor, community and executive agencies occur leading to delay or halting of construction”.

Other stakeholders like local leaders, competing contractors, community, transporters, material and equipment suppliers, and community level organizations engaged in social development sector are also found to be rarely consulted formally or informally in the planning and execution of projects. As some community level leaders informed that *“.....there have rarely been any formal stakeholders’ engagements among the contactors, local leaders, executive agencies and communities in any aspect of the works until any conflicts arise. The executive agencies, officials and contractors do the works according to their wishes, choices and preferences”.* This causes indifference, antagonism and conflicts.

Furthermore, according to community, the local leaders also cause hindrances in the project execution. They try for force their way in the decision making and execution

process. If the location of projects, choice of contractors, or suppliers, are not according to their demands or wishes, and also if the officials and contractors do not give them proper importance then they create obstacles in the realisation of the projects. As a group of people from a community asserted that

“.....elected local leaders create obstacles in the projects if the project is not executed or contractors or suppliers are not selected according their wishes. They try to influence the officials, suppliers and contractors to delay in financing the projects, supply materials and equipment and construct in time, and also sometimes instigate conflict among the people having competing interests”.

Besides, according to a school teacher *“...the contractor used low quality materials and poor specifications to construct the building to get higher profits, which created conflict among the community, school management and the contractor, thus stopping the work for a long time”.*

Thus, conflict arises among the contractor, beneficiary and community because of the ulterior motives of the contractors for higher profit which lead to low quality of construction. According to some people, the competing contractors sometimes play a crucial role in instigating the conflict too.

However, on the contrary there have been evidences of timely completion of projects, where the beneficiary and other stakeholders were engaged constructively. For example, in the words of a beneficiary of a house

“.... My family and I contributed our labour and resources and collaborated with the officials in the construction of the house. The local political representative of the ward (an administrative unit) helped in the allocation and execution of the work. We could complete the work within a year”.

Similarly, according to a school teacher, which was corroborated by the village level leaders *“... the school management and community leaders were consulted in the execution of the project; the teachers and community took active interest in the work; and the contractor requested for cooperation from the people. With the active supervision of the engineers, administrative officials and school management, the building was completed more or less within the stipulated time of about one year”.*

Thus, the views of people and stakeholders corroborate the findings of the survey that lack of stakeholders and beneficiary engagement cause delay in projects.

So, significance test (t test for $\alpha \leq 0.05$) was conducted to establish the relationship between the dependent variables (failure of projects to complete in time and project success in time) and important independent variables, which emanated from the qualitative discussions and perception indices analyses. Tables 4 and 5 and present the results of the significance tests. The results revealed that independent variables such as lack of stakeholders participation and community engagement, poor contractor choice, bureaucratic bottlenecks, interference of local political leaders, timely unavailability of

finance, timely unavailability of materials and timely unavailability of equipment have strong bearing on the failure of projects to complete in time (both one tailed and two tailed p values ≤ 0.05 for $\alpha \leq 0.05$). The test results (Table 5) also revealed that a strong stakeholder's participation and community engagement in projects contribute to the successful completion of projects time (both one tailed and two tailed p values ≤ 0.05 for $\alpha \leq 0.05$). However, as indicated from the p values in Table 5 (two tailed p values are ≥ 0.05 for $\alpha \leq 0.05$ in all cases although in some cases one tailed p values are ≤ 0.05) the availability of appropriate choice of contractors, bureaucratic support, local political leaders support, availability of finance, availability of equipment, availability of materials do not necessarily contribute to the successful completion of the projects.

Table 4 Relationship between failure of project completion and project variables

Variables	Type of projects	t- Test results (T values and p values at $\alpha \leq 0.05$), *1 tailed and ** 2 tailed						
		Lack of stakeholder participation and Community engagement	Poor contractor choice	Bureaucratic bottlenecks	Local political interference	Timely Unavailability finance	Timely Unavailability materials	Timely Unavailability equipment
Failure of Project completion	School (restoration) (df= 119)	0.0008* 0.001** (3.2)	0.0001* 0.0002** (3.13)	0.000025* 0.00005** (4.2)	0.000001* 0.000002** (4.92)	0.0027* 0.0054** (2.83)	0.0015* 0.0031** (3.03)	0.000002* 0.000005** (4.78)
	Schools (New) (df=24)	0.00001* 0.00002** (5.2)	0.0016* 0.0033** (3.26)	0.000003* 0.000006** (5.76)	0.0088* 0.0017** (2.54)	0.0020* 0.0041** (3.17)	0.0002* 0.0004** (4.08)	0.00045* 0.0009** (3.77)
	Community centres (df=31)	0.00005* 0.0001** (4.43)	0.0019* 0.0038** (3.12)	0.0048* 0.0096** (2.76)	0.0058* 0.0116** (2.68)	0.0014* 0.0028** (3.24)	0.00001* 0.00003** (4.83)	0.000005* 0.00001** (5.21)
	Government aided houses (df=82)	0.000002* 0.000004** (4.9)	0.00057* 0.00114** (3.37)	0.0034* 0.0068** (2.77)	0.0056* 0.0112** (2.59)	0.00002* 0.00005** (4.28)	0.00002* 0.00004** (4.33)	0.000002* 0.000004** (4.92)

(Note: Numbers in brackets indicate T Values)

Table 5 Relationship between failure of project completion and project variables

Variables	Type of projects	t- Test results (T values and p values at $\alpha \leq 0.05$), *1 tailed and ** 2 tailed						
		Strong Stakeholders participation and Community engagement	Appropriate choice of contractor	Bureaucratic support	Local political support	Availability of finance	Availability of materials	Availability of Equipment
Project success	All projects (df=67)	0.0*	0.04*	0.09*	0.0251*	0.045*	0.073*	0.061*
		0.0** (6.7)	0.08** (1.76)	0.18** (1.33)	0.052** (1.98)	0.090** (1.72)	0.146** (1.47)	0.123** (1.56)

(Note: Numbers in brackets indicate T Values)

A further discussion with the stakeholders of the successful projects revealed that communities, beneficiaries like school management including teachers, villagers or direct beneficiaries had a significant say in the project starting from the initiation, planning, contractor selection, execution and supervision of the projects. Besides, the representatives from the community and beneficiaries made liaisons with the executive agencies, local leaders and contractor for smooth progress of the construction work. However, while the engagements were occurred, there have never been consensus and all the stakeholders attempted to ensure their demands to be fulfilled. However, at the end compromises were attained and concessions were made like quality of work was achieved, construction completed in time and contractor got their profits; consequently each one was satisfied with the results they got. Such constructive engagements of the stakeholders have resulted in minimising or resolving conflict if any, kept the executive agencies and supervisor on their toes, ensured the contractors to work at the desired speed and according to the specifications, which resulted to successful completion of projects in time with appropriate quality. Thus, in theory, as suggested by Beck et al. (2011) and proposed by cultural theory, the constructive engagement among the stakeholders could bring out trade-offs, compromises and concessions instead of making efforts for consensus (which usually is aimed at) that would aid in successful and timely completion of projects (Thompson, Rayner and Ney, 1998; Verweij and Thompson, 2006; Beck et al., 2011). Moreover, the findings of this study also provide evidence that if due consideration to socio-cultural perspectives of the communities is given and adequate constructive stakeholders engagement is encouraged for restoration and development social infrastructure projects, improvement in the timely and successful completion rate of projects can be attained. Such considerations also strengthen the continuing arguments in favour of higher community and stakeholders' participation in decision making and execution of various infrastructure projects.

5. CONCLUSIONS

Restoration of social infrastructure in disaster hit areas of India, particularly in rural areas of Odisha state is a challenge. Restoration projects usually exceed the stipulated estimated time to complete. As found out from this investigation only 21.54% of the projects were observed to be completed within the estimated time. Therefore, the investigation examined the restoration management challenges of the disaster hit social infrastructures; and offered a theoretical socio-cultural perspective to enhance efficiency of the restoration management process. A case study approach with the aid of survey research method and qualitative discussions with stakeholders were used for this investigation. The study revealed that lack of stakeholder's engagement; poor contractor choice, bureaucratic bottlenecks, conflict among stakeholders, and timely unavailability of finance, materials, equipment, and local political interference are the major reasons which impede the successful completion of the projects. However, an examination of successful projects suggests that strong stakeholder's engagement and community participation is the single most reason which can lead to success of the

projects. In fact even availability of bureaucratic support, local political support, appropriate contractor choice and availability of finance, materials and equipment will not ensure successful project completion, if stakeholders, community and beneficiaries are not actively engaged and taken into confidence. Therefore, a constructive engagement and participation of the stakeholders including the beneficiaries that endanger resolution of conflicts and compromises will result successful completion of projects in time with appropriate quality.

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