

Community engagement in engineering education

Delwar Akbar

CEM, CQUniversity, Rockhampton, Australia
Email: d.akbar@cqu.edu.au

Mohammad Rasul

CEM, CQUniversity, Rockhampton, Australia
Email: m.rasul@cqu.edu.au

***Abstract:** Public infrastructure development projects such as dams, weirs and bridge construction – all require community engagement at least in planning and construction stages of the projects. All such projects need to do a mandatory or a voluntary environmental impact assessment (EIA) before resuming the construction activities. Engineers play a vital role in delivering these projects and they need to engage the community during the project planning, design and construction period, even sometimes during the project operation period. Hence they need to learn the principles and processes of community engagement through to a proper training and/or education course at post graduate or undergraduate engineering education. The purpose of this paper is to give an outline of key principles and processes of community engagement and to identify the importance of community engagement contents into the engineering curriculum.*

Introduction

As time has marched on, engineering graduates gradually start working as a project manager in public project management at different stages of the project such as in planning, construction, operation and maintenance. Engineering projects such as dams, weirs construction and bridge construction, mine development, gas pipe line installations, new road or highway development, new power station development, wind power generation, new railway track installation, airport building and tunnel construction – all require community engagement at least in planning and construction stages of the projects (Akbar et al., 2011). Engineers play the vital role in delivering these projects. All such projects need to do mandatory or voluntary environmental impact assessment (EIA) to resume project construction. Also most public projects aim to deliver cumulative benefits to the community, hence it is imperative to engage the community in a manner that they can count their voice and knowledge to the project planning and design, otherwise the project may not deliver the outcomes that are being sought by the community.

As the engineers are managing the most public infrastructure projects, they need to learn the principles and processes of community engagement. The purpose of this paper is to give an outline of key principles and processes of community engagement and to identify the importance of community engagement contents into the engineering curriculum.

Community Engagement

The word ‘community’ is a broad term used to define groups of people, whether they are stakeholders or a group in a certain geographic location (Adomokai & Sheate, 2004). So a community includes both a geographical and a social component, and its size varying over geographic scales and social bonds. The word community also suggests a common bond between individuals, groups or sections of the population. A community can be characterised by their ethnicity, gender, religion, or a mutually shared values.

Community engagement involves communicating with a community group and facilitating to empower community members' interests. Community engagement therefore creates a demand to share the development issues and works with the government and the industries (Johnston, 2007).

Community engagement can ensure the needs of those directly affected by any project development. In most cases, community input has been found to improve the final outcome by mitigating undesirable effects, or assisting in finding a compromise between competing interests. Hamstead, Balwin and O'Keefe (2008, p. 142) identified the following roles of community engagement in infrastructure project planning and development:

- inform about process of resource or project development,
- build capacity and awareness,
- gain local knowledge,
- understand values and concerns,
- seek alternatives and solutions,
- improve the decision or outcome,
- gain acceptance of the decision,
- build long term relationships, and
- resolve or reduce conflict of interests.

Principles of Community Engagement

Community engagement should be based on principles which drive community engagement in a systematic way within project planning and management processes. Principles of community engagement can differ from one project to another and from one perspective to another. Nevertheless, DPI, (2008) and Hamstead, Baldwin and O'Keefe (2008) identified the following nine general principles of community engagement that can be used in public works related projects.

Principle 1 - Gaining and using local knowledge: To gain information about the resource, its use, and realistic options for its consumption is very important in project planning. That is why we need to explore local knowledge, and this includes a community profile and aspirations as well as resource availability.

Principle 2 - Commitment: A commitment to the community is necessary during the early stage of community engagement. Commitment should be linked to the vision of the project or programme.

Principle 3 - Integrity: Integrity occurs when engagement is conducted in a manner that fosters mutual respect and trust. .

Principle 4 - Collaboration: This is related with the above principle of integrity. Collaboration can occur between the project proponents and the community if community rights, cultural beliefs, values and interests within the project area are recognised, and such collaboration enhances mutual benefits.

Principle 5 - Transparency: When community concerns are responded in a timely, open and effective manner, transparency is enhanced. Similarly, open sharing of information contributes to trust in both the immediate and wider communities.

Principle 6 - Inclusiveness: This is achieved when a diverse representation of community and broad participation is encouraged and supported by appropriate participation opportunities.

Principle 7 - Equity: Allowing the community to be involved in identifying and assessing options enables values to be considered and provides greater ownership of the outcomes, which is considered as equity.

Principle 8 - Good communication: Good communication is necessary for effective community participation. A two way listening and talking and valuing the outcomes of the talk enhance good and effective communication.

Principle 9 - Trust building: The trust building is an important aim and should also be a final outcome of the community engagement process. Building trust has to be established through information dissemination on how community feedback contributes to decision making.

Community Engagement Plan (CEP)

Based on the above principles, an engineer or a project manager needs to prepare a community engagement plan (CEP) at the very beginning of the project. A CEP should include a description of all engagement activities that clearly describes how, when and what engagement will occur with the community under different stages of the project development. The Department of Primary Industries (DPI) (2008) has published six key steps to developing and implementing a CEP:

Step 1 - Identify the community affected by the project: This is the first task to identify directly affected community and then to identify flow on impacts on the associated communities (DPI, 2008).

Step 2 - Identify community attitudes and expectations: Identifying community attitude and expectation helps to share understanding between the projects proponents and the community. Community attitudes and expectations can be identified through a range of techniques, such as having information evenings, meetings, developing community opinion surveys or holding focus groups (DPI, 2008). Engineers and projects managers could also consider techniques such as feedback forms, hotlines, websites or community forums or workshops.

Step 3 - Assess the level of impact: After the community has been identified, an assessment of the impact that the project activities have on the community will be helpful in identifying when and how to engage them. The level of interaction will vary depending on the community's interests associated with the activities. It is important to identify the changes first, and then to assess what impact and how much impact can occur within its areas/communities of influence.

Step 4 - Decide in what the community can be engaged: The size, diversity and local conditions of projects will inevitably contribute to different opportunities for community input and involvement (DPI, 2008). Early identification of what aspects of the project the community can and cannot have input into, can also assist in choosing the most appropriate type of engagement method around that issue and help to manage expectations (DPI, 2008).

Step 5 - Determine the levels of engagement: Community engagement varies depending on the stages of project development. Community engagement during the project concept stage may include identifying potential local support, developing different consultation options, exploring alternatives and identifying key issues, while in the construction phase, it involves exploring opportunities of using local resources. During the operational phase, community engagement may relate to activities such as reporting, consulting and disclosure of information, environmental monitoring and grievance and feedback processes (DPI, 2008).

Step 6 - Enact community engagement techniques: There are a vast number of techniques available for engaging with a community. Examples include providing written material such as letters, information sheets and newsletters, or undertaking face-to-face interactions such as meetings, workshops, events and committees. Some of these techniques can be used across the community engagement spectrum at various levels, to inform, consult, involve, collaborate and empower (DPI, 2008; Goulding, 2009).

In community engagement, it is important to be as inclusive as possible to ensure that relevant issues are identified. Project managers should attempt to identify marginalised groups who may not necessarily come forward voluntarily, plus any silent majority whose perspective may be overlooked due to vocal community groups or individuals (DPI, 2008). On the other hand, it is not always practical to engage all identified community groups with the same level of intensity. If someone follows the above steps of a CEP can utilize time and resources efficiently.

Community Engagement in Project Planning and Decision Making

Community participation in project planning and decision making can be grouped into seven categories, graded from hardly any participation to a more meaningful form of participation (Pretty, 1998, p.234):

- Manipulative or passive participation - Participation is simply a pre-plotted decision that will be mandated by this process. Usually an external professional or consultant design such participation plan as well as anticipated outcome of participation.
- Participation by consultation – This is more or less likely a one kind of passive participation. Process does not concede any share in decision-making power, and professionals are under no obligation to take on board people’s views.
- Bought participation - People participate in return for food, cash or other material incentives. Local people have no stake in prolonging technologies or practices when the incentives end.
- Functional participation - Participation seen by external agencies as a means to achieve project goals, especially reduced costs. People may participate by forming groups to meet predetermined objectives related to the project.
- Interactive participation - People participate in joint analysis, development of action plans and formulation or strengthening of local groups or institutions. Learning methodologies used to seek multiple perspectives, and groups determine how available resources are used.
- Self-mobilisation and self-reliance - People participate by taking initiatives independently of external institutions to change systems. They develop contacts with external institutions for resources and technical advice they need, but retain control over how resources are used.

Choosing type of participation depends on the project manager, timeline of the project, type of project and the government’s intervention. However, a high level of participation is desirable to all kind of public infrastructure projects.

Challenges and Benefits of Community Engagement in Engineering Project Management

There is a risk of embracing community engagement and a capacity extension role, but attempting it with the assumptions and principles of service delivery and technical assistance. Structures and processes that mediate communication between the project proponents and communities are crucial to engagement. Most engineering and resource companies and government have yet to develop many of the principles that provide a context for community engagement structures.

There is a tendency for government agencies to limit the objective of community engagement to enhanced listening. It is easy for engagement to reinforce the perception that government has responsibility for community improvement. Engagement can also be seen simply as a better means for communities to ‘tell’ government what their needs are and what government should do. Instead, true engagement is a dialogue incorporating not only what government and communities can do alone, but also how they can add value to each other. While government has ultimate responsibility for public outcomes, a truly enabling role involves government and communities in a relationship with mutual input to develop community outcomes.

Community engagement may create tension in project proponent or government’s relationship with the broader community. Community engagement also raises many other issues and questions such balance and contradiction between the legitimacy of formal leaders and community organisations, and informal leadership. Sometimes community engagement leads project proponent and governments facing a backlash of dissatisfaction in many communities. There are also risks involved in community engagement such as committing government to actions, over committing meagre resources, exposing

agency business to political leverage through community lobbying and possible political embarrassment.

A major benefit of community engagement is arguably an enhanced understanding of project components and their impacts. By building confidence among stakeholders in the appropriateness, fairness and security of water allocations and water planning procedures, a culture which values the efficient use of water resources is developed and enhanced. Minimising conflict over water allocations by directing community attention to sustainable uses including re-use and recycling, enhances acceptance of limits to water extraction, improved monitoring of water use, and compliance with water plans. Greater participation by stakeholders and by the general community in decisions affecting the common interest in not exceeding these limits results in a more equitable water plan.

Community Engagement Contents in Engineering Curriculum

Gossage (2011) found in a study of Latino-Hispanic engineering students in USA that the students who were engaged with community based project were more positive to their community development as well as to involving the community in their future project planning and management. However in Australia, in most tertiary institutions, there is no or limited content on community engagement in engineering project management courses. Many civil, mechanical, electrical, water and mining engineers need to manage the public or private infrastructure projects since the early stage of their career to the late stage but their academic understanding of community engagement is not clear. This is because of lack of community engagement content in undergraduate and post graduate engineering programs. Nonetheless, some post graduate programs, such as Integrated Water Resource Management (IWRM) program contains some limited contents of community engagement and conflict resolution but it is not compulsory for all students (Akbar et al., 2011).

Now these days, community engagement is an emerging area of study for most engineers because they need to manage large scale public projects with collaboration with the community. Also success of some projects depend on the input of local knowledge, so it is essential to the engineers to understand the local knowledge or information as to design the project in an innovative and cost effective fashion but not only for smooth operation of the project. Therefore from the pedagogic point of view, it is the time now for the engineering academics and professional to act to review the importance of community engagement content into the post-graduate and/or undergraduate curriculum as a core and/or optional subject of study.

Conclusion

Community engagement needs to be recognised by all engineering academics and professionals. The community view may not necessarily correspond to particular scientific views of the same issue but it provides an insight to the problems that may arise. It also can tell how to deal with these problems, especially dealing with the outcomes of large scale infrastructure projects. Moreover, community engagement helps manage group dynamics and facilitate effective participation, which is crucial in achieving a successful project outcome.

Engineers and projects managers should at least know the effective ways of engaging the communities and best practice elements of engagements. Partnerships and collaborative efforts are useful tools for engagement with communities. Community feels ownership and responsible through the engagement processes. Also in this democratic society in Australia, the communities have the right to know about the project before starting the project as well as they have the right to put their voice to the public project planning and design. So there is no way the engineering academics and the professionals can deny the necessity of a full or a half course development as a compulsory taught course at the postgraduate and/or undergraduate engineering education because the learning outcomes of such course will enormous and it will enhance the learners' engagement capability through to his/her life.

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