

An Innovative Model for Engagement of Rural Citizens/Community of Bangladesh with Climate Change

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Abstract: Citizens/community engagement (CE) is a “two-way interaction between the citizens and government(s) or the private sector that give citizens a stake in decision making, with the objective of improving development outcomes”. CE is about human development/human welfare with respect to education, food and health security, sustainability and climate change. This article proposes a new model encompassing some innovative programmes and projects with the aim of engaging rural community of Bangladesh (referred to here as CE) with climate change adaptation and mitigation, climate risks management (CRM) and climate resilient development (CRD) and low-carbon development (LCD). The proposed CE programme includes: (a) education of rural citizens; (b)-training of rural farmers on sustainable and climate-smart agriculture, climate-smart aquaculture practices and disaster management; and (c) generation of new job opportunities via climate-smart agriculture, aquaculture/fisheries, clean/green energy and carbon sink projects. The proposed CE has relevance with the newly globally agreed Sustainable Development Goals (SDGs). The CE programmes will be coordinated by the Upazila (Sub-district) Administration and relevant departments within the Upazila. It is envisaged that CE programmes and projects would reduce poverty, hunger and enhance economic, social and environmental growth and development in rural Bangladesh in a most sustainable way. To implement CE, five levels of engagement strategies would be adopted (inform, consult, involve, collaborate and empower citizens/community). The success of CE on targeted objectives/goals will be evaluated based on costs and time spent, benefits achieved, feedback received from participants via satisfactory survey results etc.

Keywords: Citizens/community engagement; Climate risk management; Climate resilient development; Low-carbon development; Bangladesh.

Introduction

Citizens/community engagement (CE) is a “two-way interaction between the citizens and government(s) or the private sector that give citizens a stake in decision-making processes, with the objective of improving development outcomes”. CE is about human development/human welfare with respect to education, food and health security, sustainability and climate change. CE can be achieved through consultation,

collaboration, participation and empowerment of citizens (McNeil, 2016). This article is aimed to engage rural community of Bangladesh with climate change adaptation and mitigation, climate risks management (CRM) and climate resilient development (CRD) and low-carbon development (LCD) as summarised in Box 1. Bangladesh is a globally climate risk “hot spot” (ranks #1 in the world). Climate change will cause significant challenges and problems in various sectors including climate-sensitive agriculture, aquaculture,

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fisheries, ecosystems and wetlands of Bangladesh, on which 2/3rds of people depend for their livelihood (Haroon and Kibria, 2017). Rural citizens in Bangladesh are poor and lack the capacity, capability or resources to adapt to climate change. To better prepare for and respond to the climate change, actions and investments are required (Tamma et al., 2016); one of the actions and investments is to engage citizens and community to face and adapt to climate change.

Lee et al. (2015) carried out first global assessment of factors underlying climate change awareness and risk perception, and surveyed 119 countries (representing 90% population). The research found that 40% adult population have never heard of climate change (of which 65% in developing countries including Bangladesh, India and Egypt). In fact, information on climate change (latest, science and evidence based) is not reaching to rural community in Bangladesh who are and will be most impacted due to climate change, since there is not much effort to convey such information in the most simplified form to rural community and an effective CE model is apparently lacking in Bangladesh. Therefore, an innovative CE model for Bangladesh is required which would raise awareness and educate community, build resilience and capacity of the rural community, help community to understand issues affecting them, and their livelihoods due to rise in temperatures, sea-level rise, ocean acidification and unpredictable extreme events (Wiseman and Williamson, 2009; Reidy et al., 2013; Kibria et al., 2016). The CE pathways proposed

in this article would reduce threats and risks posed by climate change on rural community of Bangladesh and ecosystems on which they depend for food, water, materials and livelihoods. Moreover, this would equip the rural people with tools and technologies required to adapt to and mitigate climate change risks and facilitate rural community towards low-cost, low-carbon development paths.

Goals, Targets and Objectives

The objectives of innovative CE model are to:

- Educate rural community including women, men, old, youth, unemployed, religious, marginalised, socially isolated, farmers/growers, fishermen, students, teachers, professionals and non-professionals people on climate change risks and climate resilient development and low-carbon development;
- Train up rural farmers on innovative and climate smart agriculture, and aquaculture practices and disaster mitigation; and
- Create new job opportunities through climate change adaptation and mitigation actions and low-carbon development projects.

Engagement Pathways

To achieve the above goals/targets/objectives, rural community will be engaged (Figure 1) through climate

Box 1: Summary of citizens' engagement (CE) approach

Title: Citizens'/Community Engagement (CE) to Climate change adaptation and mitigation and climate resilient development (CRD*) and low-carbon development (LCD**) in Bangladesh

Administration/Leader: Upazila (sub-district) Chief Administrator (Upazila Nirbahi Officer, UNO) and relevant Upazila departments including Education, Agriculture, Fisheries, Livestock, Health, Energy, Forestry (called here as 'Upazila Administration' or **UA**)

Objectives/targets: CRD in education, agriculture, fisheries-aquaculture, health and employment via clean energy and carbon sink projects

Flow of information: UA ⇌ Rural citizens

Outcomes: Capacity building, knowledge and skills enhancement; behaviour change of citizens to low-carbon life-styles, low-carbon development; innovative low-carbon polluting farming/food production; low/nil emissions projects (clean energy/carbon sinks); rural development/increased rural employment and livelihood opportunities.

*CRD considers climate change/climate variability into development decision-making and bringing together adaptation and mitigation in one policy framework of development, i.e. a development that reduces the vulnerability of climate risks and reduces/sinks greenhouse gases (GHGs).

**LCD (Low-carbon development) can be defined as a development that causes nil or very low GHGs emissions (CO₂, CH₄, N₂O).

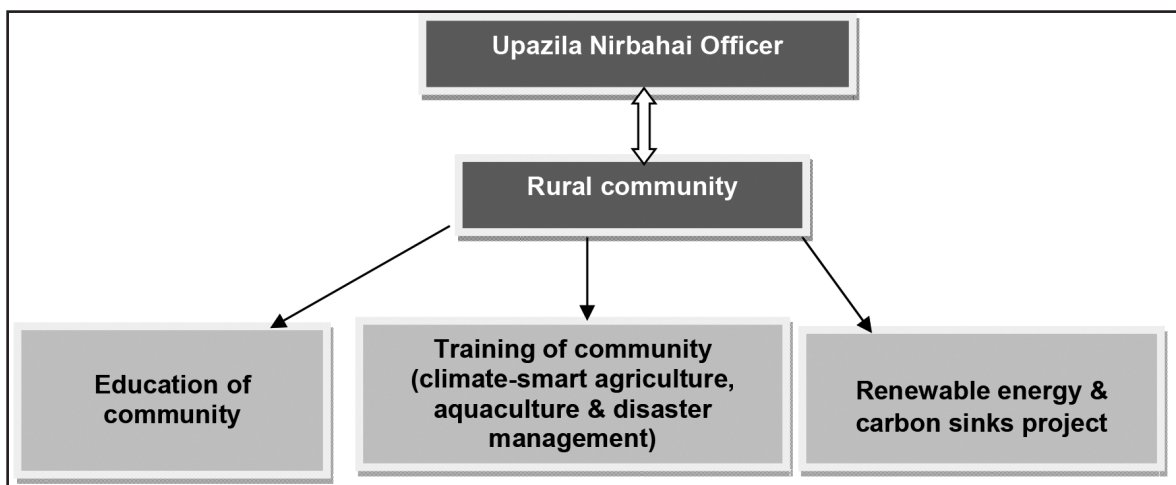


Figure 1: A flow diagram showing engagement pathways of rural communities in Bangladesh.

change education; training on climate-smart agriculture and aquaculture and disaster mitigation; renewable energy and carbon sink projects as described hereunder.

Education of Community

Climate change short courses will be introduced at rural educational institutions (schools, colleges) (Figure 2); reliable information will be supplied and pilot practical projects will be established as explained below.

Pathways

Firstly, the programme (introduction of climate change short and simple courses in rural schools and colleges, community and vocational institutions, farmers' clubs, farmers' associations, and farmers' cooperatives) will educate students/community (rural citizens) on climate change adaptation and mitigation, CRD and



Figure 2: Climate change short courses will be introduced at rural schools, colleges and vocational institutes in Bangladesh to educate rural community (women, girls, boys, men, farmers) and equip with climate change adaptation and mitigation and low-carbon development.

Image source: <https://www.google.com.au>

LCD. This will be based on latest and reliable science and evidence-based information to be conveyed via developing simple factsheets, online materials (in the local language, Bangla/Bengali) or introduction of new courses on climate change in schools and colleges as part of environmental or climate change or geography curriculum. Secondly, the students/community will be involved/attached to practical projects such as water savings (rainwater harvesting in rural homes), renewable energy production (solar, the wind, biogas, hydro, pumped irrigation power), tree plantation (afforestation/ reforestation/mangrove restoration in coastal areas), climate-smart agriculture and climate-smart aquaculture farms (floating agriculture, integrated rice-fish-duck farming; integrated brackish water aquaculture-mangrove) and waste minimisation/waste resource recovery projects (3 Rs – reduce, reuse, recycle wastes) (Lorenzonia et al., 2007; Kibria et al., 2013). Thirdly, it will educate community to adopt to a low-carbon life style (walk, bike or use public transport to go to schools/colleges and village markets for shopping; buy locally grown food/products rather than imported goods; and use energy efficient electric bulbs, refrigerators, freezers, etc.).

Benefits

The proposed courses (theory and practical) and low carbon life-style change programmes would equip citizens/community to adapt to climate change and mitigate climate change and help to reduce carbon pollution (CO_2) that causes climate change (Lorenzonia et al., 2007; Kibria et al., 2013; Kibria et al., 2010) and enhance low-carbon development in Bangladesh.

Relevance with SDGs

The proposed education programmes is aligned to

new global sustainable development goals (SDGs), principally SDG 4 (ensure equitable quality education for all), SDG 5 (empower all women and girls) and SDG 13 (action to combat climate change).

Training

Climate-smart Agriculture

Agriculture farmers will be trained up on climate-smart agriculture (Figure 3).

Pathways: The programme will train farmers on principles, practices and techniques of climate-smart agriculture; farmer's education and awareness programmes and practical demonstrations of climate-smart farming (e.g. no-tillage agriculture; rice production with less emissions of methane (CH₄) such as alternate wetting and drying in rice cultivation; floating agriculture in flood-prone areas; simultaneous forestry, food, fish/shrimp production in coastal/flood prone areas through selection/use of salt/flood/drought tolerant crops; agroforestry and nutrient/manure (N₂O) management in agriculture (Kibria, 2015a; Kibria, 2015b; Kibria et al., 2013).

Benefits: Climate-smart agriculture would help farmers/community to adapt to climate change and adopt innovative climate-smart agriculture practices that would reduce emissions of GHGs e.g. use of recycled water, reduce poverty and hunger and enhance food production and livelihoods of rural poor (Kibria, 2015a; Kibria, 2015b; Kibria et al., 2013).

Relevance with SDGs: The proposed climate-smart agriculture is aligned to new global SDGs, principally SDG 1 (end poverty), SDG 2 (end hunger; achieve food security and promote sustainable agriculture), SDG 5 and SDG 13.

Climate-smart Aquaculture

Agriculture farmers will be trained as well on climate-smart aquaculture (Figure 4).

Pathways: The programme will train farmers on climate smart aquaculture/fish farming; farmer's education and awareness programmes and practical demonstrations of climate smart farming (e.g. integrated aquaculture-agriculture; brackish water farms in sea-level rise prone areas; simultaneous aquaculture-vegetables-mangrove forestry in coastal areas; energy efficient aquaculture – farming of herbivorous/omnivorous fish, seaweeds, oysters) (Kibria et al., 2013).

Benefits: Climate-smart aquaculture would help farmers/community to adapt to climate change, and adopt innovative aquaculture practices; reduce poverty and hunger and enhance food production and their livelihoods (Kibria et al., 2013).

Relevance with SDGs: The proposed climate-smart aquaculture is aligned to new global SDGs, principally SDG 1, SDG 2, SDG 5 and SDG 13.

Disasters Management: The frequency and intensity of cyclones, storm surges, river floods, sea-level rise are projected to increase in Bangladesh due to climate change (BCCSAP, 2009; <http://www.worldbank.org/en/news/press-release/2013/06/19/warming-climate-to-hit-bangladesh-hard-with-sea-level-rise-more-floods-and-cyclones-world-bank-report-says>). Community will be trained as well on disasters management (Figure 5).

Pathways: Community will receive training on: improving homes and houses in vulnerable areas, using cyclone shelters, raised homes, and embankments during cyclones, floods; disaster preparedness including early warning systems, rainwater harvesting in disaster prone coastal area, swimming and climbing trees, and afforestation/reforestation/conservation of mangroves. Information in the form of factsheets, simple articles will be prepared to educate community on weather and disaster management.

Benefits: Disasters management training would help reducing impacts of cyclones/storms/sea-level rise related disasters on property, lives, crops, vegetables, farmed fish/shrimps, poultry and livestock.

Relevance with SDGs: The proposed disaster management is aligned to new global SDGs, principally SDG 2, SDG 3 (ensure healthy lives and wellbeing), SDG 8 (promote sustainable economy), SDG 11 (safe and resilient cities and community), SDG 12 (ensure sustainable consumption of water, food and waste production) and SDG 14 (conserve and sustainable use of marine ecosystems).

Renewable Energy (RE) and Carbon Sink Projects

Bangladesh has plenty of sunshine round the year and hence has huge opportunities to use solar energy (solar photovoltaic or PV) (Figure 6). Similarly, cattle dung, poultry droppings, and agricultural residues that are available in plenty in rural Bangladesh can be used to produce biogas. Afforestation/reforestation (Figure 4) projects in coastal areas would augment climate change mitigation (carbon sequestration/carbon sink) and disaster mitigation.

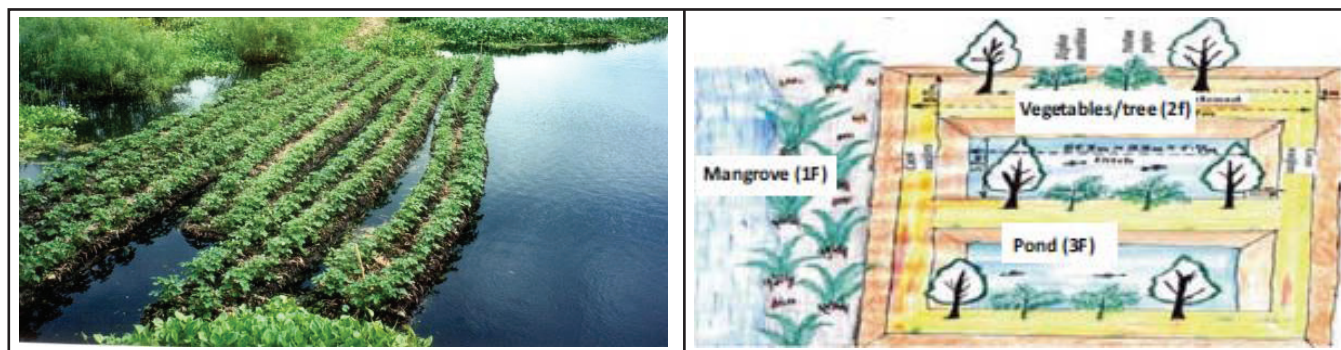


Figure 3: Examples of climate smart agriculture in Bangladesh. *Floating agriculture (left)* is an example of LCD and can be a solution and climate resilient adaptation to a flood prone country like Bangladesh. It would alleviate poverty, enhance food security, support capacity for poor/landless people, and allow both men and women to work on this simple technology leading to better gender equity. *3F models for farming (right):* simultaneous forestry, food, fish production would be suitable in coastal areas of Bangladesh which would also reduce the vulnerability of coastal community against disaster (see also Figure 4).

Image source: <https://www.google.com.au>.

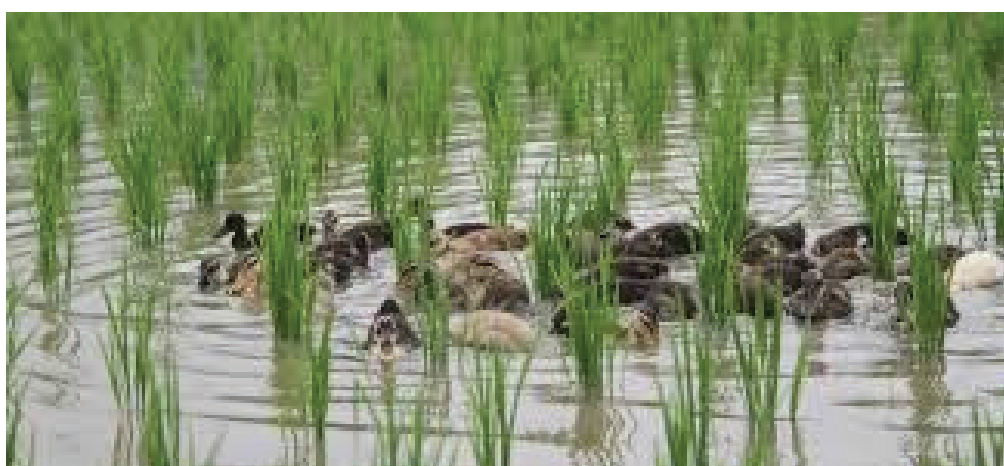


Figure 4: An example of climate-smart aquaculture in Bangladesh. Herbivorous fish farming/aquaculture; integrated rice-fish-duck farming; integrated brackish water aquaculture-mangrove etc. have good potential to adapt to and mitigate climate change impacts. Such practices would enhance farmer's income, diversify their livelihoods, recycle wastes for food production and are energy and resource efficient (Kibria et al., 2013). Image source: <https://www.google.com.au>.



Figure 5. Disaster management via cyclone/flood shelter (left) and mangroves restoration (right). Mangroves can protect the coast against waves, currents and storms, and from coastal erosion. Mangroves can act as live sea walls and is more effective than concrete wall structures. Image source: <https://www.google.com.au>.



Figure 6: Renewable energy (RE) (solar) is a clean energy with nil/minimal GHG emissions and creates an opportunity to mitigate climate change/global warming. The availability of plenty sunshine in Bangladesh provides the potential for solar energy revolution (Kibria et al., 2013).

Image source: <https://www.google.com.au>.

Pathways: RE (solar, biogas) and afforestation/reforestation projects will be established in cooperation and coordination with Upazila (sub-district) Administration (see next section) as well as in consultation with local community as part of climate change mitigation, low-carbon energy production, carbon sequestration/carbon sink project development.

Benefits: Solar power can be used for rural household uses, for irrigation pumping and small transports etc. It would reduce fossil fuels use, carbon pollution and health hazards associated with the use of forest wood, charcoal and cattle dung for cooking in rural Bangladesh. Use of dung, poultry droppings and agricultural residues would help recycle of waste for energy (biogas) and/or as biofertilizers (compost) thereby, would reduce waste, cost of waste treatment, reduce environment risks, surface and groundwater pollution, obnoxious smell, health and sanitary problem. RE

technologies can help reduce environmental degradation such as desertification/deforestation, biodiversity depletion (by preventing use of forest woods for fuel); afforestation/reforestation/mangrove restoration would enhance forestry resources/biodiversity on which rural community depend for food, water, materials, natural medicines, and reduce disasters (cyclones, typhoons, floods) impact; both solar power, biogas and forestation would create rural employment and enhance livelihoods Kibria et al., 2013; Kibria et al., 2016).

Relevance with SDGs: The proposed renewable energy and carbon sink projects proposed is aligned to new global SDGs, principally SDG 7 (ensure clean, affordable and sustainable energy for all), SDG 13 (conserve and sustainable use of terrestrial ecosystems) and SDG 15 (manage forests, wetlands, drylands and mountains and conserve its biodiversity).

Coordination of CE

CE programmes will be coordinated by Upazila (Sub-district) Administrator (UA)/relevant departments and have relevance with newly agreed Global SDGs (as highlighted earlier). It is expected that CE projects would reduce poverty and hunger and enhance economic, social and environmental growth and development in rural Bangladesh in most sustainable ways (Box 1).

Implementation of CE

To implement CE, five levels of engagement strategies (Wiseman and Williamson, 2010; Nabatchi, 2012; VIC Govt., 2013) will be adopted (inform/consult/involve/collaborate/empower) (Figure 7). Such strategies will create a platform for meaningful dialogue/flow of

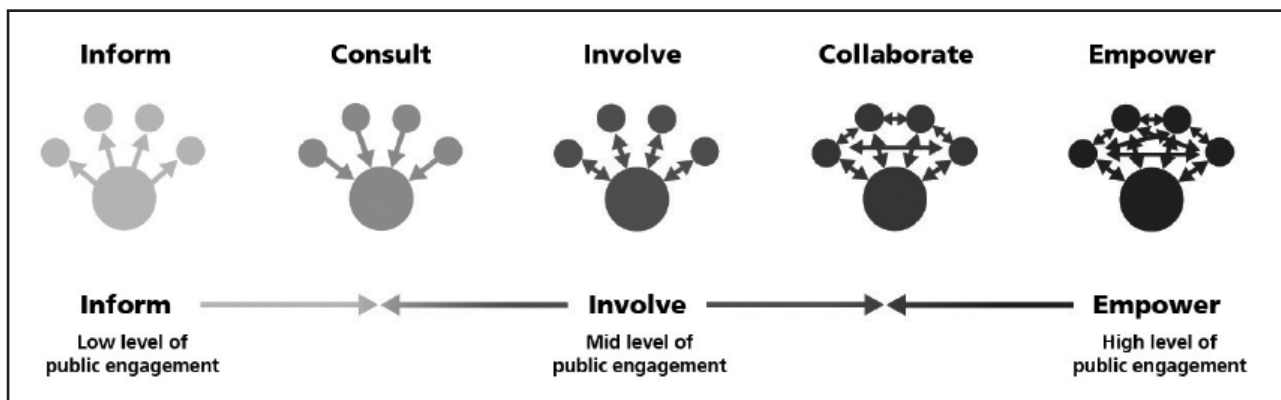


Figure 7: Five levels of engagement strategies and flow of interactions (Butteriss, 2016; Lorenzon et al., 2007).

information/interaction/learning of best practices and feedback from the UA and rural citizens (see below Level 1 to Level 5 engagement processes). For example, proposed engagement pathways (Figure 7) (inform/consult/involve/collaborate/empower) has already resulted in an effective community engagement to adapt to climate change (Riedy et al., 2013) and mitigate climate change (Wiseman and Williamson, 2010).

- Level 1 engagement: here UA will *inform* community on programmes and projects on CRD (via online/websites/mailling/fact sheets).
- Level 2 engagement: here *consultation* will take place between the community and the UA to obtain public feedback on education materials/training contents produced on climate change courses (Figure 2) or on projects such as climate-smart agriculture (Figure 3), climate-smart aquaculture (Figure 4), disasters management (Figure 5) and renewable energy and carbon sink (Figure 6). Feedback on the activities will be obtained via public meetings or focus group discussions or farmers field school programmes and citizen surveys or requesting public comments via interactive websites.
- Level 3 engagement: here community will be *involved* directly with the UA to listen/understand community's concerns/aspirations/suggestions on CRD, LCD (via public workshops/national forums/deliberative polling or wiki planning (a website or database developed for community uses to gather citizen's opinion on design/planning of CE projects).
- Level 4 engagement: here the public/community' will *collaborate/make partnership* in each step of proposed development projects/development alternatives and identification of new/preferred solutions on climate change related developments/recommendations to reduce risks of climate change in Bangladesh (via town meetings or community juries/community advisory committees or participatory decision-making processes).
- Level 5 engagement: will *empower* the community to communicate with the UA in making the final decision on CRD, LCD projects (via delegated decision making processes/community juries/participatory budgeting/participatory research/ballot (Lorenzonio et al., 2007; Kibria et al., 2013).

The success of CE on targeted objectives/goals will be evaluated (costs/time spent, benefits achieved, feedback/participant satisfaction, etc.).

Conclusions

CE is a cost-effective way of engaging community (including women, girls, men, farmers, marginalised and socially isolated people and unemployed or professionals and non-technical) in decision-making processes (informing/consulting/involving/collaborating/empowering community). CE would help to build competent and responsible community, enable societal engagement in climate change adaptation and mitigation, low-carbon development pathways and achieve sustainable development outcomes for the benefits of all (local/regional/global scales) as demonstrated in Figures 1-6 and therein. This is a simple CE model developed to engage community of Bangladesh with climate change. It is envisaged that proposed CE programmes and projects would reduce poverty and hunger and enhance economic, social and environmental growth and development in rural Bangladesh in most sustainable ways.

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