

## **External Benefits of the Application of the Technology of Effective Microorganisms (EM) in Agriculture**

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**Abstract** : *An externality can be defined as any action that affects the welfare of opportunities available to an individual without direct payment or compensation. The agricultural sector produces externalities that could be positive or negative to Society. Negative externalities include impacts to the environment (release of greenhouse gases, contamination of water and soil, erosion, loss of biodiversity) and human health food poisoning, zoonoses). Positive externalities of agriculture could include recreation opportunities, enjoyment of landscape, carbon sequestration, and nitrogen fixation among other ecological services. The application of appropriate technologies should result in more positive external effects to the society and environment compared to current production systems. The technology of Effective Microorganisms (EM) was assessed as an example of an appropriate technology to estimate its environmental benefits based on reports from the International Conferences on Kyusei Nature Farming. Next, a conjoint analysis was carried out to estimate a monetary (economic) value of the claimed benefits. This research was developed in Thailand among senior students of the Saraburi Vocational School and farmers. External benefits of the technology of EM include avoidance of the use of antibiotics, pesticides and synthetic fertilizers, reduction of the release of greenhouse gases (methane, nitrous compounds) and no contamination of water sources. The conjoint analysis estimated that there is a perceived environmental benefit valued at 15 US dollars per month per person. If this value is applied to a shrimp farm with 5 family members and a crop cycle of three months, the total external benefits of one crop can reach 225 dollars, based on the local currency and the present exchange rate. This amount is a conservative estimate but it can be considered as an attempt to incorporate the additional benefits of the technology of EM when compared to conventional practices in a Cost Benefit (C/B) analysis. C/B analysis should incorporate environmental impacts expressed in monetary terms to take a more real decision when developing local and national policies, plans and programs. The external benefits of the application of EM are expressed into enhanced levels of environmental quality than conventional farming and thus, should be included into the economic benefits of its application to society.*

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