Development of Risk Assurance Criteria to the Utilization of Natural Resources and Environment for Sustainable Development of Life Quality, Economy and Society in Rural Thai Communities

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Abstract

The research aimed at developing model of the risk assurance indicators to the utilization of natural resources and environment for sustainable development of Thai communities and evaluation of risks indicators on natural recourses and environment for sustainability of life quality, economy, and society. Mixed research methodology–both quantitative and qualitative-was employed to collect data from the various sources, related documents experts, and indigenous group from three villages- namely, upper north (Nan), central north (Uttaradit), and lower north (Pijit) with 10 villages of each to construct and validate the hypothetical indicators. A multi-stage sample size was included 80 community experts, 140 general experts, 350 community leaders, and 407 family delegates in Northern Thailand to evaluate the practicality and appropriateness of the constructed risk assurance indicators. The data were collected by group discussion, deep interview, and questionnaires. The data were analyzed by using mean, percentage, median. LISREL Program version 8.30 was applied, to evaluate the practicality and appropriateness of the constructed risk assurance indicators.

The research yielded 3 main factors with associated risk indicators to the utilization of natural resources and the environment: first, natural resources and environmental revitalization with 4 sub-factors, namely, variety of plants, wildlife, forests, soil, and water; second, hazardous waste substance prevention with 4 sub-factors, namely, hazardous waste, rubbish, smoke and dust, and natural disasters; third, resource management in community, with 5 sub-factors, namely, forest, wildlife, and water animals, soil, water and energy, total 13 sub-factors 57 associated indicators in all. Also, 3 main factors with associated indicators to sustainable development are found: first, life quality with 6 sub-factors, namely, food, clothes, household equipments, health cares, housing, environment management; second, economy with 4 sub-factors, namely, raw material for productivity, distribution and transportation; third, society with 4 sub-factors, namely, cooperation, cares, safety, peace, luxury mitigation, moral ethical values, total 14 sub-factors 66 associated indicators in all.

The models of risk assurance indicators to the utilization of natural resources and environment for sustainable development of life quality were fitted the empirical data with $\chi^2 = 62.04$, p = 0.06, GFI = 0.98, AGFI = 0.94, RMSEA = 0.03, CN = 401.96, to the utilization of natural resources and environment.

In evaluation of the risk assurance indicators, the data confirmed their practicality at a high level, the means were different of different part with statistical significance at the level of.05, the relation of risk assurance indicators to the utilization of natural resources and environment for sustainable development were significance. For the appropriate model and guidelines for developing there were 8 major activities, In conclusion, the developing model were appropriate.

Keywords: Sustainable development, Risk assurance indicators, Natural resources and the environment

1. Introduction

The development of our nation from the past have always been placing more emphasis on economic growth rather than the happiness of man in society. Thus, it is the development that lack equilibrium. And it is evident that the environment and natural resources are being depleted with exerting a huge impact on life quality of Thai

people. The Thai people are facing a number of diseases, the worst of which is cancer. As to economy, farmers are getting poorer, running into debts in social life and culture, and crimes are becoming threatening problem of Thai society.

Such impact indicates unsustainable development, the fact that economic growth is beyond the carrying capacity of our existing natural resources is confirmed. Through lack of evaluation criteria as to what indicators to use and how to use so as to assure the risk against damaging impact on life quality, economy, and society in the future-especially the utilization of natural resources in rural communities. The researcher is interested in developing the measuring criteria for use in policy-making at national and local level of administration.

2. Objectives of the Research

2.1 To construct and develop sets of risk assurance indicators to the utilization of natural resources and environment for sustainable development of life quality, economy and society in rural Thai communities.

2.2 To Confirm Factors Analysis Model of risk assurance indicators to the utilization of natural resources and environment for sustainable development of life quality, economy and society

2.3 To evaluate the constructed risk assurance indicators to the utilization of natural resources and environment for sustainable development of life quality, economy and society in rural Thai communities.

2.4 To search for guidelines for developing community learning process leading to action planning for utilization of natural resources and the environment of community for sustainable development of life quality, economy and society.

3. Research Methodology

Mixed research methodology – both quantitative and qualitative, was employed to collect data, to address the objectives through Participatory Learning Appraisal: PLA and Participatory Action Research: PAR

3.1 Population and Samples

3.1.1 The population was determined, consisting of learned men of the community experts, local organization leaders, family leaders in rural communities of the north.

3.1.2 Multi-Stage Random Sampling was employed to draw a sample of 4 groups of informants: group 1, 80 community experts, group 2, 140 general experts, group 3, 350 community leaders, and group 4, 407 family delegates in the 3 villages in the north of Thailand, as well.

3.2 Research Instruments

3.2.1 Two sets of questionnaires were constructed.

Set 1. Intended for the experts and learned men of the villages to validate the factors with associated indicators tentatively constructed.

Set 2. Intended to evaluate the level of risk assurance indicators to the utilization of natural resources and environment for sustainable development of life quality, economy and society in rural Thai communities.

3.2.2 Focus Group Structured Interviews : A set of questions as guidelines for dialogues with the experts and learned men of the villages intended for definitions of factors and associated indicators.

3.2.3 Recording forms to record the data for further analysis to formulate a model.

3.2.4 Video camera and sound recorders for group discussion recordings.

3.3 Research Procedures and Data Collection

Four phases of research were conducted as follows:

Phase 1: Constructing tentative factors with associated indicators, which consist of two steps.

Step 1. Determine a set of risk assurance indicators to the utilization of natural resources and environment for sustainable development of life quality, economy and society in rural Thai communities through research and document analysis

Step 2. Determine the definitions and factors with the association indicators, using Qualitative Analysis--Participatory Learning Appraisal: PLA of the participants from academic institutions, government, local organization leaders and community leaders through focus group discussion, intended for the factors and indicators based on authentic conditions of 3 geographical areas in the north, classified by ecological features. The sample consists of 80 community experts

Step 3. Validate the indicators through group discussion by the determined sample of 140 general experts

Phase 2: a confirmatory analysis was conducted in order to check the model with the empirical data collected by interviews with 350 community leaders from 30 communities of 3 provinces in the north. For this particular analysis LISREL Program Version 8.30 was used

Phase 3: Evaluate the risk assurance indicators, the data confirmed their practicality at a high level, as well as sustainable development for life quality, economy and society, using the constructed and validated indicators. Data were collected from 407 participants from 30 communities as evaluators, and the results were recorded and stored as database of communities.

Phase 4: Proposed Guidelines for Practices in developing participatory learning process, leading to action planning of the utilization of natural resources and the environment have been developed. This was done in a brain storming session of 30 community leaders chosen from the three communities with the highest mean scores from the evaluation in stage 3.

3.4 Statistics for Data Analysis

3.4.1 Descriptive statistics–frequency, percentage, median, mean and standard deviation

3.4.2 Inferential statistics

1) Analysis of Pearson Product Moment correlation coefficient between Risk Assurance Criteria to the Utilization of Natural Resources and Environment and Sustainable Development of Life Quality, Economy and Society in Rural Thai Communities

2) Confirmatory factor analysis was used for the scrutiny of the model by LISREL Program

3) F-test, using MANOVA technique to compare the differences between means of each factor on the basis of independent variables--3 geographical areas.

4. Research Results

4.1 Construction and development of risk assurance indicators to the utilization of natural resources and environment for sustainable development of life quality, economy and society in rural Thai communities.

4.1.1 Research yielded 3 main factors with associated risk indicators to the utilization of natural resources and the environment: first, natural resources and environmental revitalization with 4 sub-factors, namely, variety of plants, wildlife, forests, soil, and water, with 23 associated indicators in all; second, hazardous waste substance prevention with 4 sub-factors, namely, hazardous waste, rubbish, smoke and dust, and natural disasters, with 17 associated indicators in all; third, resource management in community, with 5 sub-factors, namely, forest, wildlife, and water animals, soil, water and energy, with 17 associated indicators in all

4.1.2 Research yielded 3 main factors with associated indicators to sustainable development are found : first, life quality with 6 sub-factors, namely, food, clothes, household equipments, health cares, housing, environment management with 29 indicators, second, economy with 4 sub-factors, namely, raw material for productivity, distribution and transportation, capital, with 18 associated indicators in all; third, society with 4 sub-factors, namely, cooperation, cares, safety, peace, luxury mitigation, moral ethical values, with 19 indicators in all.

4.2 In the confirmatory factor analysis of the models of risk assurance indicators to the utilization of natural resources and environment for sustainable development of life quality were fitted the empirical data with $\chi^2 = 62.04$, p = 0.06, GFI = 0.98, AGFI = 0.94, RMSEA = 0.03, CN = 401.96, The other indexes were all in accord with the set standards.

4.3 Analysis of evaluation of risk assurance indicators to the utilization of natural resources and environment for sustainable development of life quality, economy and society in rural Thai communities.

4.3.1 Risk assurance indicators to the utilization of natural resources and the environment were evaluated as a whole at a high level with $\bar{X}$ =2.40, S.D.= .46. When taking each dimension into account, the researcher found that natural resources and environmental revitalization were rated at a high level with $\bar{X}$ =2.33, S.D.= .41; hazardous waste substance prevention, at a high level with $\bar{X}$ =2.42, S.D.=.65; resource management in community at a high level with $\bar{X}$ =2.56, S.D.= .42. The high level indicators numbered 34, accounting for 59.64 %; the moderate level indicators, 23, accounting for 40.36 % of the variation in all, respectively.

4.3.2 Analysis of evaluation of sustainable development for life quality, economy and society ,using the constructed and validated indicators yielded the overall picture at a high level with $\bar{X}$ =2.52, S.D.=.28 When taking each dimension into account, the researcher found that life quality was at a high level with $\bar{X}$ = 2.48, S.D.

=.41; economy, at a high level with $\overline{X}$ = 2.42, S.D.=.36 ; society, at a high level with $\overline{X}$ =2.48, S.D.=.41. The high level indicators numbered 60, accounting for 90.91 %; the moderate level indicators, 23, accounting for 9.09 % of the variation in all, respectively.

4.3.3 Results of the comparison of the level of risk assurance indicators to the utilization of natural resources and environment on the basis of geographical areas: the upper north, the central north and the lower north. Analysis of the comparison results yielded a significant difference between means at the .05 level. whereby the levels of risk assurance were placed at a descending ranks: the central north, at the high level with $\overline{X}$ =2.51, S.D.= .48; the lower north at a high level with X =2.40, S.D.= .51 and the upper north at a moderate level with X =2.30, S.D.= .33.

4.3.4 Results of the comparison of the level of sustainable development of life quality, economy and society in rural Thai communities on the basis of geographical areas: the upper north, the central north and the lower north. Analysis of the comparison results yielded a significant difference between means at the .05 level whereby sustainable development for life quality, economy and society were placed at descending ranks: the central north, the most developed at the high level with X = 2.60, S.D.= .02; the lower north at a high level with X =2.43, S.D.= .02 and the upper north at a high level with X = 2.43, S.D.= .02

4.3.5 In an analysis of correlation between all factors dimensions of risk assurance of the utilization of natural resources and environment and sustainable development of life quality, economy and society, a high relationship was found with correlation coefficient r = .80, which was significant at the .05 level.

4.3.6 In comparison between means of all factors dimensions of risk assurance of the utilization of natural resources and environment and sustainable development of life quality, economy and society, it was found the former exerts a great impact on the latter at the .05 level of significance.

4.4 Proposed Guidelines for Practices in developing participatory learning process, leading to action planning of the utilization of natural resources and the environment have been developed. An 8-activity supplementary model is developed, which includes:

4.4.1 Studying and diagnosing of community problems

4.4.2 Action planning based on the problems and needs of each community

4.4.3 Seeking for alliances and supports for those involved to participate

4.4.4 Facilitating community learning process

4.4.5 Cultivating public awareness of natural resources and the environment

4.4.6 Designing and enforcing measures and regulations of community

4.4.7 Disseminating through networking and building agricultural learning centre for sufficiency economy or the neo-theory, to tighten food security and food safety for community

4.4.8 Asking for supports from local organizations and external agencies

4.5 Example of Development Indicators

<Insert Table 1 here>

5. Discussions

5.1 Development of risk assurance indicators to the utilization of natural resources and environment and sustainable development of life quality, economy and society in rural Thai communities.

Through a participatory process of the stakeholders in community, a number of the indicators are determined and validated. These indicators are diverse covering various dimensions of natural resources and the environment because the definitions are made carefully and based on ecological conditions of each community as perceived by the residents. (Vanee Gamgate. 2545). In every phase of research procedure, the experts, academics, development practitioners and learned men of villages get involved. This is a theory of participation, which is relevant to social development, especially in developing the indicators to development, community residents should play important roles because they are the actors who determine development process and benefit the outcome. (Havanond Napaporn. 2005).

In sum, 3 main factors with associated sub-factors as risk indicators to the utilization of natural resources and the environment emerges: first, natural resources and environmental revitalization with 4 sub-factors, namely, variety of plants, wildlife, forests, soil, and water; second, hazardous waste substance prevention with 4 sub-factors,

namely, hazardous waste, rubbish, smoke and dust, and natural disasters, third, resource management in community, with 5 sub-factors, namely, forest, wildlife, and water animals, soil, water and energy.

All these factors are main resources, extremely important to human living. If over consumed beyond the carrying capacity of the natural resources, they are bound to exert a high impact on man as evident in natural and social phenomena that humans are experiencing today such as global warming, diseases and health problem, social problem and economic crisis.

As for the sustainable development of life quality, economy and society in rural Thai communities, 3 main factors with associated sub factors indicators to sustainable development emerged: first, life quality with 6 sub-factors, namely, food, clothes, household equipments, health cares, housing, environment management, all of which are basic necessities for life quality of humans, which is the economic system of community connected with economic productions from origins of waterways, mid stream, and the outlets; second, economy with 4 sub-factors, namely, raw material for productivity, distribution and transportation, and capital; third, society with 4 sub-factors, namely, cooperation, cares, safety, peace, luxury mitigation, moral ethical values, all of which are indicators to rural society based upon sufficiency economy and sustainable development. Development must be carried on and aiming at the equilibrium in life quality of man and the environment, economy, and society. (Pradhampidok, 2003).

5.2 In the confirmatory factor analysis of of the models of risk assurance indicators to the utilization of natural resources and environment for sustainable development of life quality by using LISREL Program it was found that all Model were fitted the empirical data, it was found that on the whole the factors and the indicators jived with the empirical data, proving the appropriateness of the model. (Somkid, 2004; Wannee, 2002) As for the order of importance based on the weight of the factors, it was found that resource management in community factor ranked the highest followed respectively by hazardous waste substance prevention and natural resources and environmental revitalization

5.3 Evaluation results of risk assurance indicators to the utilization of natural resources and environment and sustainable development of life quality, economy and society in rural Thai communities.It was found that of risk assurance indicators to the utilization of natural resources and environment as a whole are at a high level. Taken into account each dimension of the evaluation, however, factor hazardous waste substance prevention, which may impact on natural resources of community, consists of a number of risk assurance indicators at a high level: appropriate use of plants in community, building community database, household's participation in smoke and dust reduction, planning to monitor smoke and dust, and waste hazard prevention. The research result indicates unsatisfactory management of natural resources and environmental revitalization in community.As for the sustainable development of life quality, economy and society in rural Thai communities, the results of the evaluation came out as a whole at a high level, which concur with the findings by Som Na-saarn. (2551). Na-saarn says that the economy and culture of community in the North East is still stable ; the rural people still conserve their cultural heritage: arts and culture, social values and traditional folkways However, his finding seems to contrast with Hansupo's in which the data show some aspects of social change in the North East. Most people are socially and culturally self-reliant at a low level, accounting for 56 % of the population, which seems to concur with Gamage's in which the evaluation data show self-reliance of families in rural Thailand in such a way that conservation of cultural arts are at a moderate level. In analysis of comparative study of development of life quality, economy and society on the basis of geographical areas, the difference is found significant; this shows the discriminating power of the constructed factors and indicators. (Tabanick and Fidell, 1996) Also, in it is found that a high relationship between all factors dimensions of risk assurance of the utilization of natural resources and environment and sustainable development of life quality, economy and society indicates that a high risk assurance of the natural resource and environment will greatly impact on sustainable development of life quality, economy and society, corresponding to the set hypothesis. The model of all the indicators developed by this research could be applicable.

5.4 Proposed Guidelines for Practices in developing participatory learning process, leading to action planning of the utilization of natural resources and the environment. Out of group discussion came 8-activity guidelines as a supplementary model for developing participatory learning process, leading to action planning of the utilization of natural resources and the environment. The 8 -activity guidelines have been recorded under the heading: research results; they could not be effectively put into practice without participatory learning process. Thus, a supplementary model for developing participatory learning process was further developed, which includes :

5.4.1 Building a learning process of community leaders through 1) Evaluation feedback in order for them recognize their own state of community 2) Diagnosing community problems to identify weaknesses, strengths,

threats, and opportunities, connecting all dimensions of development: the environment, health, learning and culture. 3) Analyzing potential of community, which the development will be able to achieve. 4) Goal setting by the people in community based upon state of the problem and potential 5) determining an appropriate model of practices for sustainable development by translating the vision of community into substantial activities.

5.4.2 In the study on risk assurance indicators to the utilization of natural resources and environment and sustainable development of life quality, economy and society**,** the researcher learns that in determining appropriate guidelines for practices, to substantiate activities are of prime importance. To fulfill this, validation process must include a variety of means. For example, in this study, the researcher employs evaluation techniques with community participation in all phases of the research procedure: operationally defining of the terms such as wellbeing, development, etc. And the most important is community leadership development which is to be carried out to achieve this particular purpose, through use of three principles: 1) Empowerment 2) Education and 3) Participation. Empowerment is intended to cultivate leaders' awareness in the importance of development. It is believed that this is one of the most important strategies for social development, leading to success in community development (Rujinak, Uttasit. 2548: 50-68; citing Slocum and others. 1998). Empowerment should be reinforced at both community and personal level, called organization empowerment and psychological empowerment, respectively. Education is intended to render knowledge and information on state and development of community through a variety of means especially self-inquiry in group learning process. Participation is a key word in all phases of research and development, without which development is impossible. Development of Risk Assurance Criteria to the Utilization of Natural Resources and Environment for Sustainable Development of Life Quality, Economy and Society in Rural Thai Communities employs this word through the research and encourages using this word in all types of organization development

6. Suggestions for Applications

6.1 Local governments should use the sets of constructed factors with indicators as a model for further development of the success indicators to sustainable development and criteria to risk assurance management of utilization of natural resources and environment.

6.2 Government agencies in charge of development policy should use the sets of constructed factors with indicators as a model to further develop risk assurance indicators to utilization of natural resources and environment and to evaluate sustainable development of life quality, economy and society for use in such a way consistent with geo-ecology of specific regions.

6.3 The risk assurance indicators to utilization of natural resources and environment and sustainable development should be further developed and modified with measurable criteria, based upon authentic evaluation database in community.

7. Suggestions for Further Research

7.1 Participatory action research should be continually and repeatedly conducted in community, using the developed indicators; selection of the appropriate indicators are then made and developed into standards for further use in community.

7.2 The model of developing the indicators should be tried out in communities of other regions in order to determine the indicators appropriate for each region.

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Table 1.

Natural Resources and Environment	Utilization of Natural Resources
1. Conservation a local plant.	1. Food preparation for family member.
2. Utilization of a local plant.	2. Food for health.
3. Studies of endanger species.	3. Use of local vegetable and meat.
4. Reforest on a public land.	4. A safety house.
5. Reserve of green area.	5. Reuse/Recycle home material.
6. Protection of forest burning.	6. Home physical management.
7. Bio farm.	7. Reduce cost of traditional cultures.
8. Reduce use of chemical fertilizer.	8. Family saving plan.
9. Toxic prevention.	9. Buy a local product.