

Administrative Feasibility of Monitoring Mechanisms Implementation for Sustainable Agriculture

¹Karim Naderi Mahdei, ²Seyed Mahmoud Hosseini,

¹Mousa Aazami and ¹Heshmatollah Saadi

¹Department of Agricultural Extension and Education,
Faculty of Agriculture, Bu-Ali Sina University, Hamedan, Iran

²Department of Agricultural Extension and Education,
University of Tehran, Iran

Abstract: Problem statement: The purpose of this study was to analyze the administrative feasibility of monitoring mechanisms implementations in Hamedan province. Recognizing, formulating and ranking appropriate mechanisms were another objective of the study. **Approach:** This study was a descriptive survey research and the statistical population of the study included staff and executive experts' that involved in related to agricultural development organizations of Hamedan. The all of statistical population were selected and studied. Data collection was accomplished by using questionnaires were filled out using interviews with the participants. The questionnaire was validated by a 5 member panel of experts and its reliability was confirmed through pre-test of data tool and Cronbach Alpha. In total, 210 questionnaires were filled out using interviews with the participants. Two statistical techniques were also used to analyze data. Coefficient of variance was used in order to determine priority of different mechanisms about resource conservation. Mann-Whitney technique utilized for assessing agreement of expert's perceptions. **Results:** Results of different mechanisms ranking show that four of them placed from first to fourth orders with a low coefficient of variance. These mechanisms were: Codification of appropriate rules and regulations, resources conservation police establishment, integrated systems of permission and utilization licenses, polluters pays surcharge. Results from agreement assessment revealed that both staff's experts and executive perceptions agreed with 12 mechanisms because variation coefficient was low for these 12 mechanisms, some command and control mechanisms implementation in the study area are unfeasible (resources conservation police establishment" (Sig = 0.032), "encounter versus invasive of natural resources" (Sig = 0.022), "monitoring of technology application standards" (Sig = 0.042) and "tradable rights (permits) for resource utilization" (Sig = 0.033). The mechanisms which had a view of external control were not agreed with experts and had no priority. **Conclusion:** Therefore, using compulsory or forced mechanisms expect to have the less possibility of success in order to conserve basic resources of agricultural sector product. It can be expected that those mechanisms which had high priority will contribute to agricultural related organizations when they intend to apply resource conservations strategies.

Key words: Sustainable agriculture, policy instruments, monitoring mechanisms, feasibility study

INTRODUCTION

Agriculture is the dominant use of land in Hamedan. This province is one of the main centers of agricultural production in Iran. 32.1% of total employment in this province and 52% of employment of rural area occupied in agricultural sector that more than average of agricultural employment in Iran. During the past two decades, agricultural sector has suffered

many challenges in Hamedan province of Iran. Natural resources such as water, soil and biodiversity are becoming increasingly scarce in this area. For mitigating mentioned challenges, it is essential to find and use appropriate mechanisms and instruments thereby they primarily prevent deterioration of agricultural sector's status and the next step restore sustainability on agro-ecology of the province. Of course, a wide range mechanisms and instruments need

Corresponding Author: Karim Naderi Mahdei, Department of Agricultural Extension and Education, Faculty of Agriculture, Bu-Ali Sina University, Hamedan, Iran Tel: +98 9188195863 Fax +98 8114427012

to improve the sustainability, from them management or control mechanisms are more important. Therefore, this study has investigated and assessed the feasibility of implementing each of control mechanisms in terms of perceptions of the relevant experts in Hamedan. After analyzing data, the feasible mechanisms will select and then introduce to agricultural related planners and actors those who are engage in developing strategies and mechanisms about agricultural sustainable development in all over the province.

Background: According to sustainable agriculture definitions, the community and people wants to ensure that its natural resources and environmental amenities are used wisely and in a way that maintains an appropriate balance between meeting their own needs and maintaining the environment's intrinsic and future value (Parminter, 2003; WCED, 1987).

The effective resource development and management, has been become as a key element of sustainable development (Horan and Ribaudo, 1999; Markandya, 1994). The performance of agricultural sustainability will be enhanced through a better agricultural activities, policies and mechanisms (Hellegers and van Ierland, 2003; OECD, 2001; Wilson and Tyrchniewicz, 1995). So, the aim of policy interventions is not just the identification and measurement of the causes of natural resource degradation, but its control and mitigation or remediation through various policy tools (Weimer and Vining, 2004) toward to sustainable agriculture. Hereupon, policy mechanisms were introduced the purpose of promoting and monitoring the sustainable management natural and physical resources to provide for people's health and safety, social, economic and cultural well being.

Environmental degradation as a current serious problem, a result of inefficiency in the monitoring and market that may only will be corrected through policy interventions. Effective and efficient control requires suitable instrument and good information on the source and extent of environmental degradation and on the technical options and instruments for improving the situation (OECD, 2001; Parminter, 2003; Wilson and Tyrchniewicz, 1995) As mentioned above, suitable instruments performing basic role in agricultural sustainability. It can categorize to four major instruments: (1) prohibitions and obligations, mostly for the limiting of substances hazardous to resource. (2) Incentives or market-based instruments comprise a range of instruments used to provide economic incentives/disincentives to economic agents to change their behavior in an environmentally desirable manner.

(3) Socio-institutional instruments (Horan and Ribaudo, 1999; Parminter, 2003; UNESCAP, 2000). In the following, some examples of above mentioned categories mechanism or instruments that performing for resource monitoring were explained.

Command and control: In some literature used command and control and the other literatures called as prohibition and obligation instruments. The use of resources and some substances can be forbidden or limited (Huang *et al.*, 2004). Measures in this category have traditionally been used to regulate damage to the environment that has been brought about by economic activities (UNESCAP, 2000). Scilicet, these instruments pursue control by using a direct intervention to define responsibilities that place limits on property rights and regulate land use and levy penalties for violations (Parminter, 2003).

Command and control instruments include regulations, standards, prohibitions, limits, issuance of permits, licenses and resource consents to operate and/or perform a certain activity (Hellegers and Ierland, 2003; Parminter, 2003; UNESCAP, 2000). For example, environmental standards comprise using technology standards, technology-forcing standards, using standards and product standards (Kemp, 2000).

Regulations are a prescription by government that must be complied with or else the parties are penalized. They may be laws, but are mostly administrative rules, permits, prohibitions and executive orders (Parminter, 2003).

Control and minimum requirement standards, with various regulations for quality requirement, the supply of natural resource and disposal resource (Huang *et al.*, 2004).The control is applied to the production and importation of pesticides and fertilizers, but not their application near a water source (UNESCAP, 2000). Resource consents are other commonly used instruments for reducing and controlling the impacts of adverse activities. Resource consents are legal authorizations allowing the holder to use or take resources from, or discharge water/wastes into the natural environment (Parminter, 2003).

Command and control regulations unsuitable for developing countries (Markandya, 1994; OECD, 2001; Requate, 2005), a one reason is the mismatch between their high regulation, monitoring and enforcement cost and the budgetary, manpower and administrative constraints of developing countries (Markandya, 1994; OECD, 2001; Requate, 2005). Besides, regulations, unlike market-based incentives, are written in tough and rigid language that carries with it the threat of punishment gives a sense of power and authority (Markandya, 1994).

Property rights over resources (land, water, forests and fisheries) are monitoring-institutional instruments that act as economic incentives for efficient use and sustainable management because they vest with the owner the gains from conservation and regeneration of resources (Markandya, 1994; Parminter, 2003). Tradable resource shares this is a variation of property rights used in the case of indivisible or uncertain resources, such as water and fisheries. Individual transferable rights, transferable development rights, tradable emission permits (Hellegers and Ierland, 2003; Huang *et al.*, 2004; Sterner, 2002; Parminter, 2003) were the other same mechanisms. In the whole, these instruments allow the transfer of development rights from one area to another in the interest of preservation of specific sites or conservation of natural resources.

Together, these considerations raise important questions about the sustainability of agriculture and need for interventions, monitoring, implementation of new policy prescription and instruments.

MATERIALS AND METHODS

The study is an applied-descriptive research in which a non-experimental plan has been used as a survey design. This method, in contrary to experimental methods, doesn't apply variables' control or manipulation. Questionnaire was the only tool for data collection and included closed questions. The questionnaire was finalized after an extensive literature review, face and content validity and a pre-test. Data collection was accomplished by using interview method and a questionnaire which was validated by a jury of university professors at Bu-Ali Sina, Tehran, Zanjan and a number of Ph.D. students at Netherlands. Moreover, its reliability was confirmed through pre-test of data tool amongst a group of 30 respondents from statistical population and Cronbach Alpha. There were totally 20 closed questions with a Likert-type scale. Likert-type responses with 11 scales (never applicable = 0 fully applicable = 10) were used to assess different sections of the questionnaire. For these types of questions, the questionnaires' reliability was calculated by Cronbach's Alpha technique within SPSS statistical software. The total mean reliability of scales was 93. There was also one open question in order to collect additional perceptions of respondents. The questionnaire was divided into three sections (the number of questions for each section is noted between brackets): (a) cover letter, (b) personal information (c) monitoring mechanisms or instruments.

Statistical population was selected in terms of important criteria like knowledge of respondents about the research topic and involvement in developing control mechanisms in agricultural sector. At present, the Department of Environment, Department of Natural Resources and Agriculture Organization (AGJO) is the primary government agency responsible for the conservation, management, development and proper use of the province environment and natural resources. In total, 210 questionnaires were filled out using interviews with the participants, those who were engaged in planning, administrative, staff and executive activities on agricultural sustainable development were selected in the province amongst mentioned different organizations.

RESULTS

Instruments feasibility's were assessed in two step: in the step one, various mechanisms were analyzed and ranked by Coefficient of Variance (CV), in the step two, the Mann Whitney test used for agreement assessment of staff and executive experts about the mechanisms. Both descriptive and analytical methods were used in order to analyze the data. Descriptive techniques included: Frequency distribution tables, mean, standard deviation and coefficient of variance. Analytical technique was Mann-Whitney test. Respondents who participated in this research ranged in age from 24-62 years. The respondents were 86% male and 14% female. About level of education, 66% of respondents owed a B.Sc degree, 17% had an M.Sc degree and 14% had a post-diploma.

Years of job experience ranged from 2-30 years with an average on 17.2 years. In terms of position, maximum percentage was for staff experts (42%) and minimum was for staff administrators (3%) (Table 1).

Feasibility of various monitoring mechanism applications analyzed on the basis of administrative feasibility. Feasibility assessed in the two steps, in the step one priority of various mechanisms were analyzed and ranked by Coefficient of Variance (CV), in the second step, the Mann Whitney test used for assessment of staff and executive experts' agreement about the mechanisms.

Mechanisms priority: staff and administrative experts were asked to indicate their perception ranged from 0 to 10 about the mechanisms compatibility with current administrative structure. The most applicable and compatible mechanisms were ranked respectively: codification of appropriate rules and regulations ($M = 6.23$, $SD = 2.73$, $CV = 0.437$) coefficient of variance stand in the first grade. Resources conservation police establishment ($M = 5.82$, $SD = 2.69$,

CV = 0.463), Integrated systems of permission and utilization licenses (M = 5.56, SD = 2.59, CV = 0.465), Polluters pays surcharge (M = 5.64, SD = 2.68, CV = 0.474). Table 2 shows the other mechanisms M, SD and CV priority.

According to Table 2, the last applicable and compatible mechanisms were ranked respectively: Command and suasion (M = 4.21, SD = 2.53, CV = 0.600) and constitution and development of environment controller by scholarly (M = 4.78, SD = 3.06, CV = 0.638).

Some mechanisms which had a view of external control were not agreed with experts and had no priority. Therefore, using prohibitions and obligations mechanisms expect to have the less possibility of success in order to conserve basic resources of agricultural sector products.

Agreement assessment: Because of the nature of this study, was required to study and choice of agreed mechanisms. As be mentioned above, staff and executive experts maybe will be varied on the point of views. The Mann-Whitenny test used for comparing two groups of responders those who employ in staff level and employ in executive level. The results of Mann Whiney nonparametric test show that there was significant difference (p<0.05) between the two groups in the four following mechanisms.

Table 1: Frequency distribution of position of respondents

Degree	Frequency	Percentage
Staff administrators	7	3
Executive administrators	24	11
Staff experts	92	42
Executive experts	87	40
Not remark	6	2
Sum	210	100

Table 2: Responder opinions about administrative feasibility of mechanisms by coefficient of variance

Mechanisms	M	SD	CV	Priority
Codification of appropriate rules and regulations	6.23	2.73	0.437	1
Resources conservation police establishment	5.82	2.69	0.463	2
Integrated systems of permission and utilization licenses	5.56	2.59	0.465	3
Polluters pays surcharge	5.64	2.68	0.474	4
Establishment of local committee for monitoring and standards	6.03	2.98	0.494	5
Constitution of democratic club by indigenous people for resource protection	5.36	2.65	0.494	6
Encounter versus invasive of natural resources	5.21	2.66	0.510	7
Product standards controlling	4.97	2.58	0.518	8
Monitoring of technology using standards	4.80	2.65	0.534	9
Tradable rights (permits) for resource utilization	5.07	2.58	0.538	10
Giving ownership authority to soundly user	4.84	2.77	0.546	11
Health labeling by control	5.25	2.71	0.559	12
Using new technologies such as remote control	4.21	2.99	0.570	13
Command and suasion	4.78	2.53	0.600	14
Constitution and development of environment controller by scholarly	4.80	3.06	0.638	15

0 = never applicable ----- 10 = fully applicable

Note: M: Mean; SD: Standard Deviation; CV: Coefficient of Variance

Table 3: Comparing two groups (staff and executive) experts' agreement about the implementation feasibility

Mechanism	Mean rank		U	p-value
	Staff	Executive		
Codification of appropriate rules and regulations	104.85	100.50	4949	0.598
Resources conservation police establishment	93.95	111.67	4365	0.032*
Integrated systems of permission and utilization licenses	106.01	99.38	4847	0.421
Polluters pays surcharge	105.87	101.47	5047	0.595
Establishment of local committee for monitoring and standards	101.17	103.64	5045	0.765
Constitution of democratic club by indigenous people for resource protection	106.77	97.96	4671	0.285
Encounter versus invasive of natural resources	92.93	111.87	4265	0.022*
Production standards controlling	109.14	98.58	4738	0.203
Monitoring of technology application standards	94.74	112.29	4296	0.042*
Tradable rights (permits) for resource utilization	110.19	92.80	4247	0.033*
Giving ownership authority to soundly user	107.44	98.28	4705	0.267
Health labeling by control	102.18	101.85	5098	0.967
Using new technologies such as remote control	108.55	100.06	4891	0.308
Command and suasion	107.27	98.34	4724	0.278
Constitution and development of environment controller by scholarly	107.56	100.02	4886	0.363

Note: p-value: Sig. *: p<0.05

“Resources conservation police establishment” (Sig = 0.032), “encounter versus invasive of natural resources” (Sig = 0.022), “monitoring of technology application standards” (Sig = 0.042) and “tradable rights (permits) for resource utilization” (Sig = 0.033). Table 3 indicated the agreed mechanisms statistic.

DISCUSSION

There are several reasons about disagreement of staff and executive experts about administrative feasibility of four above mentioned mechanisms such as: Because of nature of the agricultural sector, plurality of policymaking and decision making centers and lack of impetus versus invasive and destroyer of natural resources.

High mean and low standard deviation of responder’s opinion about administrative feasibility of majority of the study mechanisms indicate need to quickly implementing of monitoring mechanisms in the study area.

Attentions to findings of the study, some command and control mechanisms implementation in the study area are unfeasible (resources conservation police establishment” (Sig = 0.032), “encounter versus invasive of natural resources” (Sig = 0.022), “monitoring of technology application standards” (Sig = 0.042) and “tradable rights (permits) for resource utilization” (Sig = 0.033). Because, mentioned command and control instruments have little grounding in local realities and cultures and therefore are largely unenforceable. Command and control do not work in the area because it is virtually impossible to monitor hundreds of thousands of scattered farmers and resource users, which individually degradation and generate pollution.

CONCLUSION

High mean and low standard deviation of responder’s opinion about administrative feasibility of majority of the study mechanisms indicate need to quickly implementing of monitoring mechanisms in the study area.

Attentions to findings of the study, command and control instruments have little grounding in local realities and cultures and therefore are largely unenforceable. Command and control do not work in the area because it is virtually impossible to monitor hundreds of thousands of scattered farmers and resource users, which individually degradation and generate pollution. This will not administratively feasible, also economically it makes no impossible. It is

esteems the other reason for the unfeasibility of command and control mechanisms for study area is the mismatch between their high regulation, monitoring and enforcement cost and the budgetary, manpower and administrative constraints. So following can be recommended:

- Prohibition and obligation mechanisms will not work in the study area and that internalized and incentives instruments have a better chance for complementing and synchronizing for its feasibility (carrots instruments better than stick)
- Design appropriate incentive mechanisms to include innovation of resource-saving practice and technologies
- Consideration and internalization of applicable and acceptable mechanisms by social activities such as education and culture making. Education interventions, constitution of democratic club by indigenous people for resource protection, establishment of local committee for monitoring and standards are flexible and so can be built upon by monitoring instruments. There are empirical results that indicate education and social instruments can be effective in reducing environmental externalities through encouraging farmers to adopt monitoring instrument and practices
- Internalizing the external costs and facilitating the efficient allocation of resources
- Four departments involved about performing of monitoring mechanisms, so the ranked instruments have to apply under the one integrated environmental or resource management for permission and utilization licenses in the province level
- Reallocate resource rights through market- oriented mechanisms to increase the social benefits from resource use and its acceptability’s. So property rights, tradable resource shares, Individual transferable rights, transferable development rights, tradable emission permits that are monitoring-institutional-incentive instruments can be feasible for implementation in Hamedan.

ACKNOWLEDGEMENT

This study has been financed by Bu-Ali Sina University (No. 32-2538). We thanks to Office of Research Affairs for providing us with the financial and facilities needed. Also we would like to acknowledge and thanks all researchers and technicians who have contribute to this project.

REFERENCES

- Hellegers, P. and E. van Ierland, 2003. Policy instruments for groundwater in Netherlands. *Environ. Res. Econ.*, 26: 163-172. <http://www.ingentaconnect.com/content/klu/eare/2003/00000026/00000001>
- Horan, R.D. and M.O. Ribauda, 1999. Policy objectives and economic incentives for controlling agricultural sources of non-point pollution. *J. Am. Water Resour. Assoc.*, 35: 1023-1035. DOI: 10.1111/j.1752-1688.1999.tb04191.x
- Huang, M.J., P.C. Eames and B. Norton, 2004. Thermal regulation of building-integrated photovoltaics using phase change materials. *Int. J. Heat Mass Transfer*, 47: 2715-2733. DOI: 10.1016/j.ijheatmasstransfer.2003.11.015
- Kemp, R., 2000. *Technology and Environmental Policy: Innovation Effects of Past Policies and Suggestions for Improvement*. OECD.
- Markandya, A., 1994. *Criteria, Instruments and tools for Sustainable Agricultural Development*. FAO, Rome, ISBN: 92-5-103491-5, pp: 268.
- OECD, 2001. *Improving the Environmental Performance of Agriculture: Policy options and Market Approaches*. Organization of Economic Cooperation in Development, United States, ISBN: 92-64-01603, pp: 50.
- Parminter, T., 2003. *Policy Strategies for Natural Resource Management*. MAF. Technical Paper No: 2003/1.
- Requate, T., 2005. Dynamic incentives by environmental policy instrument-a survey. *Ecol. Econ.*, 54: 175-195. DOI: 10.1016/j.ecolecon.2004.12.028
- Sternier, T., 2002. *Policy Instruments for Environmental and Natural Resource Management*. Resources for the Future, Washington, DC, ISBN: 1-891853-12-0, pp: 504.
- UNESCAP., 2000. *Integrating Environmental Consideration into Economic Policymaking: Institutional Issues*. United Nations, New York, ISBN: 92-1-119948-4, pp: 141.
- WCED., 1987. *Our Common Future*. Oxford University Press, Oxford, ISBN: 13: 978-0192820808, pp: 400.
- Weimer, D.L. and A.R. Vining, 2004. *Policy Analysis Concepts and Practice*. 4th Edn., Prentice Hall, ISBN: 13: 978-0-13-183001-1, pp: 528.
- Wilson, A. and A.J. Tyrchniewicz, 1995. *Agriculture and Sustainable Development: Policy analysis on the Great Plains*. International Institute for Sustainable Development, USA., ISBN: 1-895536-38-3, pp: 108.