International Journal of Agricultural Management and Development (IJAMAD)
Available online on: www.ijamad.com
ISSN: 2159-5852 (Print)
ISSN:2159-5860 (Online)
DOI:10.5455/ijamd.164538

Analysis of Communicative Factors Affecting in Application of Sustainable Rice Farming Practices among Paddy Farmers of Mazandaran Province

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Received: 16 July 2014,
Accepted: 10 September 2014

Abstract

The main purpose of this study was to analyze of communicative factors affecting in application of Sustainable Rice Farming Practices among paddy farmers of Mazandaran province. The statistical population of consisted of paddy farmers of Mazandaran province (N= 208839). According to Cochran formula, a sample of 240 farmers was selected through cluster sampling method. To collect data, a questionnaire was designed. Reliability of the questionnaire was measured by computing Cronbach's alpha (α ≥0/7) and its validity was approved by a panel of expert. Factor analysis revealed that communicative factors affecting in application of Sustainable Rice Farming Practices were four factors including: organizational communication, modern communication, local interpersonal communication and external interpersonal communication, respectively according to their importance. These factors explained 67.92 percent of the total variance.

Keywords:
Communicative factors, Communication, Paddy farmers, Sustainable Rice Farming Practices

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INTRODUCTION

Despite long-standing introduction of sustainable agriculture in the globe, fast decline of critical agricultural resources due to erosion, increase the salinity of soils, desertification, extinction of species and environmental pollution are a matter of great concern in global reports (Shahvali and Moshfegh, 2005). This is due to different factors such as lack of farmers' awareness and knowledge about sustainable agriculture; their ignorance about consequences of natural resources destruction and most important, dominant perspective of applying conventional agricultural system which is often based on using external inputs and increasing commercial and export crops production are emphasized (Koucahki, 1997; Wauters *et al.,* 2010).

In this regards, paddy agriculture system, has been based on chemical external inputs since many years ago. This led to diseases and pests' resistance and higher production costs and environmental problems in rice production. Paddy farmers, have ignored, sustainable agricultural technologies and faces many challenges when try to adopt them.

Theoretical models have categorized adoption in three paradigm i.e. economic barriers of adoption paradigm (factors affecting adopter's behavior including natural resources, access to capital, learning costs, capital and attitude toward risk taking), innovation diffusion and adoption (factors affecting adopters' behavior such as access to information) and adopters' perception paradigm (factors affecting adopters' behavior including access to information, individual factors, human values, experience, training and level of understanding about sustainable agriculture) (Posthumus *et al*., 2010). Innovation adoption and adaptors' perception paradigms that emphasis on access to information and affective factors on behavior have a wider application (Reimer and Prnokopy, 2014). In this regard, many researches (Ajzen, 2001; Ajzen and Fishbein, 2000; Briñol and Petty, 2009) showed that behavior is influenced by attitude and attitude is influenced by believes which is changed by information received from environmental communication channels and is modified by previous experiences (Kim *et al*., 2008) Then communication can change behavior through affecting believes and attitude. Therefore for changing behavior, content, source, contextual characters of message and communicational networks are very important (Petty and Cacioppo, 1996). Communicative networks' users, often faces a vast volume of contradicting information (Sparks *et al.,* 2013), and their perception, intention and behaviors about an issue is dependent of these information and their perception about attraction, information symbol and credit of source (Briñol and Petty, 2009; Hansen, 2005; Papathanassis and Knolle, 2011; Sigala, 2011; Sparks and Browning, 2011). Then, it can be said that individual behavior in adoption and application of sustainable Rice farming practices among paddy farmers affected by his/her communication and amount and type of information resources and communication channels used are very important. As Rogers (1995), believed that, communication, is the most important factor of agriculture modernization (Hejazi *et al.*, 2011). Then ignoring the communication program in any plan or project and supposing that communication will be naturally formed is a great mistake and an important opportunity for guaranteeing efficient communication will be missed (Ramirez and Quarry, 2004). So, the basic question is that what are communicative factors affecting Application of Sustainable Rice Farming Practices? Few studies have addressed this issue which will be reviewed in the next part.

Makokha *et al.* (1999) showed that participation of farmers in agricultural workshops and seminars and contacting with extension organization was effective to decision making on applying conservational operations in agriculture.

Mahboubi *et al*. (2005) showed that intending to consult with local leaders, awareness of soil conservation consequences, and number of training course participated and amount of information about conservation attained from radio and pamphlets, have a positive relationship with soil conservation operation.

Rezvanfar and Zare (2006) concluded that television, Colleagues and fishermen, friends and Relatives, and radio were respectively the

most effective on adoption of GPS. In contrast, extension agents, newspaper, pamphlets and publications were respectively the least effective on adoption of GPS. They also categorized the communication channels whit respect to efficiency into five category i.e. cosmopolitan province channels, profit local channels, nonprofit local channels and television, through factor analysis. Bagheri *et al.* (2008) showed that education, contact with agricultural experts and presence in extension programs were the most important predicators of paddy farmers' aptitude toward applying sustainable agriculture technologies in Haraz region in Mazandaran province.

Shahvali *et al.* (2008) emphasized that in terms of communication and informing, radio and television were the most important information resources in the region and most of the farmers tried to meet their need for technical, political, economic and social information through these mass media. Furthermore wheat growers tried to upgrade their practices through interact with extension center and rural cooperatives and acquire information about weather and agricultural inputs distribution condition. Moreover, it is worth to take into consideration that computer and satellite receivers had special status among people of region so that these two technologies can be named as new gateway of informing in the region. Kutter *et al*. (2011), in a research entitled "the role of communication in adoption of precision agriculture is very important and communication factors such as phone, Email, internet, face to face meeting, webpages, fax and post, field day, fair, seminar, workshop, announces, demonstration farms and scientific journals had a great role in it.

Given to the importance of the issue and reviewed related literature, the main purpose of this study was to investigate the communicative effective factors in Application of Sustainable Rice Farming Practices among paddy farmers of Mazandaran Province, Iran. For meeting this aim following objectives were addressed:

1- Prioritization of information resources and communicative channels for Application of Sustainable Rice Farming Practices among paddy farmers of Mazandaran Province

2- Examining the level of using information resources and communicative among paddy farmers with respect to applying sustainable farming practices of rice.

3- Factor analysis of communicative factors affecting applying sustainable farming practices of rice.

MATERIALS AND METHODS

Data for this survey study were collected using a structured questionnaire during 2013-2014, which addressed Paddy Farmers of Mazandaran Province. Face validity of the instrument was approved by a panel of experts. A pilot study was conducted with 30 farmers. The aim was to test and improve the questionnaire. Revisions were made based on the pilot study. Responses from the pilot test were not included in the final analysis. Reliability of the questionnaire was measured by computing Cronbach's alpha coefficient. Cronbach's alpha coefficient was calculated at 0.7 or higher for different part of the questionnaire, indicating an acceptable level of reliability.

The statistical population of the study consisted of 208,839 paddy farmers, working in Mazandaran province, Iran. The sample size was determined based on Cochran's formula, which consisted of 240 participants selected via a cluster random sampling approach.

The survey instrument contained a series of questions to which participants responded by indicating their level of application of communicative channels and recourses on a four-point scale ranging from never, to always (Not at all= 0, Rarely= 1, Often= 2, Always= 3).

Sustainable rice farming practices is sowing seeds in appropriate time and applying appropriate amount of main inputs i.e. Tillage practices, supplying nutrition elements through fertilizers, plant protection against pest, diseases and weeds and appropriate crop rotation (Hotfield and Karlen, 2007). Thus in this study sustainable rice farming practices was defined as producing rice process from seed to seed, considering appropriate time, amount and method of input consumption and agricultural practices.

For examining the level of paddy farmers ap-

Table1: Rankings of information sources use by paddy farmers.

Information resources	Mean	SD	CV	Rank
Agricultural experts	2.82	0.46	0.163	1
Elite farmers	2.66	0.54	0.203	2
Neighbors	2.53	0.65	0.256	3
Spouse	2.49	0.65	0.261	4
Relatives	2.40	0.72	0.300	5
Children	2.38	0.72	0.302	6
Farmers from other villages	2.11	0.71	0.336	7
Orchardist (Kiwi and citrus	2.32	0.85	0.366	8
Agricultural inputs seller	2.38	0.89	0.373	9
Islamic council	2.11	0.82	0.388	10
Extension contacts	1.88	0.73	0.388	11
Village manger	2.07	0.83	0.400	12
Rural cooperative	2.14	0.92	0.429	13
Faculty members of agricultural colleges	1.33	0.74	0.556	14
Agricultural researchers	1.36	0.76	0.558	15

(Scale: Not at all= 0, Rarely= 1, Often= 2, Always= 3)

plying different type of communication, sum of all items scores (the level applying each communicative channels and resources) was computed. For further investigation of this summative score, ISDM[1] was applied to categorize respondent into three class in terms of their use of communicative channels and resources. This classification conducted according to following formula (Gangadharappa *et al.*, 2007; Movahed Mohamadi *et al.*, 2012).

Weak: A < ($\overline{X}$ - ½ SD)

Medium: B ($\overline{X}$ - ½ SD) - ($\overline{X}$ + ½ SD)

Strong: C > ($\overline{X}$ + ½ SD)

Findings

The average of respondents' age was 52.9 (SD=13.67). The average of agricultural experience was 34.69 (SD=15.95). 93.33 percent of the respondents were man and 6.66 percent of them were woman.

Coefficient of Variation (CV) was used to rank the communication channels and sources used by paddy farmers and results were summarized in Tables (1) and (2). Prioritization showed that agricultural experts, elite farmers, neighbors, spouse and relatives were the most used information sources for attaining information about sustainable farming practices of rice. Faculties of agricultural colleges and agricultural researchers were least used sources.

Furthermore, ranking of communication channels (Table 2) showed that face to face meetings, province TV network, question and answers sessions, training classes and announces were the most used channels for attaining information about application of sustainable farming of rice. Modern communication channels least used were internet and computer.

Classification of paddy farmers with respect to their total score of using different type of communication by Interval of Standard Deviation from Mean (ISDM) is reported in Table (3). Most of the respondents settled in medium category, that is, most of them use a medium level of communication.

Given to diversity of communication channels, factor analysis was applied to reduce the variables and categorize them into communicative affective factors of sustainable farming practices of rice.

To categorize communicative channels and information resources factors affecting application of rice sustainable farming practice and to determine the variance explained by each factor, an exploratory factor analysis approach was conducted. Using principal components approach, communicative channels and information resources were reduced into four factors. In order

[1] *Interval of Standard Deviation from Mean*

Table 2: rankings of communicative channels use by paddy farmers.

Communicative channels	SD	CV	Rank	SD
Face to face meetings	2.60	0.61	0.234	1
Province TV network	2.62	0.69	0.263	2
Questions and answers sessions	2.45	0.74	0.302	3
Training classes	1.53	0.50	0.326	4
Announces	1.53	0.50	0.326	4
Cell phone	1.25	0.43	0.344	5
Phone	2.20	0.77	0.350	6
Group discussion	2.26	0.81	0.358	7
Playing instructional films by agricultural experts	2.06	0.77	0.373	8
National TV	1.74	0.68	0.390	9
Newspaper and magazines (The press)	2.11	0.84	0.398	10
Visiting research farms	1.47	0.59	0.401	11
Field day	2.30	0.93	0.404	12
Booklet, publication and brochure	1.71	0.70	0.409	13
Instructional agricultural CDs	1.77	0.73	0.412	14
Week of conveying findings	1.60	0.66	0.412	15
Video	1.17	0.49	0.418	16
Farmer field school	1.74	0.73	0.419	17
Workshops	1.75	0.74	0.422	18
Agricultural fairs	1.44	0.62	0.430	19
Field trip	1.85	0.80	0.432	20
Province radio	1.90	0.85	0.447	21
Poster	1.85	0.83	0.448	22
National radio	1.60	0.96	0.600	23
Research plan in continuous years	1.27	0.78	0.614	24
Research plan in 1 year	1.42	0.90	0.633	25
Book	1.37	0.87	0.635	26
Agricultural Message system (for cell phone)	1.24	0.81	0.653	27
Seminar and	1.37	0.91	0.664	28
Computer	1.02	0.86	0.843	29
Internet	0.92	0.86	0.934	30

(Scale: Not at all= 0, Rarely= 1, Often= 2, Always= 3)

to test the appropriateness of data for factor analysis KMO (0.882) and Bartlett's test (4193.930, p<0.000) were applied. According to Kaiser Criteria there were four factors with Eigen values more than 1. These four factors explained 68.373 percent of variance .These results were summarized in Table (4).

Eigen values, variance percentage and the cu

Applying Varimax Rotation Method these factors were named: "Organizational communication", "Modern communication", "Local interpersonal communication" and "External inter-

Table 3: Frequency of paddy farmers in terms of their use of different types of communication for application of sustainable rice farming practices.

Level of using communication	Frequency	Percent	Valid percent	Cumulative percent
Weak: < 82.875	57	23.75	25.22	25.22
Medium: 89.705 – 82.75	95	39.58	42.04	67.26
Strong: > 89.705	74	30.84	32.74	100.00
Missing	14	5.83	-	
Sum	240	100.00	100.00	

Mean=86.29 SD= 6.83 Min= 66 Max= 106

Table 4: The extracted factors along with the Eigen values, variance percentage and the cumulative variance percentage.

Cumulative variance	Percent of explained variance	Eigenvalue	Factor
22.948	22.948	5.278	First
44.689	21.741	5.000	Second
59.985	15.295	3.518	Third
68.373	8.388	1.929	Fourth

Bartlett's test =4193.930 ***p<0.000 KMO= 0.882

Table 5: Factors of communicative channels and information sources for application of sustainable rice farming practice explored and labeled.

Factor name	Variables	Factor load
Organizational communication	Farmer Field School	0.883
	Workshop	0.782
	Visiting research farms	0.842
	Agricultural fairs	0.804
	Week of conveying findings	0.789
	Field trip	0.782
	Face to face meeting	O.770
Modern communication	Playing instructional films by agricultural experts	0.887
	Instructional agricultural CDs	0.825
	Province TV network	0.812
	Announces	0.797
	Agricultural Message system (for cell phone)	0.776
	National TV	0.773
Local interpersonal communication	Local elite farmers	0.778
	Spouse	0.748
	Orchardist (Kiwi and citrus	0.738
	Children	0.693
	Relatives	0.653
	Neighbors	0.590
External interpersonal communication	Agricultural experts	0.697
	Agricultural inputs sellers	0.652
	Rural cooperatives	0.510

Bartlett's test =4193.930 ***p<0.000 KMO= 0.882

personal communication" which were reported in Table (5).

CONCLUSIONS

Ranking of amount of information resources use showed that paddy farmers mostly acquire information of sustainable farming of rice from agricultural experts, local elite farmers, neighbors, spouse and relatives. This can be due to convenient access to these information resources. Exploiting these resources is not usually expensive and time consuming. Furthermore, neighbors and relatives usually have common profits which make them reliable information resources of each other. Using agricultural experts as the first information resource is consistent with Bagheri *et al.* (2008); Makokha *et al.* (1999) and Shahvali *et al*. (2008). They pointed out the relationship of farmers with extension and agricultural experts. Importance of local elite farmers, neighbors, and relatives is consistent with Rezvanfar and Zare (2006). And the role of spouse is Consistent with Mahboubi *et al.*, (2005).

According to findings; face to face meeting, consistent with Kutter *et al*. (2011), province TV network, consistent with Rezvanfar and zare (2006) and Shahvali *et al.* (2008), questions and answers sessions, training classes and announces,

consistent with Mahboubi *et al.* (2005), were respectively the most common communicative channels for acquiring information about sustainable rice farming practices. Furthermore, internet and computer were the least common modern channels. This is mostly due to age and education level of respondents which were mostly middle-aged and illiterate or under-literate; i.e. people who usually can not apply these channels.

Findings, also revealed that, more than half of the studied paddy farmers (70.42) have used different kind of communication at medium or high level, for applying rice sustainable farming practices. This shows that respondents have an appropriate access to communication for application sustainable forming practices of rice.

Factor analysis revealed that communicative resources and channels can be categorized into four factors i.e. organizational communication, modern communication, local interpersonal communication and external interpersonal communication. These factors explained 67.92 percent of total variance.

Following suggestions are recommended:

As finding showed, only 23 percent of studied the paddy farmers, used different kind of communication at low level and most of the respondent had appropriate use of communication related to sustainable farming practices of rice. Furthermore, communicative factors, explained 68 percent of total variance of applying rice sustainable farming practice. This is indicative of importance of communication for extension of sustainable farming practices of rice. Thus appropriate planning whit considering farmers need for enriching efficient communication with paddy farmers should be taken into account in order to increase their knowledge, information and awareness about rice sustainable farming.

Organizational factor explained the highest share of total variance. This factor consisted of items such as farmer field school, workshop, fair and week of conveying findings. These are experiential or visual methods of education. Then these kinds of methods are more efficient for training farmers about sustainable farming practices of rice.

Interpersonal communication consisted of two factors in factor analysis indicative of the importance of this type of communication. Moreover, should be attended and used modern communication channels such as educational films and CDs and other items along whit it. For example these items can be given to the audiences at the end of training courses. This is emphasis on transferring one message with several channels and will lead to more attention and application to message by audiences.

Given to role of local interpersonal communication and key role of spouse in paddy farming, paddy farmers should be trained with their spouses and families. Also, group training such as field trip, can enrich interpersonal communication which can be covered total person in paddy farmers' local communication network such as other farmers, orchardists, Islamic council members and others.

Providers of agricultural inputs are continuously contacted with farmers and have critical role in inputs consumption process. Thus they, as an important source of information about sustainable farming practices, should be trained. Furthermore, related organizations can use communicative print material such as poster, brochure, announce and leaflet which can be read easily and fast, in place of inputs sale to convey messages about sustainable farming practice such as method of inputs consumption and health and safety to farmers and sellers of inputs. Moreover, agricultural inputs sellers should be required to work under the supervision of agricultural experts at least in the season of inputs consumption.

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