Communication Strategies for Sustainable Animal Husbandry in Kohgilooyeh County: the Application of Evidential Reasoning

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Abstract

"Information", "persuasion", "dialogue" and "consensus building" were taken as the possible communication strategies to facilitate Sustainable Animal Husbandry (SAH) in rural areas of Kohgilooyeh County, Southwestern Iran. Also, various different aspects of SAH attributes were considered which include organizational sustainability, sustainable programs, use of proper media, focusing on target customers, and suitable monitoring- evaluation systems. The study was carried out using Evidential Reasoning, a Multiple Attribute Decision Making (MADM) technique, to choose the most appropriate communication strategy for SAH in the study area. Results indicated that, generally, "dialogue" was the first communication strategy that should be chosen for SAH. Of course, it was revealed that communication strategies would vary depending on the attributes of sustainability. More detailed results, especially about how to choose media based on the communication strategy, are presented in the body of the paper.

Keywords: Sustainable animal husbandry, Communication strategies, Evidential Reasoning, Kohgilooyeh.

انتخاب راهبرد ارتباطی بهینه برای توسعه پایدار دامپروری شهرستان کهگیلویه: کاربرد استدلال بر پایه شواهد

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چکیده

هر برنامه توسعه را می‌توان یک فرآیند ارتباطی دانست. بنابراین، با توجه به ضرورت انتخاب راهبرد ارتباطی مناسب، این مهم در مقاله حاضر مورد توجه قرار گرفت. برای این منظور، چهار راهبرد ارتباطی اصلی اطلاع رسانی، ترغیب، مذاکره و حصول توافق به عنوان مهم‌ترین راهبردهای ارتباطی در نظر گرفته شدند و به کمک تکنیک استدلال بر پایه شواهد که از جمله تکنیک‌های ریاضیاتی تصمیم‌گیری چند خصیصه‌ای می‌باشد، راهبرد بهینه ارتباطی مشخص گردید. از طرف دیگر، با در نظر گرفتن این نکته که کشاورزی شامل سه زیر بخش فعالیت‌های زراعی، باغی و دامی می‌باشد، برای عینی‌تر و کاربردی‌تر بودن یافته‌های پژوهش، این مطالعه در زمینه فعالیت‌های دامی انجام گرفت. معیارهای پایداری فعالیت‌های دامی در جنبه‌های مختلف شامل "پایداری سازمانی"، "پایداری برنامه‌ها و فعالیت‌ها"، "بکارگیری رسانه های ارتباطی مناسب"، "تمرکز بر مخاطبان واقعی" و "نظام مناسب نظارت و ارزشیابی" سازماندهی شدند. داده‌های میدانی مطالعه به ویژه در زمینه ارزیابی مقدماتی و نهایی معیارهای پایداری، از روستاهای شهرستان کهگیلویه جمع‌آوری گردید. یافته‌های مطالعه نشان داد که انتخاب بهترین راهبرد ارتباطی بستگی به جنبه‌ها و معیارهای مختلف پایداری دارد. اما به طور کلی، با در نظر گرفتن تمامی جنبه‌های پایداری فعالیت‌های دامی، راهبرد مذاکره بهترین راهبرد ارتباطی در مجموع، انتخاب شده است. شرح بیشتر و دقیق‌تر یافته‌های پژوهش به ویژه به چگونگی انتخاب رسانه‌های ارتباطی با توجه به راهبرد مربوطه در متن مقاله آمده است.

کلمات کلیدی: راهبردهای ارتباطی، توسعه پایدار دامپروری، استدلال بر پایه شواهد، کهگیلویه.

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Introduction

Sustainable development programs such as SAH are a communication process since, during this process, development agents communicate innovations to specific clientele (Karami and Fanaee, 1995). Most of the existing literature on communication show that there is a real need to shift from one-way informative to two-way consensus, intuitive, empowerment and active communication strategies (Melkote, 1998; Gitta, 2000; Chambers, 1997; Wallace, 1994). This poses the question: is the above orientation a universal and prescriptive direction or it is opportunistic and situation dependent?

Evidential Reasoning as a MADM technique was used to answer the above question because MADM techniques use mathematical calculations to choose the best decision or alternative from a set of attributes (Cheng, 2000; Xu and Yang, 2005). Moreover, the best alternative is a choice (e.g. a communication strategy) that provides the optimum utility of the supposed goal (e.g. SAH) (Asgarpoor, 2002; Cheng, 2000).

Thus if we can identify the best alternative, i.e. the optimal communication strategy with regard to SAH attributes, then the above-mentioned question can be answered more precisely. Therefore, this study considered two objectives: firstly, to determine a set of SAH attributes for Kohgilouyeh County; and secondly, to choose the best communication strategy for those attributes.

Materials and Methods

In this study ER as a MADM technique was used to choose the best communication strategy for SAH in the study area. Of course, MADM techniques are very diverse (e.g. AHP; SAW; ELECTRE3, ELECTRE4, TOPSIS, CP and ER) with a various range of applications (e.g. to select the best irrigation method: Ebrahimi, 1997; to choose the best strategy of water pricing: Ganoulis, 2001; to develop a sustainable decision making model for municipal solid waste management: Hung, *et al.*, 2006; to determine the priority of cleaner production: Ghazinoori, 2004; to evaluate offshore technologies for water management: Sadiq, *et. al.,* 2005; or for self assessment in small and medium enterprises: Xu and Yang, 2003).

During recent decades, some deficiencies of the classic MADM techniques have been revealed (Triantaphyllou, 2001). Therefore, it is necessary to find and use new MADM techniques that deal with these short-comings. ER is one of these new techniques. Some special characteristics of ER are as follows (Xu and Yang, 2005; Xu and Yang, 2003; Xu, *et al.,* 2006):

- Alternatives are evaluated in terms of a belief degree such as best, good, average, poor and worst. Thus, decision matrixes are two dimensional; including pair-wise comparisons scores and belief degrees. This matrix structure is referred to as an "extended matrix".
- Instead of mean scores in classic techniques, the Dempster and Shafer Theory of evidence is used to aggregate evidences in ER.
- Enhancement of an approximate reasoning process is followed by some specific rules.

With regard to the basic theoretical and mathematical framework, such as the method of evaluation (judgment) and aggregating, ER does

not display the irregularities of classic techniques. Furthermore, by using developed software such as the Intelligent Decision System (IDS), the above steps, especially the complex mathematical calculations, could be performedeasily.

ER performance involves some decision making steps. Of course, most of them are similar across different MADM techniques (based on Xu and Yang, 2005; Asgarpoor, 2002; Ebrahimi, 1997; Cheng, 2000). These steps are:

1. Determination of attributes and alternatives;

The literature on sustainability shows that, although most studies view the context of sustainability in terms of its "socio-cultural", "economic-technical" and "environmental" aspects (Pearce, 2006; Shahvali, 2005; Segnestam, 2002; Karami, 1995; Gilman, 1992), it would be more useful if sustainability were also considered in terms of a communication process (Nooripoor and Shahvali, 2007). Therefore, SAH attributes were considered based on the basic Rogers and Shoemaker's communication model (1998) including "source", "message", "channel "," receiver" and "feedback. According to this view, sustainability elements included:

- Development organizations as sources
- Sustainable programs (socio-cultural, economic-technical, and environmental) as messages
- Communication media as channels
- Customers (farmers) as receivers
- Monitoring and evaluation (MandE) of development programs as the feedback system.

Therefore, a SAH as a communication process will be more sustainable if there is: more organizational sustainability, more sustainable programs, effective communication channels, focus on real costumers, and an appropriate monitoring and evaluation (MandE) system (Nooripoor and Shahvali, 2008).

Sustainability attributes for each one of the above elements were determined in two stages:

- In stage 1, attributes were obtained from literature reviews and library research.
- In stage 2, a survey method was used in the Kohgilooyeh County to determine the most problematic criteria for the study area. For this purpose, a questionnaire including criteria (attributes) obtained from the first stage was designed with close-ended statements and a Likert-type scale. The questionnaire was validated by five specialists on the subject. A pilot study was conducted with 30 samples taken from the total research sample. The reliability coefficient of 0.72- 0.86 was calculated using Cronbach's Alpha reliability coefficient. Based on ER rules, expert respondents should be selected for the study. Thus, for this purpose, 35 informants were selected from the staff of Agricultural Services Centers of the study area. Also, to collect more realistic data, 75 Local Extension Aids were considered and selected using Patton's table of random samples (Patton, 2000). These two groups of respondents were asked to assess problematic SAH attributes in the region. Based on the mean score and variance, SAH attributes were developed for the region.

Communication strategies were regarded as decision alternatives in this study. There is abundant literature about various communication strategies; however in this study, Ruler's definition of communication strategies (Ruler, 2004) was taken as the basis of all the possible communication strategies, because it describes them with a parsimonious view called the "communication grid". This framework is shown in figure 1.
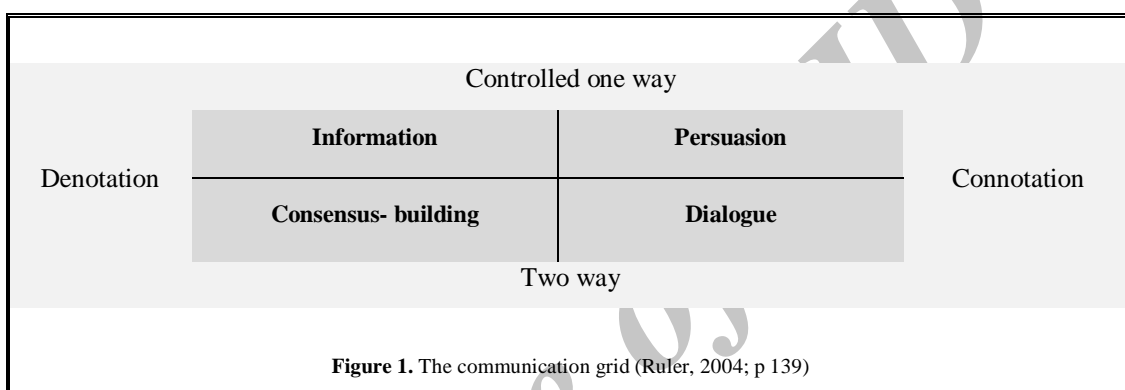
requires informational messages from both sides, and an aware public.

- *Consensus-building strategy* deals with building bridges between two parties. This strategy covers a process of mutual agreement. It advocates an active public and clear negotiation.

2. Development of a decision tree;

A decision tree is a structure that shows the

	Controlled one way		
Denotation	Information	Persuasion	Connotation
	Consensus- building	Dialogue	
	Two way		

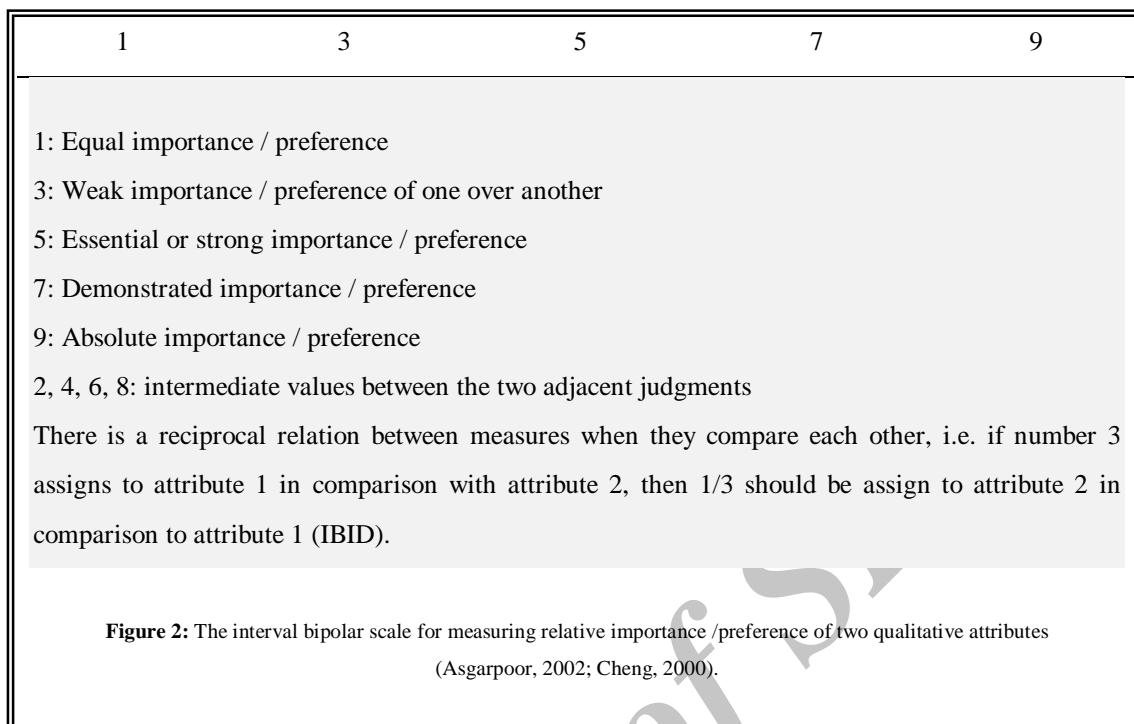**Figure 1.** The communication grid (Ruler, 2004; p 139)

According to Ruler's framework; four main communication strategies are (IBID):

- *Information strategy* is the strategy of just informing someone about something. The strategy demands a well-defined policy (since there has to be a clear message), an informative message, and an inherently aware and well-informed public.
- *Persuasion strategy* is the basis of advertising and propaganda. It is a targeted tuning of the knowledge, attitude and behavior of specified others. This strategy demands a well- rounded policy, a persuasive message and a latent public.
- *Dialogue strategy* is seeking consultation with specific stakeholders, with regard to developing their policies. It is a facilitating strategy and

relations between ultimate goal and level(s) of attributes. It is also includes alternatives (Asgarpoor, 2002; Cheng, 2000).

3. Pair- wise comparison of attributes and evaluation of alternatives;

Informant decision maker(s) judge(s) the relative importance of attributes with respect to the ultimate goal and evaluation of alternatives using belief degrees (Xu and Yang, 2005). In this study, nine more informants and Local Extension Aids were employed as decision makers. They compared and weighed up the attributes and evaluated alternatives. The scale usually is used for a comparison of two qualitative attributes, it functions as a bipolar scale as shown in figure 2.

1	3	5	7	9

1: Equal importance / preference

3: Weak importance / preference of one over another

5: Essential or strong importance / preference

7: Demonstrated importance / preference

9: Absolute importance / preference

2, 4, 6, 8: intermediate values between the two adjacent judgments

There is a reciprocal relation between measures when they compare each other, i.e. if number 3 assigns to attribute 1 in comparison with attribute 2, then 1/3 should be assign to attribute 2 in comparison to attribute 1 (IBID).

Figure 2: The interval bipolar scale for measuring relative importance /preference of two qualitative attributes (Asgarpoor, 2002; Cheng, 2000).

4. Development of extended matrixes;

The results of the above judgments and evaluations are presented in a framework called an extended matrix. The Inconsistency Ratio (IR) shows possible error(s) in pair-wise comparisons. Inconsistency ratio should be less than 0.1 otherwise; the decision maker should re-evaluate the judgment until the ratio is finally less than 0.1 (IBID).

5. Determination of attributes and alternatives weights and priorities

The Intelligent Decision System (IDS), a software developed for doing ER, was used in this study for calculations and to determine attributes and alternatives weights and priorities.

Results

The results of SAH attributes from literature reviews, based on the SAH attributes model and according to the communication elements are shown in Table 1. In addition, Table 2 shows the most problematic SAH attributes revealed from research surveys from the study area. After determination of SAH attributes and communication strategies as alternatives, the decision tree was developed to include levels of attributes and alternatives. Figure 3 shows the tree view of SAH model which its attributes are arranged at two levels.

Entering data resulted from pair-wise comparisons of attributes and evaluation of alternatives (communication strategies) to Intelligent Decision System (IDS) Software will conclude the development of an extended matrix and attributes priorities. Table 3 shows the results.

Table 1- SAH Attributes derived from the literature.

	Organizational sustainability	Decentralization and customers' participation; establishment of intermediate associations including: customers and officials; privatization; cost- sharing with customers; coordination/ cooperation among different development agents/organizations (Haji- Mir Rahimi, and Karami, 1997; Stevis, 1988; Gitta, 2000; Chambers, 1997; Roy, 1982; Wallace, 1994; Rogers, 1992)
Sustainable programs	Socio-cultural	Rural- urban migration rate reduction; income generating; Health, nutrition, housing and employment improvement; Recreational opportunities and education provision; crime and stress reduction; prevalence of perma-culture; social security availability; motivation for achievement (Moshfeq, 2002; Segnestam, 2002; Meyer, 2000; Walker, *et al.*, 2000; Gates and Lee, 2005)
	Economic- technical	Animal products export; nutrition uses of animal products; direct marketing; profitability of animal husbandry; availability of labor force (Birthal and Rao, 2001; McGlone, 2001; Thompson and Nardone, 1999)
	Environmental	Diversity in animal husbandry; animal manure management; amount of drugs and hormones; using open animal husbandry systems; swirl usage of pastures to reduce dependency of animals to pastures (Hoden, 2005; Puskur, *et. al.*, 2004; Thompson and Nardone, 1999)
Proper communication media		Two- way, interactive and participative communication; attractive communication; using local and volunteer leaders (Melkote, 1998; Sharma, 2003; Panford, *et al.*, 2001; Warren, 2002; Tiffin and Tiffin, 2005; Kenny, 2000)
Focus on real costumers		More focus on rural poor, youth and women (Lahsaeezadeh, 2000; Karami and Fanaee, 1995; Roy, 1982; Chambers, 1997)
Suitable MandE system		Participative and people- oriented M&E such as empowerment M&E (Fetterman, 1997)

Table 2- SAH attributes revealed from survey research in study area.

Organizational sustainability		Cost- sharing with customers; coordination/ cooperation among different development agents/organizations; reducing corruption among staff
Sustainable programs	socio- cultural	Provision of recreational opportunities; employment improvement t; prevalence of perma-culture
	economic- technical	increasing animal products export; improving animal husbandry profitability
	environmental	Reducing animals dependency to pastures, animal manures management
Proper communication media		Two- way and interactive communication; attractive communication
Focus on real costumers		More focus on rural poor, youth and women
Suitable M&E system		Participative and people- oriented M&E

Information   Persuasion   Dialogue   Consensus- building

- 📁 **sustainable animal husbandry**
  - 📁 **organizational sustainability**
    - 📄 **cost sharing with customers**
    - 📄 **reducing corruption among staff**
  - 📁 **appropriate development programs**
    - 📄 **increasing employement**
    - 📄 **providing recreational opportunities**
    - 📄 **decreasing migration**
    - 📄 **increasing animal products' export**
    - 📄 **Improving animal husbandry profitability**
    - 📄 **Reducing animals dependency to pastures**
    - 📄 **animal manures' management**
  - 📁 **proper communication media**
    - 📄 **two- way interactive communication**
    - 📄 **Entertaining communication**
  - 📁 **focus on real customers**
    - 📄 **rural youth**
    - 📄 **rural poor**
    - 📄 **rural women**
  - 📁 **suitable M&E**
    - 📄 **participatory M&E**
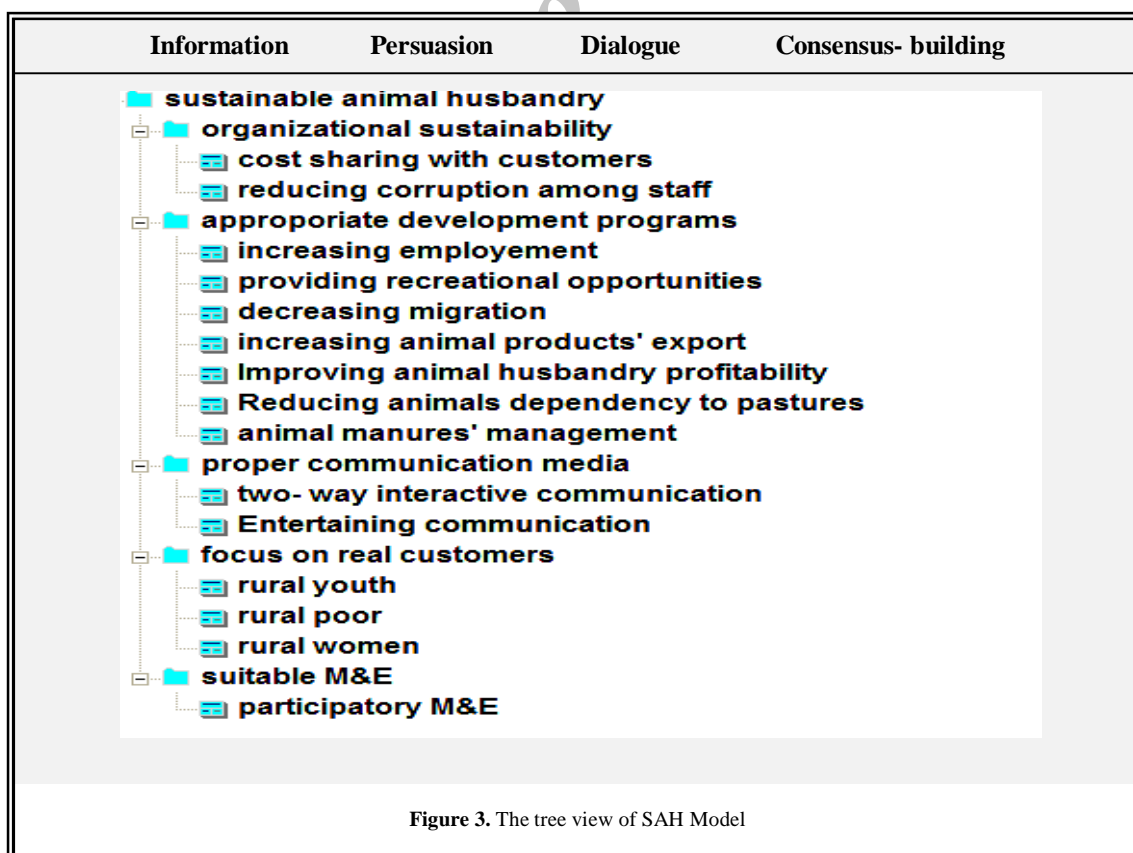
Figure 3. The tree view of SAH Model

Table 3. The extended matrix and priorities of attributes

Goal	Priority and percentages of 1st and 2nd level attributes	Belief degrees and related percents of attributes			
		information	persuasion	dialogue	cons. building
Sustainable animal husbandry	**1. Suitable monitoring and evaluation system (27)** / 1-1. participatory monitoring and evaluation	P(35) a(65)	p(33) a(34) g(35)	a(50) g(50)	a (30) g(60) b (10)
	2. Sustainable programs (25)	p(21) a(13) g(66)	P (1) a(49) g (50)	P (1) a(35) g (64)	P (1) a(55) g (4)
	2-3. reducing migration (27)	P(35) a(65)	a(50) g(50)	a(35) g(65)	a(50) g(50)
	2-5. improving animal husbandry profitability (16)	p(33) a(34) g(33)	a(50) g(50)	a(65) g(35)	P(35) a(65)
	2-4. increasing animal products export (14)	g(100)	a(50) g(50)	a(65) g(35)	P(35) a(65)
	2-6. reducing animals dependency to pastures (13)	P(35) g(65)	a(50) g(50)	g(100)	a(50) g(50)
	2-1. increasing employment (13)	a(50) g(50)	g(100)	a(35) g(65)	a(50) g(50)
	2-7. animal manure management (11)	P(35) g(65)	a(100)	a(65) g(35)	a(50) g(50)
	2-2. providing recreational services (6)	a(50) g(50)	P (33) a(34) g (33)	P(35) g(65)	a(50) g(50)
	3. Proper communication media (23)	P (3) a(62) g (35)	a(58) g(42)	P (3) a(35) g (62)	a (69) g(3) b (28)
	3-1. two-way communication (75)	a(65) g(35)	a(65) g(35)	a(35) g(65)	a(65) b(35)
	3-2. entertaining communication (25)	p(33) a(34) g(33)	a(25) g(75)	p(33) a(34) g(33)	a(65) b(35)
	4. Focus on real customers (15)	p(44) a(52) g(4)	p(18) a(73) g(9)	a(5) g(95)	p(5) a(61) g(34)
	4-1. rural youth (55)	P(50) a(50)	g(100)	g(100)	a(65) b(35)
	4-2. rural poor (24)	p(35) a(65)	p(25) a(75)	a(65) b(35)	p(33) a(34) g(33)
	4-3. rural women (21)	p(33) a(34) g(33)	p(33) a(34) g(33)	g(100)	a(65) g(35)
	5. Organizational sustainability (10)	p(53) a(41) g(5)	a(23) g(77)	p(3) a(94) g(3)	p(28) a(3) g(69)
	5-2. reducing corruption among staff (75)	P(50) a(50)	a(25) g(75)	a(100)	p(35) g(65)
	5-1. cost sharing with customers (25)	P(50) g(50)	a(25) g(75)	p(33) a(34) g(33)	a(35) g(65)

Evaluation scores: excellent (e), good (g), average (a), poor (p) and very poor (v)

Priority of communication strategies was also derived from the Intelligent Decision System Software calculation. The results are shown in Table 5.

Figure 4 shows the trade-off analysis of first level of SAH attributes with respect to optimum goal (SAH). This structure represents the score of each alternative on X and Y axis and as well as the aggregation of communication strategies.

Table 4. Priorities for communication strategies.

Goal	Attributes in priority	Alternatives priority and related scores			
		1	**2**	**3**	**4**
Sustainable animal husbandry	**Suitable monitoring and evaluation system**	**C(70)**	**D(62)**	**P(50)**	**I(41)**
	Participatory monitoring and evaluation				
	Sustainable programs	**D(65)**	**P(62)**	**I(61)**	**C(59)**
	Reducing migration	D(66)	C(62)	P(62)	I(57)
	Improving animal husbandry profitability	P(62)	D(58)	I(50)	C(51)
	Increasing animal products export	I(75)	D(66)	C(62)	P(62)
	Reducing animals dependency to pastures	D(75)	P(62)	C(62)	I(57)
	Increasing employment	P(75)	D(66)	C(62)	I(62)
	Animal manures management	C(62)	D(58)	I(57)	P(50)
	Providing recreational services	C(62)	I(58)	D(57)	P(50)
	Proper communication media	**D(64)**	**C(64)**	**P(60)**	**I(57)**
	Two-way communication	C(67)	D(66)	P(58)	I(58)
	Entertaining communication	P(68)	C(58)	D(50)	I(50)
	Focus on real customers	**D(73)**	**P(66)**	**C(57)**	**I(40)**
	Rural youth	D(66)	C(50)	P(43)	I(41)
	Rural poor	C(72)	P(68)	D(63)	I(63)
	Rural women	D(75)	C(58)	P(50)	I(50)
	Organizational sustainability	**P(69)**	**C(60)**	**D(50)**	**I(37)**
	Reducing corruption among staff	P(68)	C(57)	D(50)	I(37)
	Cost sharing with customers	P(68)	C(66)	D(50)	I(50)
		D(64)	**C(62)**	**P(60)**	**I(49)**

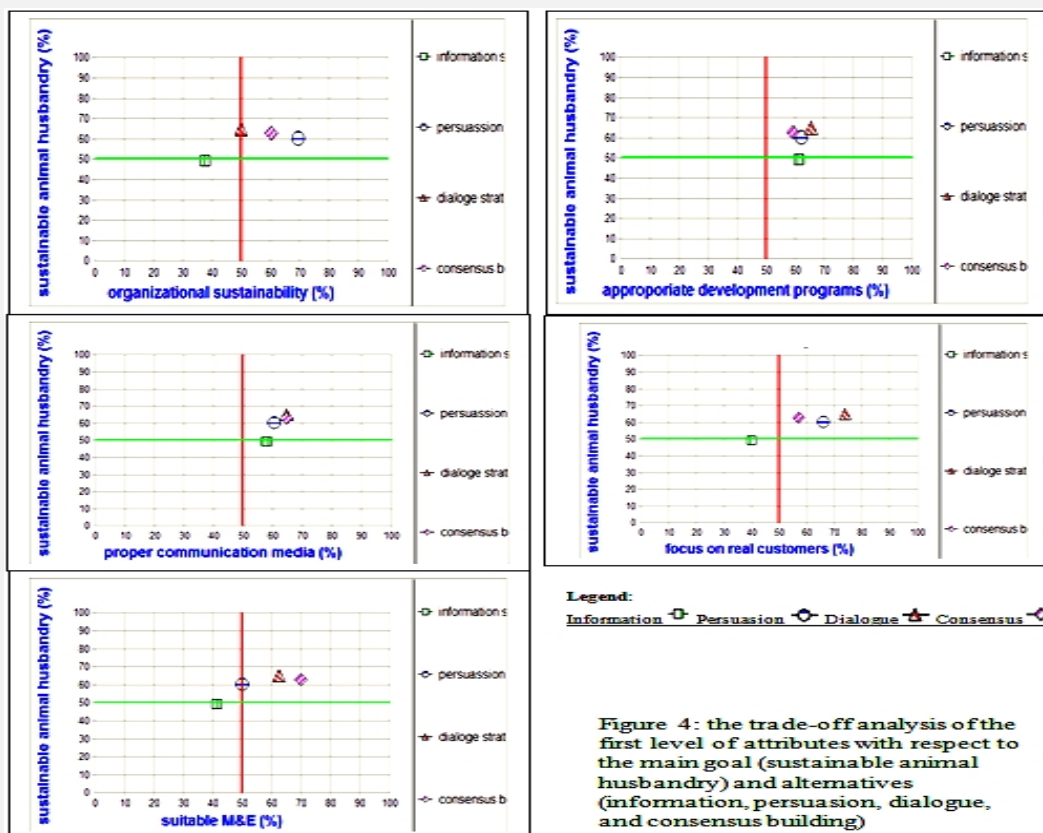Alternatives: I (information), P (persuasion), D (dialogue), C (consensus- building)

Figure 4: the trade-off analysis of the first level of attributes with respect to the main goal (sustainable animal husbandry) and alternatives (information, persuasion, dialogue, and consensus building)

Discussion

Most of the existing literature divides sustainability into three main aspects: economic-technical; socio-cultural and environmental. But in this study we used a broader view and considered sustainability from a communication perspective. According to this perspective, sustainability subjects such as SAH have five main aspects: *organizational sustainability* (e.g. decentralization and cost-sharing with customers); *sustainable development programs* in socio- cultural (e.g. health, nutrition and employment improvement), economic- technical (e.g. marketing and profitability of animal husbandry) and environmental (e.g. diversity in

animal husbandry; animal manure management) sub-aspects; *proper communication media* (e.g. two-way, interactive and participative communication media); *focus on real costumers* (e.g. rural poor); and *suitable M&E system* (e.g. participative and people- oriented M&E).

To achieve the supposed sustainability, different communication strategies can be used. According to the findings of this study Evidential Reasoning (ER), a MCDM technique, is a helpful decision making tool for choosing communication strategies for sustainability purposes.

In classic MCDM processes, decision makers

should compare and balance the criteria and the alternatives need to be compared paired-wisely. This is a subjective and complex process that is difficult for most people particularly rural people or farmers. But to do ER, criteria are also compared pair-wisely but alternatives are evaluated using belief degrees. Therefore, the ER process is less complex and more subjective than classic techniques. Moreover, ER is a flexible technique and its process can be carried out even with incomplete information about some criteria or alternatives.

With regard to the findings of this study, "dialogue" was identified as the best communication strategy for SAH programs. This result is in line with general trends of communication models in past decades.

According to (Melkote, 1998); (Gitta, 2001); (Mefalopulos, 2003), communication models and strategies have evolved from one-way informative to two-way mutual and participative models. Dialogue is also a two-way communication strategy (Ruler, 2004).

If we want to consider priority of communication strategies in detail, it is clear that special communication strategies are suitable for certain sustainability objectives. Table 5 shows these relationships.

It is also possible to classify the findings of this study on the basis of one-way or two- way communication strategies. For example, based on Ruler (2004), "information" and "persuasion" are one way and "dialogue" and "consensus building" are two-way communication strategies.

Table 5. Priority of communication strategies with respect to different roles and functions.

Strategies	Identified roles	Functions with regard to each role
Information	Providing sustainable programs	Increasing animal products exports
Persuasion	Organizational development	Reducing corruption among staff
		Cost sharing with customers
	Providing sustainable programs	Increasing employment
		Improving animal husbandry profitability
	Providing proper communication media	Entertaining communication
Dialogue	Providing sustainable programs	Reducing rural- urban migration
		Reducing animals dependency to pastures
	Development of target groups	Rural youth
		Rural women
Consensus-building	Providing sustainable programs	Animal manures management
		Providing recreational services
	Providing proper communication media	Two-way communication
	Development of target groups	Rural poor

Thus, information and dialogue strategies are suitable for some sustainability purposes that don't need mutual and participative communication. In other words, they are accessible via publicity using mass media. But functions of the other two strategies usually need two way- participative occasions. That involves development of disadvantaged target groups such as rural poor, women and youth; specifically, they need to have a close relationship with them to assess their needs and to know their aspirations and trends.

Recommendations

Based on the above discussions, some recommendations are presented here:

1. To consider sustainability criteria more precisely, it is necessary to categorize and organize them. The five elements of categorization for sustainability criteria used in this study present a useful tool for this purpose. By this categorization, sustainability criteria are arranged based on the main components of a communication process.

2. Sustainable development programs such as SAH are usually hindered by limited availability of resources. Therefore, it is necessary to find a way to prioritize different programs and goals and then allocate resources to those goals. MADM techniques such as ER are very useful for this purpose. This technique can be used for prioritization of needs in need assessment phase of development programs.

3. Each communication strategy can be followed using special media. For example, mass media are useful for persuasion/ motivation purposes; but folk media such as local festivals and ceremonies can be used to develop close and reciprocal relationships. Inter/intranet is a modern medium able to provide opportunities for mutual communication, but its use is different from that of folk media. The Internet and Intranet are ineffective in the establishment and maintenance of a close relationship with poor customers and it is also useful for communication with young people. Of course, further research is needed to establish in detail the applicability of different media with regard to communication strategies.

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