ORIGINAL ARTICLE

Modeling and analyzing affective factors on dispersion and division of farming lands in paddy workers' view at Sari Township

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ABSTRACT

The main goal of this research is to analyze effective factors on dispersion and division of farming lands in paddy workers' view at Sari Township. Sample society includes all paddy workers of Sari Township at Mazandaran province. We used classified random sampling in order to choose samples based on dispersion of villages. The sample was 50 (n=50). Cronbach Alpha coefficient was 0/90 (a=0/90). SPSS 19 and Lisrel 8.7 and Amos 19 were used for data analysis. The result of exploratory factor analysis shows that these six variables: facilities and equipment, economic factors, land quality, heritage, legislation, and social-cultural factors explain 73.68% of total variance. This model was confirmed by factor analysis ($x^2/df \leq 3$ and RMSEA = 0.078). result of step by step regression showed that number of workforces other than family members, number of family workforce, agriculture history, fertility of land pieces, income of non-agriculture activities, age, slope of most land pieces, and level of literacy explain about 57.2% dispersion changes and land division (modified coefficient $AdR^2 = 0.572$ and coefficient of determination $R^2 = 0.61$).
Key words: dispersion of land farming lands, paddy workers, modeling, Sari

INTRODUCTION

Agriculture unit should response to food needs of current and future population of our society as basis of economy of society. In formation of new systems in agriculture section and using technology and mechanized different level of agriculture process (cultivation, preserve, harvest) irregular dispersion of land pieces is considered as preventive factor which reduced efficiency and increased production costs. Natural, social-cultural, economic and political, historical and geographical processes each one play different role typically in farming land dispersion. These main factors depends on environmental conditions in each place prepared the field for land dispersion and has main role in exacerbation of process [1].

Researchers, experts and policy makers of agriculture according to those changes in use system of land concluded that dispersion phenomenon and small land under cultivation is one of basic problems of Iran agriculture [3]. In dispersion and fragmentation of lands, great amount of farming lands was involved in boundaries, borders and irrigation canal, so possibility of proper use of water sources wouldn't be prepared [14]. Todays, dispersion of land pieces is basic barrier in way of progress and development of agriculture and rural society [2]. Gradually, land dispersion is considered as basic barriers of agriculture development [13].

Todays, dispersion of land pieces is basic barrier in way of progress and development of agriculture and rural society [10].

 Whatever farming lands be smaller and dispersed then using modern technologies would be harder and causes decrease or lack of use of scientific and new methods of production, protection or fertility of farming soil, fight with pest and plant diseases, and all are considered as serious threat for soil fertility and environment and sustainable development. In agriculture production and rural development of Iran,

farming land dispersion is considered as basic barrier [11]. Land dispersion also follows positive and undesired effects [5]. Reasons for land dispersion can be assessed at two main classes of natural and geographical causes (e.g. river, flood, hill, ups and down, mountains and valleys) and social and economic causes (e.g. customs, heritage laws, land reforms, buy and sell, and security) [4]. Generally combination of factors such as natural phenomenon, difference in soil fertility, distance from water source and residential areas, land reforms, irrigation method, slope of land, type of activity, cultivation sample, crop rotation, doing real estate transactions, dividing farming land among inheritors, farm capacity all are effective factors on land dispersion and division [12]. Land integration as an suitable approach in order to access sustainable use of ground sources does not merely consider amount of farming land in order to establish balance and integration in farming lands but also consider other aspects such as improving quality of farming lands, reconstructing environmental conditions and progress in setting economic form [15]. Process of land integration not also can solve structural issues of rural lands but also can create incentives for creating economic diversification and proper fields for growth and rural development through improving rural infrastructural services[9].

Size of farms varies from one country to another and one production to other one. But however, combination of factors such as different natural effects, difference in soil fertility, distance from water source and residential areas, land reforms, irrigation method, slope of land, type of activity, land type, cultivation sample in operations, dividing farming land among inheritors, doing real estate transactions, and land capacity and capability, all are effective factors on dispersion and division of farming lands. because awareness of dispersion of farming land, its effects, and effective factors on it can play key role in preparing goals of agriculture sustainable development. In this research, effective factors on dispersion of farming lands across paddy lands of Sari Township were assessed. Main goal of this research is to analyze effective factors on dispersion and division of farming lands in view of paddy workers of Sari Township. Consequently, it has specific goals including: finding information sources, recognizing type of ownership, identifying type of farming system, identifying extent of awareness of integration benefits, attitude toward development of land integration, identifying extent of use of mechanized sets, identifying level of technology used by paddy workers and etc.

MATERIALS AND METHODS

This research is analyzing-descriptive type. In this research we used documents review and Internet searches and then field studies. The statistical society in this research includes all paddy workers of Sari Township at Mazandaran Province.

We used classified sampling method with proportional assignment in order to choose samples based on dispersion of villages. Thus, the sample size was 150 (n=150). The research tool for data collection was questionnaire which its validity was obtained by professor of agriculture college and experts of agriculture organization of Mazandaran province and the reliability was calculated by pre-test in other city through filling questionnaire that the Cronbach Alpha was 0/90 (a=0/90). Independent variables of the research includes: performance degree, number of workforces other than family members, number of family workforces and … and the dependent variables includes: division and dispersion of lands. There are many indexes of land dispersion in order to measure variable of "agricultural land dispersion" which includes: number of pieces, mean of piece size, and Simon's index [1]. In this research, we used "number of pieces" index in order to measure dependent variable. We used descriptive methods, exploratory factor analysis and regression methods in order to analyze data and access to aimed goals and also we used SPSS 18 and Lisrel 8.7 and Amos 19 software and finally effective factors on dispersion were presented which were confirmed by factor analysis.

RESULTS

Mean of respondents' age was 52.83 and their literacy level (90% of them) was lower than Diploma degree. Mean of farming work history and number of family members were 32.88 and 6 respectively. These paddy workers had mean of rice cultivation of 29.12 years and most of them were owner (76.7%). Type of farming soil was mainly sandy-clay mix (75.3%). Type of farming system of them was farming and farming-ranching (86.9%). About type of used data source by these paddy workers based on calculated rated average, other experiences farmers were at first rank and experts of agriculture extension were at second rank. Number of family workforces and number of workforces other than family members were 4 and 3 respectively. Results of using some economic variables by these paddy workers showed that most of them didn't benefit those loans, consulting services about integration and insurance of agriculture productions. In paddy workers view, increased irrigation efficiency and increased income, were at first and second rank respectively.
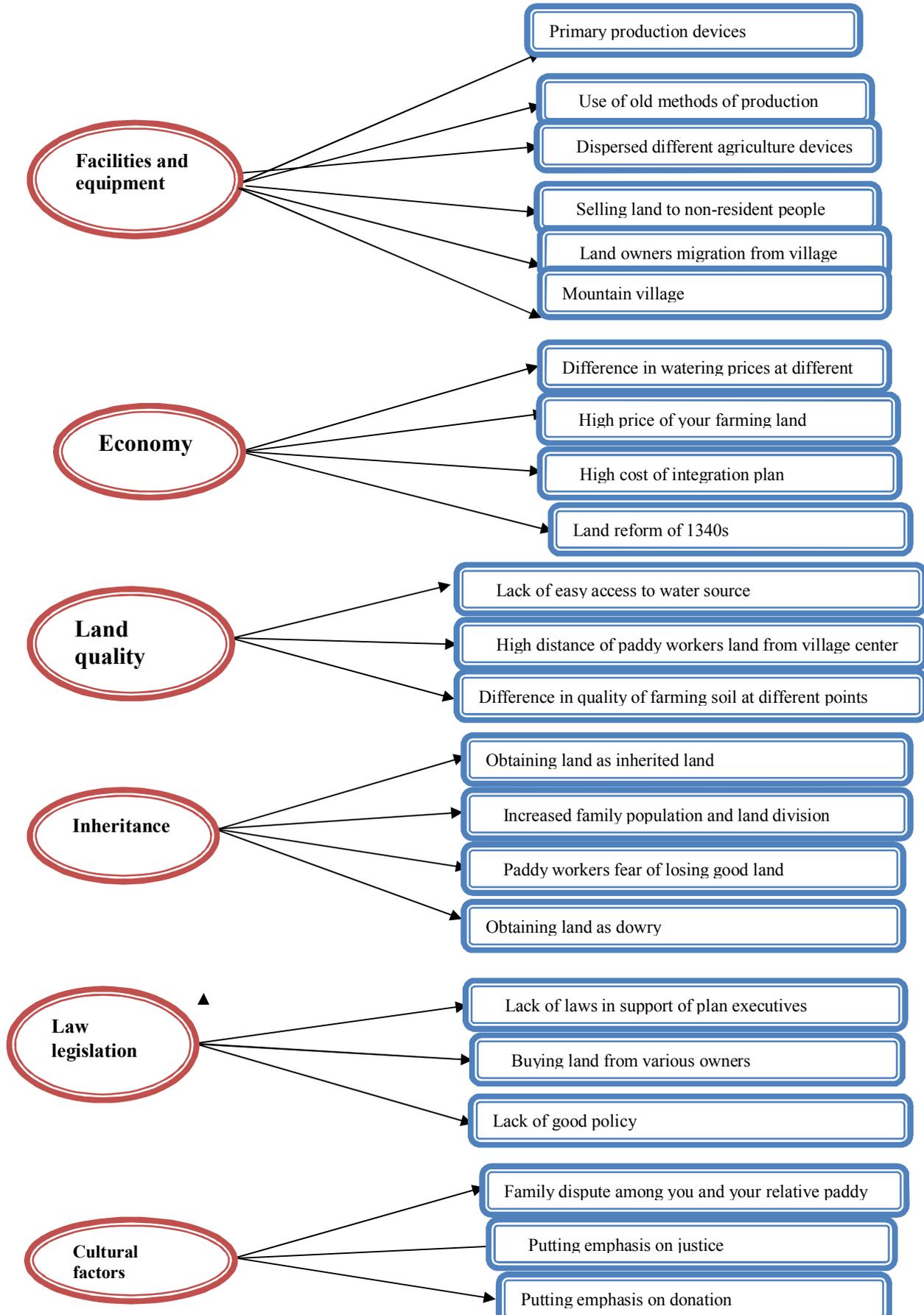
Fig1: model of effective factor on approved dispersion by approval factor analysis

The diagram shows the following latent factors (ovals) and their indicators (boxes):

Facilities and equipment
- Primary production devices
- Use of old methods of production
- Dispersed different agriculture devices
- Selling land to non-resident people
- Land owners migration from village
- Mountain village

Economy
- Difference in watering prices at different
- High price of your farming land
- High cost of integration plan
- Land reform of 1340s

Land quality
- Lack of easy access to water source
- High distance of paddy workers land from village center
- Difference in quality of farming soil at different points

Inheritance
- Obtaining land as inherited land
- Increased family population and land division
- Paddy workers fear of losing good land
- Obtaining land as dowry

Law legislation
- Lack of laws in support of plan executives
- Buying land from various owners
- Lack of good policy

Cultural factors
- Family dispute among you and your relative paddy
- Putting emphasis on justice
- Putting emphasis on donation

Based on results of exploratory factor analysis about cases which are effective on land dispersion in framers view; KMO was 0/80 and values of Bartlet test was 1841/912 (P<0/.01) which shows suitability of data for factor analysis. The obtained factors were presented with certain value and Variance percentage and Cumulative Variance percentage in table (1). Generally, these six factors explain 73.68% of total variance of land dispersion in farmers view which shows that was explained at high level by these factors.

Table1: certain values (Eigen value), cumulative and Variance percentage

factor	Certain value	Variance percentage	Cumulative frequency of variance percentage
Facilities and equipment	4/659	20/255	20/255
Economic factor	2/993	13/012	33/266
Land quality	2/568	11/164	44/430
heritage	2/324	10/105	54/535
legislation	2/239	9/736	64/271
Social cultural factors	2/164	9/411	73/681

Table2: correlation coefficients of variables with each factor (factor loads)

factor	variables	Factor load
Facility and equipment	Primary production devices	0/776
	Use of old ways of production	0/803
	Dispersion of different agricultural instrument	0/790
	Selling land to non-residence people at village	0/817
	Migration of those who own lands and no cultivation	0/790
	Mountain villages	0/773
economic	Difference of watering price at different places of village	0/783
	High price of farming land at certain place of village	0/746
	High cost of land integration plan	0/709
	Land reforms at 1340's	0/609
Land quality	Lack of easy access to water sources at villages	0/791
	Far distance of paddy workers' farming lands from center of village	0/805
	Different land quality at different places of village	0/867
heritage	Owning land as an inheritance	0/524
	Increased population of families and land division as inheritance among inheritors	0/537
	Fear of losing good lands	0/753
	Obtaining land as wife's dowry	0/610
legislation	Lack of laws in support of integration plan executives	0/692
	Buying land from various owners	0/650
	Lack of good policy in order to prevent land division by inheritors	0/577
Cultural factors	Family dispute between you and family paddy workers who have land pieces near your land and prevent land swap with other paddy workers' land	0/558
	putting emphasize on executing justice in exact determination of ownership	0/849
	Putting emphasize on donation	0/660

Determining fitting of confirmatory factor model

In this research, values of Chi-Square for fitting of model (after modifying) was 430/93 and degree of freedom was 147 (x^2/df ≤ 3) and values of RMSEA (root mean square Error of Approximation) was 0/078 (≤0/10RMSEA) which shows acceptable fitting of model (according to Jorskug & Surbum, Gephen et al and Marchland (7,6,8) .

In this paper, T-value was significant for all variables that represent suitability of apparent variables for estimation of hidden variable so wasn't represented in table. Next parameter is to estimate non-standardized value which it means that each change unit in apparent variable to how extent can change hidden variable if other independent variables being constant. In addition to significant factor loads, the calculated R2 (except for variables of fear of losing good lands R2=0/28 and variable of obtaining land as wife's dowry R2=0/22) shows explanation of high percentage of changes in hidden variable by apparent variable. For example, 88% of changes of facilities and equipment factor were explained by variable of primary production devices.

Table3: results of assessment of model measurement section

factor	variables	Non-standardized estimation	R2
Facility and equipment F1	Primary production devices	0/81	0/88
	Use of old ways of production	0/80	0/64
	Dispersion of different agricultural instrument	0/76	0/59
	Selling land to non-residence people at village	0/85	0/71
	Migration of those who own lands and no cultivation	0/74	0/54
	Mountain villages	0/80	0/64
Economic F2	Difference of watering price at different places of village	0/63	0/40
	High price of farming land at certain place of village	0/79	0/62
	High cost of land integration plan	0/65	0/42
	Land reforms at 1340's	0/77	0/63
Land quality	Lack of easy access to water sources at villages	0/72	0/52
	Far distance of paddy workers' farming lands from center of village	0/70	`0/49
	Different land quality at different places of village	0/94	0/88
heritage	Owning land as an inheritance	0/77	0/59
	Increased population of families and land division as inheritance among inheritors	0/75	0/56
	Fear of losing good lands	0/52	0/28
	Obtaining land as wife's dowry	0/47	0/22
legislation	Lack of laws in support of integration plan executives	0/65	0/42
	Buying land from various owners	0/77	0/59
	Lack of good policy in order to prevent land division by inheritors	0/76	0/58
Cultural factors	Family dispute between you and family paddy workers who have land pieces near your land and prevent land swap with other paddy workers' land	1/05	0/64
	putting emphasize on executing justice in exact determination of ownership	0/84	0/43
	Putting emphasize on donation	1/03	0/62

Correlation analysis and regression analysis:

Pearson correlation coefficient was used for correlation of independent variables with division and dispersion of lands. Data of research reveals that there is direct and significant relation at 0/99 level between number of workforce other than family members and land division and dispersion and the value is r= 0/420. Correlation of other independent variables with dispersion and division of lands was represented in table4.

Table4: results of Pearson correlation test

R	Independent variable	Dependent variable	r value	Sig level
1	Performance level of your rice	Dispersion and division of land	0/297	01/0**
2	Number of workforce other than your family members		0/420	01/0**
3	Number of family workforce		0/272	01/0**
4	Non-agriculture income		0/247	01/0**
5	Rice cultivated extent		0/228	01/0**
6	Slope of land		0/231	01/0**
7	Farming work history		- 0/139	039/0**
8	Land fertility		0/208 -	011/0*
9	Context of farming soil		0/217 -	01/0**

Results of step by step regression showed that variables of number of workforces other than family members, number of family workforce, agricultural work history, fertility of farming lands, income of non-agricultural activities, age, high slope of land pieces, and literacy level totally explains about 57/2% of changes in land dispersion and division (adjusted coefficient of determination was R2Ad=0/572 and coefficient of determination was R2=0/61) (tables 5 and 6).

Table 5: determination coefficients of effective factors on land dispersion

step	variable	Correlation coefficient R	R2 coefficient	Determination of F-value
1	Number of workforces other than family members	0/42	0/177	** 31/76
2	Number of family workforce	0/50	0/238	** 24/24
3	Agricultural work history	0/60	0/342	** 26/9
4	Fertility of land pieces	0/65	0/423	** 26/6
5	Income of non-agricultural activities	0/70	0/48	** 26/95
6	age	0/72	0/52	** 26/91
7	High slope of land pieces	0/74	0/55	** 24/50
8	Literacy level	0/75	0/56	** 22/41

Table6: extent of effect of studied variables on land dispersion and division

variable	Standard coefficient B	Non-coefficient Beta	Standard T	SIG T
Constant coefficient	3/56	-	2/44	0/016
Number of workforces other than family members X1	0/24	0/41	6/43	0/000
Number of family workforce X2	0/38	0/35	4/37	0/000
Agricultural work history X3	- 0/18	-1/06	-7/71	0/000
Fertility of land pieces X4	-1/42	-0/24	-3/85	0/000
Income of non-agricultural activities X5	5/3	0/32	5/21	0/000
Age X6	0/10	0/55	3/83	0/000
High slope of land pieces X7	0/75	0/21	3/02	0/003
Literacy level X8	0/09	-0/16	-2/03	0/045

Line equation of regression of land dispersion and division is as following:

$0.24X_1 + 0.38 X_2 – 0.18X_3 – 1.42X_4 + 5.3X_5 + 0.1X_6 + 0.75X_7 – 0.09X_8 + 3.56 Y=$

β equation in order to identify share and effect of each independent variable in land dispersion and division is as following:

$0.41X_1 + 0.35 X_2 – 1.06X_3 – 0.24X_4 + 0.32X_5 + 0.55X_6 + 0.21X_7 – 0.16X_8 Y=$

CONCLUSIONS AND SUGGESTIONS

Mean of farmers' age is about 53 years and mean of agricultural work history is 33 years and mean of their rice cultivation history is 29 years which shows old age and high experience in agriculture field in this studied region. Results shows that mean of piece of families is about 4 pieces and mean of size of each piece is about 4700 meters and mean of distance between each piece is about 900 meters which shows agricultural land dispersion in studied region.

High mean of family size (6 people) also and mean of family workforce (3 people) and workforce out of family (4 people) and also low share of non-agricultural income in economy of family show that farmers high dependence on agriculture and subsistence economy based on it caused the regions being seriously exposed to division and dispersion. Results of exploratory factor analysis shows that these six factors (facilities and equipment, economic factors, land quality, heritage, legislation, and social-cultural factors explain about 73.68 % of total Variance. Many factors also involved in agricultural land dispersion but it should be noted that all these factors wouldn't be affected in a same way.

Dependency of family income on agriculture caused that farmers try to mitigate risk of monoculture cultivation by cultivating various production. Therefore, whatever this dependency being increased number of cultivated production will be increased which is index of risk mitigation in subsistence economy and finally the land dispersion will be increased. Positive coefficient of number of family workforce also shows that whatever the agriculture be more traditional and the family income be

dependent on income of agriculture then more family members will involve in agriculture production and consequently, their demand for land will increase land dispersion.

Studies show that per capita availability of land in village depends on changes of land quality (access to water, soil type, drainage conditions and access to road).

These variables wasn't signified in this model but regression results show that variable of fertility of farming land pieces has negative role and is significant in extent of dispersion which was considered as a scale for land quality. At the other hand, variable of income of non-agricultural activities has positive and significant role in extent of dispersion. So as it is expected, increased level of family income of agricultural activities which is result of economized agricultural activities due to support and proper manage of farm, can lead to adjusted dispersion. Variable of literacy level also can play positive and significant role in extent of dispersion thus according to results some suggestions are represented:

- Land is important factor in land agricultural land dispersion in addition to mean of family income. Some rules should be legislated to prevent agricultural land dispersion through adjustment in land division rules. Legislation in the field of optimum size of farming land at different regions and/or the least size of land that can't be divided can prevent more division of useful lands.

- Variable of family workforce also is considered as main factors in agricultural land division. Because variable of share of non-agricultural income also effect on number of pieces and those families with non-agricultural income, rarely tend to cultivate dispersed and small pieces. Therefore, development of non-agricultural jobs especially rural micro industries for villagers' employment has main role in decreased irregular land dispersion.

- Diversity of cultivation effects on land dispersion because diversified uses, is significant feature of subsistence uses. Thus, development of marketing and storage infrastructure, storing, insurance and supportive subsidiaries for micro farmers play main role in adjusting dispersion in result of this factor.

- Since that literacy level of people has direct and significant role in extent of dispersion so increased awareness of paddy workers especially by other farmers and extension experts whom are considered as main information resources and especially through educational and extensional courses as school approaches at farms and etc. can play main role in adjusting dispersion.

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