Journal of Agricultural Machinery
Vol. 11, No. 1, Spring- Summer 2021, p. 43-53

نشریه ماشین‌های کشاورزی
جلد ۱۱، شماره ۱، نیمسال اول ۱۴۰۰، ص ۵۳-۴۳

Full Research Paper

Effect of Fragmentation of Land on Agricultural Mechanization Development using AHP Technique

M. Sabati Gavgani[1], D. Mohammad Zamani[2*], M. Gholami Par-Shokohi[2]

Received: 09-11-2019
Accepted: 20-07-2020

Abstract

The agricultural sector is in need of a rapid transition from traditional and livelihoods to the stage of advanced production and commercialization, in order to provide food security for the community and to play an effective role in strengthening national independence. Mechanization is an approach that allows the agricultural sector to achieve the stage of commercial production. Without mechanization, there is no clear vision of a dynamic and sustainable agriculture that can rectify the food needs sensibly. The development of mechanization in agricultural societies, especially in the rural areas, has been accompanied by problems that the identification of the factors affecting it can help plan to eliminate them. Therefore, in the present study, the effect of the fragmentation of land on the development of agricultural mechanization in the rural districts has been investigated. The research type is applied and descriptive-analytic, survey method has been used and information has been collected through a questionnaire from 420 users in Jiroft city. The data were analyzed using a hierarchical analytical process technique using Expert Choice11 software. The research findings show that the family-social factor in the city of Jiroft was the main deterrent to the lack of development of mechanization and the cultural-communication, educational-technical, lawful-legal, and economic-financial factors were placed in the next priorities. It is proposed to implement the development of mechanization, the modernization of modern technology, education and promotion, building trust, credit and financial facilities for the modernization of agricultural implements.

Keywords: Analytical hierarchy process, Development of agricultural mechanization, Fragmentation of land

Introduction

Land scattering is one of the consequences of the traditional agricultural structure of country (TurkiBoldaji and Ghanbari, 2013). Such an arrangement in the land system is not exclusively for Iran and also exists in most countries with more or less proportions (Rezvani Alvarand Rachel, 2011). Today, researchers, agricultural experts and policy makers, considering the changes that have taken place in the land utilization system, believe that the dispersal and widespread use of agricultural land is one of the main problems of agricultural mechanization development (Rezvani Alvarand Rachel, 2014). Lack of economic justification for the use of technology in the production stage, the low incentive to invest in this area, the low production efficiency and the low economic profit are among the problems caused by the small-peasant farming systems (Mahdavi and Kiani, 2017).

In spite of the extensive efforts taken during the five-year development plans of Iran from 1990 to 2005 with aim of reforming the structure of the agricultural exploitation systems and the establishment and institutionalization of all types of optimum, efficient and appropriate operating system in accordance with socio-economic conditions and agricultural capacities in different regions of the country, agricultural sector continues to face this challenge in its development direction (Bagheri, 2016).

Fragmentation of agricultural lands is one of the major obstacles to sustainable agriculture development and is an obstacle to

1- PhD, Student, Department of Biosystems Engineering, Islamic Azad University, Takestan Branch, Takestan, Iran
2- Department of Biosystems Engineering, Islamic Azad University, Takestan Branch, Takestan, Iran
(*- Corresponding Author Email: Dr.dmzamani@gmail.com)
DOI: 10.22067/jam.v11i1.82910

optimal and eligible use of land, water, manpower, inputs, mechanization, creation of new ideas, precision agriculture and other factors affecting agricultural production and faces the two long-standing problems of smallholder plots, as well as the fragmentation and scattering of land by each farmer which are mainly influenced by these factors: Family-social factors such as benefits of awareness, participation, bias, family disputes and cultural-communication factors such as communication centers, the interests of group work, communication with agricultural service centers, traditional beliefs and educational-technical factors such as access to technical instructions, the presence of specialists, the availability of machines, the holding of workshops and Juridical-legal acts such as dedication, the law of inheritance, the law of participation in partnership with the owner, the way of sharing the land between the partners and economic-financial factors such as price difference between lands, bad economic conditions, machinery and equipment costs, banking facilities and etc. These are nowadays considered as obstacles to the development of agricultural mechanization in the country. This leads to a reduction in productivity, increased costs, inefficient farm management and inefficient use of new technologies, reduced agricultural investment and intensified land use changes and the elimination of small land from the production cycle, inadequate access to finance, a decrease in revenue, rural migration, and hidden unemployment, inadequate use of agricultural mechanization, inadequate use of water resources, and waste of production resources leading to a decline in agricultural output as indicators of underdevelopment (Secretariat of the Fourth Program Headquarters, 2005).

Understanding these issues and developing appropriate programs to solve or mitigate them will have implications for the agricultural sector, optimizing the potential of the agricultural sector, increasing production, increasing farmer's income, stabilizing the rural population and agricultural development (NajibiKheirabadi and Maghsoudi, 2010).

In this study, an attempt is made to take an effective step towards the development of agriculture in Jiroft by identifying the prioritization of the factors affecting the lack of development of agricultural mechanization due to the fragmentation of land using the viewpoint of the exploiters of Jiroft city. For this purpose, Hierarchical Analysis Process (AHP) technique has been used. This technique provides appropriate ways to organize information and make judgments and use them in decision-making based on ability, emotion, logic, and subject matter, then the judgments are combined into results that are consistent with internal expectations. The above process to solve complex problems by hierarchical criteria helps us to draw conclusions by extracting judgments to advance priorities (Saati, 1998)

A study conducted in Greece to study land consolidation as one of the ways to develop agriculture in Macedonia. The results showed that soil dispersion is one of the main obstacles to Macedonian agricultural development and the establishment of rural cooperatives and technical funding of the government (Grygewski, 2005). A descriptive-analytical study conducted with a survey approach to evaluate the effects of land consolidation on rural agricultural development, showed that the implementation of the integrated land consolidation plan led to a reduction in the number of agricultural plots, reduced production costs and savings in consumption. It also follows the application of agricultural mechanization in farms, increasing production and improving farmers' incomes (Falsliman and Moradi, 2011). Study to identify and analyze the factors affecting the development of agricultural mechanization in the city of Borujen showed that 45% of farmers are engaged in agriculture on lands with an area of less than 5 hectares and the biggest problem of farmers in using agricultural mechanization is the price of tools. There is a codified policy and careful planning to accelerate the development process of mechanization and land distribution and subsistence farming (Turki Boldaji and Ghanbari, 2013). A study

based on the library's study method and the study of scientific documents, as well as extensive internet searches in databases to study the history of agricultural mechanization in Iran and its policies in development programs, showed the main challenge facing the development of agricultural mechanization in Iran. The lack of a codified program is large-scale and operational, and the need to develop codified policies in the field of agricultural mechanization has been emphasized (Rezvani Alvarand Rachel, 2014). Comprehensive review of theoretical literature and library resources on the effects of land consolidation on agricultural economics with an emphasis on agricultural development, showed that one of the obstacles to rural development and transition from one stage to another is the distribution of agricultural land. In general classification, its causes include socio-cultural, economic, physical and user factors. On the other hand, agricultural development itself requires two groups of physical production factors (land, seeds, etc.) and non-physical (management). Optimum production requires the presence of physical and non-physical factors of production together (Mohammadzadeh and Amin Fenck, 2015). A study in China examined the estimated effect of land fragmentation on the use of machinery and crop production. The results showed that the integration of agricultural land consumption increases agricultural machinery and increases crop production (Lai and Roe, 2015). To investigate the effect of land size relationship on agricultural mechanization indicators in Qazvin, Iran, the three factors of inheritance, population growth and literacy had a greater impact on the distribution of agricultural land in Qazvin (Hashemipour and Mohammad Zamani, 2016). Examination of the barriers to agricultural land consolidation, showing that farmers are less inclined to integrate and prefer to engage with familiar individuals and families under the condition of temporary consolidation (Mahdavi and Kiani, 2017). In Finland a study on the effects of agriculture and the profitability of land consolidation showed that land consolidation is an effective and viable management tool to improve asset structure and, if implemented, reduce production costs by an average of 15 percent (Hyeronin and Rickenin, 2017).

In this study, the effect of fragmentation of exploitation levels on the development of agricultural mechanization with aim of finding the most important factor on the underdevelopment of Jiroft and providing appropriate solutions is discussed.

Materials and Methods

The field data were collected using a questionnaire. Jiroft city was the spatial territory of this research. Jiroft has a population of 380823 people with 4 sections, 14 rural and 1264 villages, with 762 villages having populations and 502 villages are empty. The statistical population of this research was 154867 farmers of agricultural sector that based on Cochran's formula (Equation 1), 384 farmers were selected by simple sampling method.

$$n = \frac{\frac{z^2 pq}{d^2}}{1+\frac{1}{N}\left(\frac{z^2 pq}{d^2}-1\right)} \quad (1)$$

n: Sample size.
N: The statistical population volume (population volume of the city, province, etc.).
z: The value of the normal variable of the standard unit.
p: The value of the attribute ratio in society. If it is not available, it can be considered 0.5. In this case, the amount of variance reaches its maximum value.
q: The percentage of people who do not have that attribute in society (q = 1-p).
d: The desired degree of certainty or possible accuracy or the amount of error allowed (Sobhani Fard, 2017).

We usually consider p and q equal to0.5. The value of z at the 95% confidence level is 1.96. d can be 0.01 or 0.05.

$$n = \frac{\frac{(1.96)^2\times 0.5\times 0.5}{(0.05)^2}}{1+\frac{1}{154867}\left(\frac{(1.96)^2\times 0.5\times 0.5}{(0.05)^2}-1\right)} = 384$$

In order to increase the accuracy and correctness of the results, the sample size was increased to 420. The collected data were evaluated and processed using a hierarchical technique, which is a group decision making method in complex environments. The basis of this method is the formation of a hierarchical decision tree. Each decision problem can be designed in the form of a tree. The first level of this tree represents the decision maker's purpose. Prioritizing competing options is to achieve this goal. Intermediate levels represent planners' preferred criteria for achieving the goal at the first level. The last level shows the options available to achieve the goal.

In this study, structure of the hierarchical decision tree was designed based on what is shown in Figure 1. The first level consists of the main objective of prioritizing the factors contributing to the underdevelopment of agricultural mechanization through the fragmentation of lands. The second level involves the basic criteria that influence the research goal, such as the benefits of knowledge, participation, prejudice, and so on. The final level includes the important options derived from the classification of criteria at the second level, including socio-family, cultural-communicational, educational-technical, juridical-legal, and economics-financial factors. In this research, it has been attempted to prioritize among the mentioned factors so that the planners and executives of agricultural mechanization development plan, while identifying the factors preventing agricultural mechanization development due to fragmentation of the land, attempt to eliminate it.

Comparative Tables were prepared based on the above hierarchical structure and paired comparison was performed using a scale that was designed from the same preference to the completely better one. This scale is shown in the Table 1. To calculate the numerical mean after completing the questionnaires by farmers, we will have different views on each of the options. To solve this problem, comparative tables should be combined. After preparing the hierarchical tree of geometric mean calculation, mathematical operations were performed by the Expert Choice 11 software in order to prioritize the effective factors in the underdevelopment of agricultural mechanization due to the fragmentation of the lands. Initially, relative weight of each criterion was estimated according to the purpose of comparison, and in the next step, the relative weight of each option was calculated according to paired comparison criteria.

$$a_{ij} = \left(\pi_{k=1}^{n} a_{ij}^{(k)}\right)^{\frac{1}{n}} \quad (2)$$

a_{ij}: Average geometric criterion a
a: A criterion that is compared to options
ij: Two options that compare
k: The code of the person who answered the questionnaire questions
n: Number of people who have compared criterion options (Samet, 2003).

In the real world, there is often an inconsistency. These inconsistencies may come into the model. When the incompatibility rate is zero, it means that full compatibility has occurred. As the rate rises, the inconsistency in the target also increases. Generally, if the incompatibility rate is less than 0.1, the incompatibility is relatively acceptable, otherwise a revision in judgment would be necessary.

After comparing the relative weights of the criteria of the options, it is necessary to calculate the final weight of each option. To do this, the integration process was used. In this way, the final answers to the problem were obtained.

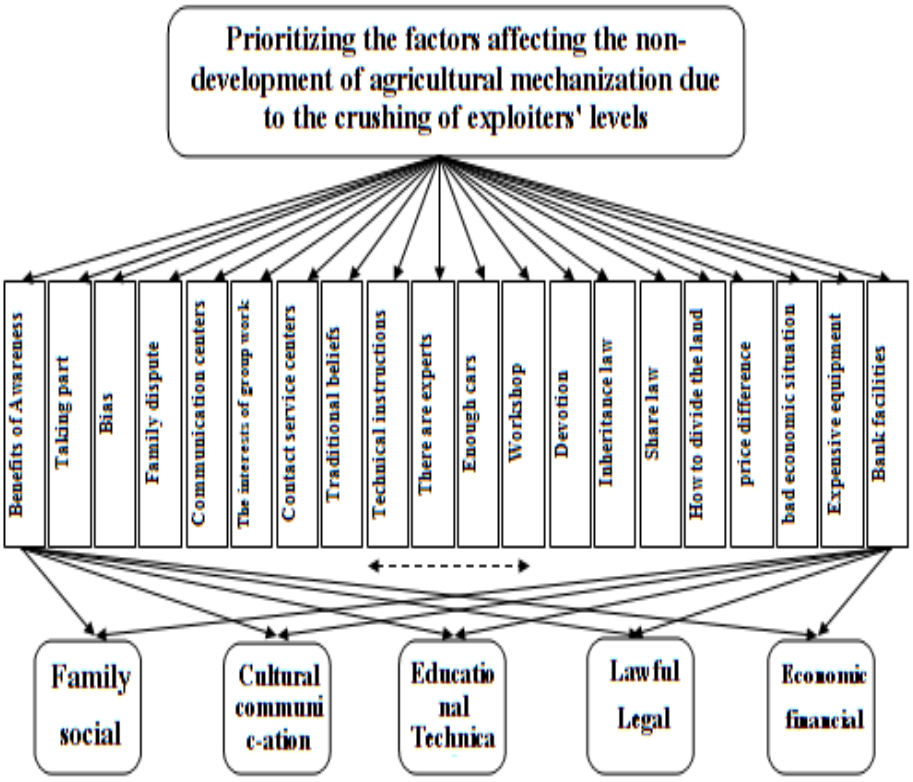

Fig.1. General structure of the tree hierarchy

Table1-Comparison of Paired Scales

1	**The same preference**	**Both options have the same effect on the target.**
3	Slightly better	The preference of one option over another (the comparative option) is small.
5	Better	The preferences of one option over another (the comparative option) is strong.
7	Much better	The preference of one option over another (the comparison option) is very strong.
9	Quite better	The choice of one option over another (the option to compare) is at its maximum.
2,4,6,8		The average scores represent the average states of each of the above comparison modes.

Results and Discussion

Comparison of criteria with respect to the purpose

In the first stage, the criteria were compared in pairs with respect to purpose of the study (prioritizing the factors affecting the non-development of agricultural mechanization due to the fragmentation of lands). According to Figure 2, which shows the pairwise comparison of criteria with respect to the purpose of the research, the criterion of knowledge and technical guidance advantages with the ratio of 0.071 and banking facilities with a ratio of 0.021 has the highest to lowest priority, respectively. The calculated incompatibility rate is 0.07, therefore, the compatibility of the criteria with the objective of the research is acceptable.

Paired comparison of options

In the second step, the options were compared in terms of criteria. Figure 3 shows the pairwise comparisons of criteria according to the benefits of knowledge. According to Figure 3, the family-social factor with the ratio of 0.356 and the economic-financial factor with the ratio of 0.041 have the highest and lowest shares respectively. The calculated incompatibility rate is equal to 0.09. Therefore, the compatibility of the criteria of the benefits of knowledge with the options is acceptable.

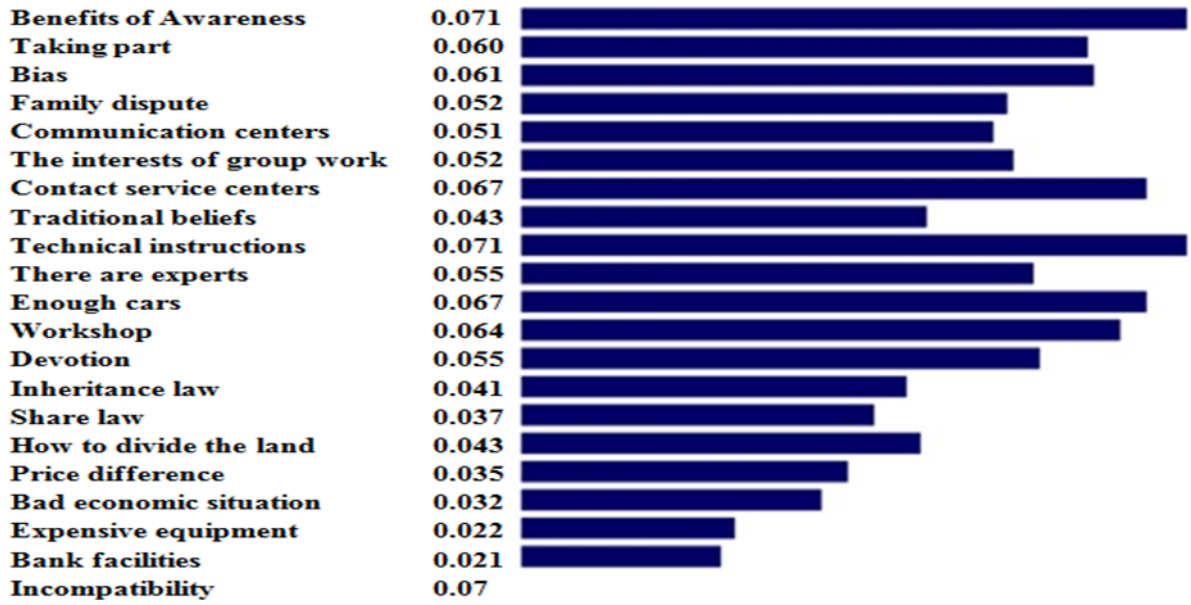

Fig.2. Comparison of the criteria in a paired relation to the purpose of the research

According to Figure 4, which shows a pairwise comparison of criteria with respect to participation criterion, the family-social factor with the ratio of 0.368 and the economic-financial factor with the ratio of 0.098 has the highest and lowest shares respectively. The calculated incompatibility rate is 0.07. Therefore, the compatibility of the participation criterion with the options is acceptable. Figure 5, shows a pairwise comparison of criteria with respect to bias criterion, and shows that the family-social factor with a ratio of 0.368 and the economic-financial factor with the ratio of 0.077 have the highest and lowest shares respectively. The calculated incompatibility rate is 0.08, so the compatibility of the bias criterion with the options is acceptable. A pairwise comparison of criteria with respect to family dispute criterion shows (Figure 6) that the family-social factor with the ratio of 0.544 and economic-financial factor with the ratio of 0.052 have the highest and lowest shares respectively. The calculated incompatibility rate is equal to 0.1, so the compatibility of the family difference criterion with the options is acceptable. According to Figure 7, which shows a pairwise comparison of criteria with respect to the criteria of communication centers, the family-social factor with the ratio of 0.479 and economic-financial factor with the ratio of 0.056 has the highest and lowest shares respectively. The calculated incompatibility rate is 0.08. Therefore, the compatibility of the centers of communication with the options is acceptable. A pairwise comparison of criteria with respect to the criteria of teamwork benefits shows (Figure 8) the family-social factor with a ratio of 0.490 and the economic-financial factor with the ratio of 0.048, has the highest and lowest shares respectively. The calculated incompatibility rate is equal to 0.09. Therefore, the compatibility of the criterion of the benefit of teamwork with options is acceptable. According to Figure 9, which shows a paired comparison of criteria according to the criteria of communication with service centers, the family-social factor with the ratio of 0.474 and economic-financial factor with the ratio of 0.047 has the highest and lowest share respectively. The calculated incompatibility rate is 0.05. Therefore, the compatibility of the criterion of communication with the service centers with the options is acceptable.

The family-social factor with a ratio of 0.526 and economic-financial factor with the ratio of 0.049 have the highest and lowest shares respectively (Figure 10). The calculated

incompatibility rate is 0.07 and since it is less than 0.1, the compatibility of the criterion of traditional beliefs with options is acceptable. Figure 11 shows a paired comparison of the criteria according to the criteria of technical guidelines, cultural-communication factor with the ratio of 0.404 and economic-financial factor with the ratio of 0.034 have the highest and lowest shares respectively. The calculated incompatibility rate is 0.07 and since it is less than 0.1, the compatibility of the criterion of technical guidelines with the options is acceptable. However, Figure 12, shows a paired comparison of the criteria according to the criterion of the existence of specialists with the family-social factor with the ratio of 0.503 and economic-financial factor with the ratio of 0.027, which is the highest and the lowest share respectively. The calculated incompatibility rate is 0.09 and since it is less than 0.1, the compatibility of the criterion of the availability of experts with options is acceptable. With respect to the adequacy of the machines (Figure 13), the family-social factor with a ratio of 0.447 and economic-financial factor with the ratio of 0.031 has the highest and lowest share respectively. The calculated incompatibility rate is 0.09 so the compatibility of the criterion of the adequacy of the machines with the options is acceptable. Figure 14 shows a paired comparison of the criteria according to the criteria of the workshop, the family-social factor with a ratio of 0.474 and economic-financial factor with the ratio of 0.033 have the highest and lowest shares respectively. The calculated incompatibility rate is equal to 0.09. Therefore, the compatibility of the workshop criteria with acceptable options is acceptable. Using a paired comparison of criteria with respect to the dedication criterion (Figure 15), the family-social factor with a ratio of 0.412 and the economic-financial factor with the ratio of 0.028, has the highest and lowest shares respectively. The calculated incompatibility rate is 0.08 so the compatibility of the endowment criterion with the options is acceptable. According to Figure 16, which shows a paired comparison of the criteria according to the law of inheritance, the family-social factor with the ratio of 0.455 and the economic-financial factor with the ratio of 0.030, has the highest and the lowest share respectively. The calculated incompatibility rate is 0.07. Therefore, the compatibility of the criterion of the inheritance law with acceptable options is acceptable. However, a paired comparison of the criteria according to the participatory law (Figure 17), the cultural factor is related to the ratio of 0.360 and the economic-financial factor with the ratio of 0.040, has the highest and lowest shares respectively. The calculated incompatibility rate is 0.09 so the compatibility of the criterion of the participatory law with the options is acceptable. A paired comparison of the criteria according to the criteria of the division of land (Figure 18), the family-social factor with a ratio of 0.316 and the economic-financial factor with the ratio of 0.073 has the highest and lowest shares respectively. The calculated incompatibility rate is 0.07. Therefore, the compatibility of the criteria for the division of land with options is acceptable. According to Figure 19, which shows a paired comparison of the criteria according to the price difference criterion, the educational-technical factor with the ratio of 0.340 and the economic-financial factor with the ratio of 0.033 have the highest and lowest shares respectively. The calculated incompatibility rate is equal to 0.06. Therefore, the compatibility of the price difference criterion with the options is acceptable. Based on Figure 20, which shows a paired comparison of criteria according to the criteria of bad economic conditions, the family-social factor with the ratio of 0.417 and the economic-financial factor with the ratio of 0.030 has the highest and lowest shares respectively. The calculated incompatibility rate is 0.08 so that the compatibility of the bad economic conditions with acceptable options is acceptable. Paired comparison of criteria according to the criteria of equipment cost (Figure 21), the cultural-communication factor with the ratio of 0.400 and the economic-financial factor with the ratio of 0.028, has the highest and lowest shares respectively.

Fig.3. Comparison of criteria in the form of a pair of criteria for awareness benefits

Fig.4. Comparison of criteria in terms of participation rate

Fig.5. Comparison of the criteria in a pairwise way to the bias criterion

Fig.6. Comparison of criteria in relation to family differences

Fig.7. Comparison of criteria in two ways compared to the criteria of communication centers

Fig.8. Comparison of benchmark criteria in comparison to the benchmark of group work benefits

Fig.9. Comparison of criteria in terms of the ratio of service centers to criteria

Fig.10. Comparison of criteria in the form of a pair of traditional beliefs

Fig.11. Comparison of criteria in a pair to the standard of technical instruction

Fig.12. Comparison of criteria in the form of a pair of experts

Fig.13. Comparison of criteria in a pairwise manner with respect to the adequacy of machines

Fig.14. Comparison of the criteria in terms of the criteria of the workshop

Fig.15. Comparison of criteria in the form of a pair of deductive criteria

Fig.16. Comparison of criteria in the form of a pair of criteria of the inheritance law

Fig.17. Comparison of benchmarks in terms of the law of participation

Fig.18. Comparison of criteria in a pairwise way to the land parcel standard

Fig.19. Comparison of criteria in a pairwise way to the price difference criterion

Fig.20. Comparison of benchmarks in terms of economic criteria

Fig.21. Comparison of criteria in terms of equipment costs

Fig.22. Comparison of benchmarks in terms of banking facility criteria

The calculated incompatibility rate is equal to 0.1 so the compatibility of the equipment cost criterion with the options is acceptable. According to Figure 22, which shows a paired comparison of the criteria according to the criteria of bank facilities, the family-social factor with a ratio of 0.434 and the economic-financial factor with the ratio of 0.032 has the highest and lowest shares respectively. The calculated incompatibility rate is 0.09. Therefore, the compatibility of the bank facilities criterion with options is acceptable.

Integration

Based on the results of the integration of options and criteria according to the purpose of the study (Figure 23) it can be concluded that among the barriers to implementation of the agricultural mechanization development project in Jiroft city, family-social factor was the most deterrent factor. The economic-financial factor is of the least importance. Finally, it can be said that the factors preventing the development of agricultural mechanization in Jiroft city due to fragmentation of lands are social-family, cultural-communication, educational-technical, lawful- legal, economic-financial.

Factors influencing the lack of development of agricultural mechanization in each region are different according to its conditions. For example, the study of Hashemipour and Zamani (2016), in Qazvin-Iran showed that the most important factors are inheritance, population growth and literacy, and in Azna-Iran, according to Mahdavi and Kiani (2017), individual-social and economic factors; and in Jiroft, family- social factors play a significant role in agricultural development.

Fig.23. The final weight of the options

Conclusions

Given the existing theoretical scope, present findings and limitations, and the results obtained from the Analytical Hierarchical Process technique model, the most important cause of land fragmentation is the family-social factor in Jiroft whereas family disputes have a strong role that village elders can play in mediation and problem solving. This process is done by involving all supply chain actors, analyzing problems and providing solutions. Applying mechanisms for organizing family farms, investing in infrastructure, adapting world technologies to country conditions in the scale of small farms (localization), marketing and branding are some of the most experienced strategies in the world for developing small farms. Familiarizing farmers with the benefits of mechanization development through promotional activities and through awareness raising will encourage them to expand the mechanization coefficient in their land. Farmers, for cultural reasons and not merely for economic reasons, have little risk-taking potential and therefore do not readily accept any new proposal simply because it is new. However, if leading farmers and local leaders who are largely trusted by farmers voluntarily implement mechanized development plans on their land, there will be considerable scope for acceptance by farmers, especially when the positive results of the plan are well known. Progressive farmers, if they accept themselves as innovators and implementers of the project on their land, will certainly help to boost the confidence of other farmers. Another influential factor was the technical skills of farmers. Undoubtedly, one of the obstacles to the acceptance of technology by farmers is the lack of skills in the use of equipment, which tend to be employed by participating in training classes and improving the technical skills of using different machines mechanization increases at the farm level.

References

1. Bagheri, N. 2016. Strategies for the development of agricultural mechanization in micro systems. Promoters (154): 43-47. (In Farsi).
2. Fall Solomon, M., and M. Moradi. 2011. Evaluation of the effects of land consolidation on rural development in rural areas. Geographical studies of arid regions. 2 (6): 85-67. (In Farsi).
3. Gergievsk, K. 2005. Land Consolidation as one of the modes for the enlargement of agricultural land in Macedonia. Journal Central European Agriculture 6 (4): 562-574.
4. Hashemipour, P., and D. Mohammad Zamani.2016. Investigating the Effect of Land Size Relationship on Agricultural Mechanization Indices by Regression Method in Qazvin. Vineyard Biomedical Engineering Journal 5 (2): 1-15. (In Farsi).
5. Hiironen, J., and K. Riekkinen. 2014. Agricultural impacts and profitability of land consolidations. Land Use Policy Volume 55. September 2016. Pages 309-317.
6. Lai, W., and B. Roe. 2015. Estimating the Effect of Land Fragmentation on Machinery Use and Crop Production. Association and Western Agricultural Economics Association Annual Meeting, San Francisco.
7. Lak, M. B., and A. M. Borghaee. 2011. Multi-Criteria Decision Making Based in Choosing an Appropriate Tractor (A Case Study for Hamedan Province). Journal of Agricultural Machinery Engineering 1 (1): 41-47. (In Farsi).
8. Mahdavi, I., and M. Kiani. 2017. Evaluation of barriers to agricultural land integration (case study: villages of Azna city). Iranian Economic Research and Development 48 (2): 342-333. (In Farsi).
9. Mohammad Zadeh, L., and D. A. Fenech. 2015. Analysis and evaluation of the effects of land consolidation in agricultural economy with an emphasis on agricultural development. The 3rd National Conference of Academic Students in Agriculture and Natural Resources. Karaj. Campus of Agriculture and Natural Resources of Tehran University. (In Farsi).
10. Nijibkhirabadi, H., and T. Maghsoudi.2010. Agricultural land degradation Challenges for agricultural development (factors and solutions). National Conference on Agricultural and Natural Resources Contribution to the Development of the Islamic Republic of Iran in Horizon 2025. Rasht. Islamic Azad University of Rasht Branch. (In Farsi).
11. Rezvani Alvar, M., and H. Rachel. 2014. History of Agricultural Mechanization in Iran and Its Policies in Development Plans. Second National Conference on Agriculture and Sustainable Natural Resources. Tehran. Educational institute of Mehr Arvand. Advocacy group for environmental lovers and the Iranian Nature Conservation Association. (In Farsi).
12. Saiedirad, M. H., and S. A. Parhizgar. 2011. Study on Agricultural Mechanization Indexes of Small Farms in Khorasan Razavi Province and Suggesting Possible Improvement. Journal of Agricultural Machinery Engineering 1 (1): 48-53. (In Farsi).
13. Saati, T. L. 1998. Decision making for manager. Translated by Ali Asghar Tofighi. Organization of industrial management. Publication: Tehran. (In Farsi).
14. Samati, M., and M. Asghari. 2003. Priority of development in industrial sector in Isfahan Province based on AHP method. Journal Commodity Research 4 (10). p27. (In Farsi).
15. Secretariat of the Fourth Program Headquarters. 2005. National Document for Development of Agriculture and Natural Resources in the Fourth Development Plan. Editor: Bahram Khazin. Tehran. Publisher: Agricultural Planning and Economics Research Institute, Process Management and Research Findings. (In Farsi).
16. Sobhani Fard, Y. 2017. Statistical Analysis. Tehran. University of Science and Industry. (In Farsi).
17. TurkiBoldaji, B., and Y. Ghanbari. 2013. Identifying and Analyzing the Factors Affecting the Development of Agricultural Mechanization Case Study: Borujen County. The 2nd National Conference on Sustainable Agriculture and Sustainable Environment. Hamedan. Tomorrow's environmental think tank. (In Farsi).

نشریه ماشین‌های کشاورزی
جلد ۱۱، شماره ۱، نیمسال اول ۱۴۰۰، ص ۵۳-۴۳

Journal of Agricultural Machinery
Vol. 11, No. 1, Spring- Summer 2021, p. 43-53

مقاله علمی-پژوهشی

بررسی اثر خردشدن سطوح بهره‌برداران بر توسعه مکانیزاسیون کشاورزی با استفاده از تکنیک AHP

مهدی ثباتی گاوگانی[۱]، داود محمدزمانی[۲*]، محمد غلامی پرشکوهی[۲]

تاریخ دریافت: ۱۳۹۸/۰۸/۱۸
تاریخ پذیرش: ۱۳۹۹/۰۴/۳۰

چکیده

بخش کشاورزی برای تأمین امنیت غذایی برای جامعه و ایفای نقش مؤثر در تقویت استقلال ملی نیاز به انتقال سریع از معیشت‌های سنتی و معیشتی به مرحله تولید و تجاری‌سازی پیشرفته دارد. مکانیزاسیون رویکردی است که دستیابی بخش کشاورزی به مرحلهٔ تولید تجاری را ممکن می‌سازد. بدون مکانیزاسیون، چشم‌انداز روشنی از کشاورزی پویا و پایدار که بتواند نیازهای غذایی را معقولانه برطرف سازد، متصور نیست. توسعهٔ مکانیزاسیون در جوامع کشاورزی و به‌ویژه در نواحی روستایی کشور با مشکلاتی همراه بوده است که شناخت عوامل مؤثر بر آن می‌تواند به برنامه‌ریزی برای رفع آن‌ها کمک کند. از این رو در تحقیق حاضر به بررسی اثر خردشدن سطوح بهره‌بردران بر توسعه مکانیزاسیون کشاورزی در دهستان‌های شهرستان جیرفت پرداخته شده است. نوع تحقیق کاربردی است و از نوع توصیفی- تحلیلی است، از روش پیمایشی استفاده شده است و اطلاعات از طریق پرسشنامه از ۴۲۰ کاربر در شهر جیرفت جمع‌آوری شده است. تجزیه و تحلیل اطلاعات با استفاده از تکنیک فرآیند تحلیلی سلسله مراتبی با استفاده از نرم‌افزار اکسپرت چویس ۱۱ انجام شده‌است. یافته‌های تحقیق نشان داد که عامل اجتماعی- خانوادگی در شهر جیرفت عامل اصلی بازدارنده عدم توسعه مکانیزاسیون و فرهنگ-ارتباطی، آموزشی-فنی، حقوقی و قانونی است و عوامل اقتصادی-مالی در اولویت‌های بعدی قرار گرفتند. پیشنهاد شده است که توسعه مکانیزاسیون، نوسازی فناوری نوین، آموزش و ارتقاء، ایجاد اعتماد، اعتبار و تسهیلات مالی برای نوسازی ادوات کشاورزی اجرا شود.

واژه‌های کلیدی: توسعهٔ مکانیزاسیون کشاورزی، خرد شدن اراضی، فرآیند تحلیلی سلسله مراتبی

۱- دانشجوی دکتری، گروه مهندسی بیوسیستم، دانشگاه آزاد اسلامی واحد تاکستان، تاکستان، ایران
۲- گروه مهندسی بیوسیستم، دانشگاه آزاد اسلامی واحد تاکستان، تاکستان، ایران
(*- نویسنده مسئول: Email: Dr.dmzamani@gmail.com)

DOI: 10.22067/jam.v11i1.82910