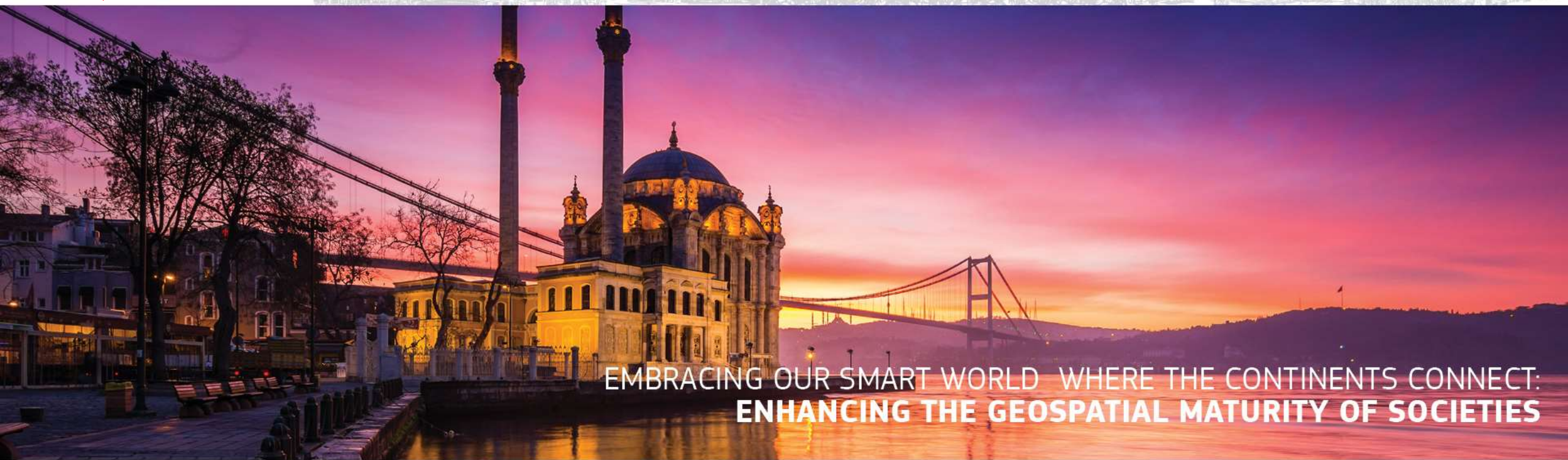
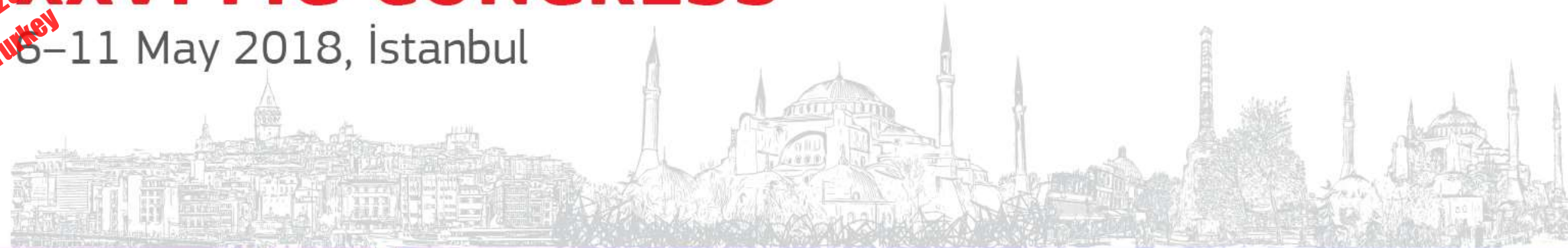


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Hybrid Method Application in Land Consolidation Studies

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PRESENTATION OUTLINE

- Introduction
- Hybrid Method in Land Consolidation Studies
- Conclusion

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Introduction

- The basic economic activity necessary for the survival of human life is agriculture.
- Since the areas where agriculture can be done can not be increased in parallel with the population increase, the solution is to find ways to get more yield from the limited existing agricultural land.

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Introduction

- In order to increase agricultural productivity, firstly legal measures should be taken to prevent further fragmentation of agricultural land, after the existing fragmented structure should be consolidated and regulation according to the principles of modern agriculture operation, so it must go the way of land consolidation.

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Introduction

- Land consolidation, which is implemented in rural areas by plot and land regulation, is one of the important means of increasing productivity in agricultural production.
- Land consolidation not only consolidates fragmented land, but also improves the standards of landowners in agriculture, technical, social and cultural.

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Introduction

- The block reallocation phase in land consolidation studies is a process that directly affects the success of land consolidation projects and the project is one of the most time-consuming process steps.

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Introduction

- In this study, a new hybrid algorithm (AT-FGA) was developed using genetic algorithm and fuzzy logic that provide block reallocation in land consolidation projects .
- Block reallocation is done automatically with this developed model.

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Hybrid Method in Land Consolidation Studies

- Block reallocation is all of the effort to model the most appropriate of the possible solutions when reallocation to parcel blocks.
- When we look at the processing done, block reallocation is optimization problem. Optimization is the process of doing something better.

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Hybrid Method in Land Consolidation Studies

- In this phase, a method is proposed that takes into account the enterprise preferences by using the convergence properties of the optimization methods to the optimum result quickly and can reallocate the minimum space in the block areas.
- In the realization of this method, the hybrid algorithm was created by using the Fuzzy Logic Method in order to increase the success of Genetic Algorithms because the reallocation problem is concerned, there are too many options and it is easy to implement.

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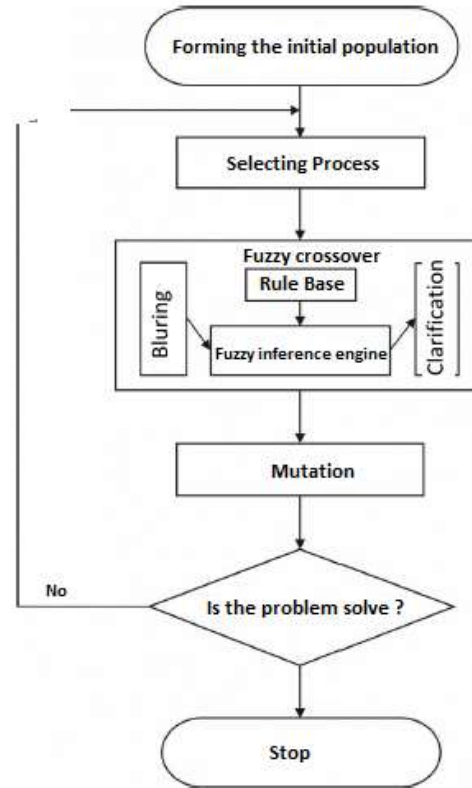


Figure 1. FGA algorithm structure

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Hybrid Method in Land Consolidation Studies

- Hybrid block reallocation algorithm was tested on land consolidation project belonging to the Aciöz Neighborhood (Şereflikoçhisar-Ankara-Turkey). The following results were obtained for the application area .

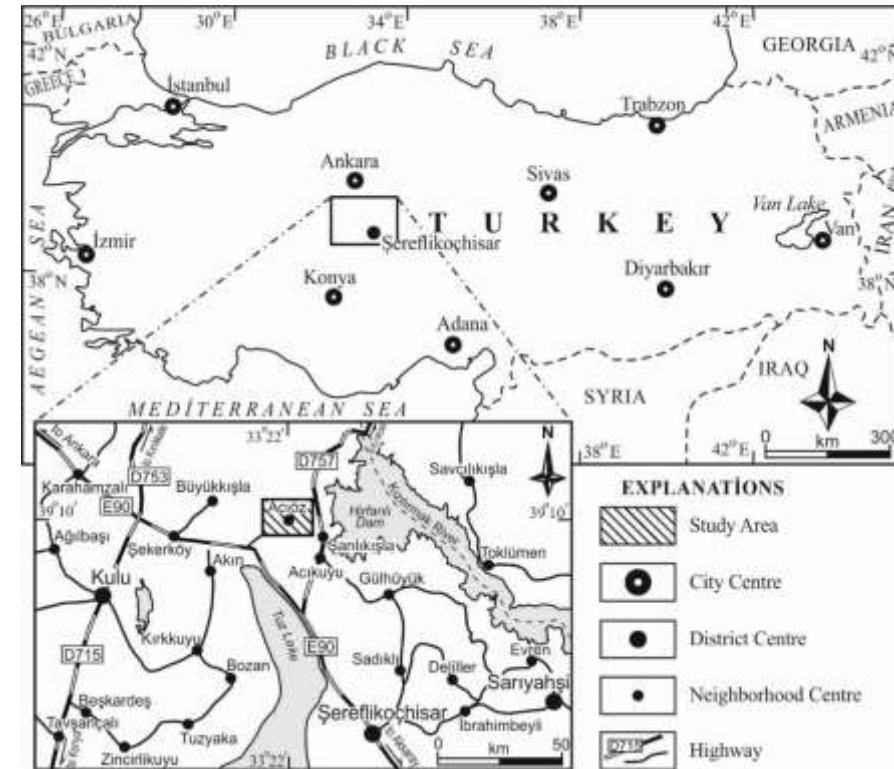


Figure 1. Study area

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Hybrid Method in Land Consolidation Studies

When we examine Table 1, there are 140 enterprises in the field of application. 96 of these enterprise are in the first preference, 16 in the second preference, 3 in the third preference. 25 enterprise are in outside the preferences. Preferred success rate reached 81.5603%.

Table 1. Aciöz AT, FGA automatic block reallocation result table

	Number of Enterprises	1. Preferred	2. Preferred	3. Preferred	Outside the Preferred	Success Rate (%)
Hybrid Method (FGA)	140	96	16	3	25	81.5603

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Hybrid Method in Land Consolidation Studies

Examination of models by number of parcel, consolidation ratio and average parcel sizes

When we look at the table in general, there is a decrease in the number of small parcels in accordance with the logical of land consolidation .

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Hybrid Method in Land Consolidation Studies

Table 2. Examination of the models in terms of the number of parcels

The Size of Parcel (Decares)	Cadastral Status	Interview-Based Reallocation Model	Block Priority-Based Reallocation Model	Hybrid Model
	The Number of Parcel	The Number of Parcel	The Number of Parcel	The Number of Parcel
0-5	30	13	12	12
5-10	19	3	17	28
10-20	56	22	23	29
20-30	31	28	15	15
30-40	18	20	5	15
40-50	31	27	10	20
50-60	17	12	5	11
60-80	19	23	25	9
80-100	8	7	20	3
100-120	7	10	5	3
120-150	2	6	6	3
150+	9	9	14	5
Total	247	180	157	153
Consolidation Ratio (%)	-	27	36	38

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Hybrid Method in Land Consolidation Studies

Examination of models according to average parcel sizes

We can say that the hybrid block reallocation model is more successful when we compare the reallocation models according to the average parcel size.

Table 3. The average sizes of parcels of the reallocation models

The Average Parcel Size	Area (m ²)	Increase Percentage (%)
Cadastral status	43 469.44	-
Interview-based reallocation model	59 649.73	37
Block priority-based reallocation model	68 388.22	57
Hybrid block reallocation model	70 176.15	61

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Hybrid Method in Land Consolidation Studies

Examination of models in terms of jointly owned parcels

According to Table 4, before reallocation the jointly owned parcels is 32. Number of parcels shareholding after reallocation, 3 for the block priority model, 25 for the interview-based reallocation model, and 8 for the hybrid reallocation model.

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Hybrid Method in Land Consolidation Studies

Table 4. The number of jointly owned parcels occurred with the reallocation methods

The Number of Share in Parcel	Cadastre	Interview-Based Reallocation Model	Block Priority-Based Reallocation Model	Hybrid Model
1	215	155	154	142
2	17	15	1	10
3	3	2	-	-
4	3	1	-	-
5	1	1	-	-
6	4	3	1	1
7	2	2	-	-
8	2	1	1	-
9	-	-	-	-
10	-	-	-	-
11	-	-	-	-
13	-	-	-	-
The number of jointly owned parcel	32	25	3	8
Total	247	180	157	153

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Hybrid Method in Land Consolidation Studies

Number of parcels per enterprise in models

According to the Table 5, the number of parcels per enterprises with single parcel before reallocation is 57 (40.71%). This number is 85 (60.71%) for the interview model, 135 (96.5%) for the block priority model and 122 (87.14%) for the hybrid reallocation model after reallocation.

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Hybrid Method in Land Consolidation Studies

Table 5. The number of parcels per enterprise in the reallocation models

The Number of Parcels	CADASTRAL		INTERVIEW-BASED REALLOCATION MODEL		BLOCK PRIORITY-BASED REALLOCATION MODEL		HYBRID MODEL	
	The Number of Enterprises	%	The Number of Enterprises	%	The Number of Enterprises	%	The Number of Enterprises	%
1	57	40.71	85	60.71	135	96.50	122	87.14
2	33	23.57	36	25.71	1	0.70	17	12.15
3	23	16.43	9	6.43	-	-	-	-
4	13	9.29	7	5.00	1	0.70	-	-
5	8	5.71	-	-	1	0.70	1	0.71
6	3	2.14	1	0.71	-	-	-	-
7	1	0.71	-	-	-	-	-	-
8	-	-	-	-	1	0.70	-	-
11	1	0.71	2	1.43	-	-	-	-
15	1	0.71	-	-	1	0.70	-	-
TOTAL	140	100	140	100	140	100	140	100

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Conclusion

- It is observed that the Hybrid block reallocation model is generally more successful than the interview priority reallocation model when compared with the preferential reallocation models after the LC.

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Conclusion

- The results obtained from the application area show that the FGA block reallocation model can be accepted by farmers. According to these results, Hybrid block reallocation model developed for block reallocation in land arrangement works can be proposed.

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Conclusion

- Hybrid block reallocation model, which also takes into account the enterprise preferences, automatically makes the block reallocation.
- The developed model almost coincides with the results obtained from the interview priority model currently used in practice and the automatic reallocation of blocks in this model will result in considerable time and cost savings for large land consolidation projects.

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