



Article

Evaluating the Relationship Between Land Consolidation and Agricultural Mechanization: Evidence from a Case Study in Türkiye

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Abstract

Land consolidation plays a crucial role in improving agricultural mechanization by optimizing land-use efficiency, reducing transportation distances, and enhancing the operational viability of mechanized farming. This study evaluates the effects of land consolidation on key mechanization indicators in Türkiye, focusing on Kırşehir Province over a 13-year period (2010–2022). By integrating official statistics, field data, and variance-based statistical methods, changes in tractor density, average parcel size, tractor power per hectare, and the number of implements per tractor were analyzed before and after consolidation. The results indicate that land consolidation significantly increased parcel size and contributed to the use of stronger, more modern machinery. Additionally, thematic maps were utilized to visually support the spatial aspects of consolidation, although no GIS-based quantitative analysis was performed. These findings highlight the importance of aligning land consolidation policies with mechanization strategies to foster more sustainable and efficient agricultural systems.

Keywords: agricultural mechanization; land consolidation; GIS analysis; tractor density; sustainable agriculture; Türkiye



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1. Introduction

The fragmentation of agricultural lands has long been recognized as one of the primary constraints limiting efficient and sustainable agricultural production, particularly in developing countries such as Türkiye [1–4]. Increasing population pressure and the scarcity of cultivable land make it essential to optimize the use of existing farmland. Land consolidation (LC) has therefore emerged as one of the most widely applied policy instruments to address land fragmentation, reduce the number of scattered parcels, improve parcel geometry, and increase average parcel size [1–3].

In Türkiye, land consolidation has a long-standing institutional and legal background. Since its first implementation in 1961, the LC program has undergone several reforms [1,5,6] most notably in 1984 and 2005, becoming a core component of the national agricultural modernization agenda. Earlier studies reported that LC contributes positively to agricultural productivity, improves operational efficiency, and facilitates timely implementation of mechanized activities by reducing the number of parcels per farmer.

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