

AGRICULTURAL MECHANISATION IN THE BALEARIC ISLANDS (1960-1970). THE TRANSITION FROM TRADITIONAL TO INDUSTRIAL AGRICULTURE

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I. DEFINITION

This is a second reflection exercise on the process of modernisation of insular agriculture in the last fifty years through the analysis of mechanisation, a representative aspect concerning the transition from a traditional agriculture, characterised by a minimum external dependence to an industrial agriculture which consumes industrial inputs with a negative energy balance. Mechanisation is an essential indicator of the transformation of traditional (and organic) agriculture, based on the use of animal and human energy, to modern agriculture, which incorporates the use of fossil energy (Naredo, 1988). In this case, the approach to understand the process of mechanisation has focused on the incorporation of agricultural machinery, based on data extraction from the Registry of Tractors in the Balearic Islands from 1946 to 1970.

According to David Grigg (1992), land and labour are the main inputs in traditional agriculture, which occupies more than 70% of the workforce. The availability of energy in traditional agriculture is reduced to that of animals and humans; the use of organic matter is the main source of fertilisation; profits per hectare and agricultural workforce are low; there is a high consumption of self-produced food (that is, less than 50% of the production is marketed) and the degree of specialisation of crops is scarce. Accepting Grigg's definition and the initial considerations, it can be said that, during the postwar period, the Balearic Islands were in a state of transition from traditional agriculture to modern agriculture. Undoubtedly, the Civil War had stopped a quicker progression given that there is, indeed, continuity in the sequencing of the Spanish agrarian history between the changes that took place since the late 19th century and the changes occurred during the 1950s and 1960s.

Certainly, the process of agricultural mechanisation with self-propelled machinery that started in the 1940s is one of the most decisive transformation factors with regard to insular agriculture, which during the subsequent decades (from 1950 to 1980) would make an effort to become a more modern and industrialised agriculture.

II. OBJECTIVES

Studies on the mechanisation of agriculture in the Balearic Islands are scarce and information is generally scattered. The goal is to cover the evolution of mechanisation until now, according to the analysis of the progressive incorporation of self-propelled machinery (formed first by tractors and later on by cultivators, combine harvesters and articulated tractors, etc.). After a first approach to the study of the beginnings of mechanisation in the countryside between 1946 and 1960 (Binimelis, Ginard, Ordinas, 2005), there is a second chapter which covers the 1960s, a main period regarding the generalisation process in the use of agricultural machinery in the archipelago and the rest of Spain.

Of course, it is not possible to reduce agricultural mechanisation and motorisation to the use of self-propelled machinery. Simultaneously, elements such as farm electrification, the motorisation of wells and water abstraction, as well as improvements in supplements and tools for tractors (Clar, 2009) or the mechanisation of farming activities, among other aspects, have to be considered (López Ortiz, 1999: 86). Nevertheless, we will concentrate on the analysis of registered vehicles.

This work focuses on the 1960s and 1970s, a period that comprises the economic and urban development that began with the Stabilisation Plan and that follows the period of economic autarky (1939-1959), thus representing an opening to foreign markets and trade liberalisation. Nonetheless, the main change for Spanish agriculture dates back to the 1950s, coinciding with the appointment of Cabestany as agricultural minister. Clar (2009: 105, trans.) states that it: *"...can be said that 1951 meant for agriculture what 1959 for the whole of the Spanish economy, if only from the perspective of a new political orientation that had to await the impulse represented by the prestabilising period to come true..."*. Besides, it is important to note that in the context of the Balearic Islands, 1960 is a turning point as for economic and social transformation driven by tourism specialisation.

III. SOURCES

The study of agricultural mechanisation in Spain is an issue which has been *«forgotten by geographers»* (Ferrer, 1978: 117, trans.) due to the scarcity of sources, *«often unreliable and without adequate disaggregation in most cases»* (Segrelles, 1988: 231, trans.). The study of the process of mechanisation of agriculture has both specific and indirect sources of information. In the first group, the Register of Machinery of Provincial Departments from the Ministry of Agriculture and the Machinery Census (in Spanish, CM) can be pointed out, elaborated annually by the old Local Chambers of Agriculture.

A first premise to conduct the study was the importance of having original and unpublished information, an objective that has been achieved with the elaboration of the database

and the subsequent exploitation of the series of books that make up the Registry of Tractors. As Segrelles (1989) has already explained, their exploitation is an arduous and difficult task neglected by the Administration being it, undoubtedly, the best documentation of the diffusion process of the self-propelled machinery with fossil energy during the transition from traditional to industrial agriculture in the Spanish State.

Regarding the source used for the preparation of this work, the first 7 volumes of the Registry of Tractors of the Ministry of Agriculture (from the Balearic Agricultural Central Office) have been consulted, along with the volume devoted to combine harvesters. It is a specific series for the analysis of the diffusion process and the implementation of agricultural machinery in Spain that began in 1946, considering that until 1977 the delegations of the Ministry of Agriculture were the ones «...*that granted license plates for tractors, cultivators and combine harvesters...*» (Segrelles, 1988: 232). This series, as it may be checked once the collected characteristics of each machine are specified, changes its format at the same time that small changes concerning the collected characteristics of each registered machine take place. It comprises, from 1946 to 1970 (up to inscription 6356 in the case of the Balearic Islands), not only the municipality of registration of the machine, but the place name of the property of the purchaser, increasing significantly the possibilities of information, becoming cultivations the most commonly used units of analysis. In this case, the degree of disaggregation of the data will be municipal, although the analysis of the diffusion process of technological innovations considering each of the farms is not discarded, with the invaluable help of toponymic reference of the agrarian company. Furthermore, it is a diachronic source, since it allows the study of the evolutions of the registration of new machinery as well as the transfer of used machines from other Spanish provinces. In a first period (until book 7), there is no distinction between new and used vehicles. This leads to an arduous task of differentiation between new vehicles and transfers basing on the number plate and the fact that the comment section displays both the previous and later precedence registration number. Accordingly, «...*these registration records could be treated to be an ideal source for study of agricultural mechanisation, but this would be arduous and complicated...*» (Segrelles, 1988: 233, trans.). Thus, this has been the main focus of this study, which has led to the elaboration of the database. Also, reporting the number of *horsepower* of each of the machines, made it possible to measure the weight of the insular agricultural machinery, which was impossible when simply distinguishing between machine types as in the case of the Agricultural Census. In the construction of agricultural typologies *horsepower* is first looked at so as to measure the weight of agricultural machinery of a country or region, as in the work of the Polish geographer Jerzy Kostrowicki (1991). Besides, until 1977 –when the so-called “Block Operation” occurred, that consisted of granting the National Departments of Traffic (DGT) the responsibility of registering self-propelled agricultural machinery, after having been registered in the offices of the Ministry of Agriculture–, all the agricultural machinery was registered in the Registry of Tractors. Hence, our database, which ends in 1970, has combine harvesters, cultivators and articulated tractors. In 1977 a registry book for each type of machinery was created. For this reason, the first book of combine harvesters has been consulted, which also includes those registered in the preceding Registry of Tractors.

VI. CONCLUSIONS

The processes of motorisation and mechanisation of agricultural activities play a key role in the analysis of the transition from traditional (and organic) agriculture to industrialised agriculture. This is the second attempt in the study of the development of agricultural mechanisation in the Balearic Islands during the decisive 1960s, using the Registry of Tractors, which has become a specific and unique source to study this evolution diachronically and to reach the following conclusions.

1. Although significant, the incorporation of tractors for agricultural work in 1960 did not affect the entire territory yet. In fact, this phase would not consolidate until 1970, when mechanisation not only reached the entire territory but also the power of agricultural machinery park increased tenfold compared to that of 1950. Moreover, the intensity of the self-propelled mechanical power almost doubled, since in 1965 the average was 0,264 *hp/ha*, in 1970 it was 0,549 *hp/ha*, with reference to the data of the agricultural census from 1962 and 1972.
2. Agricultural mechanisation in the 1960s brought the generalisation of tractors with pneumatic tires in the insular farms, becoming the most relevant implementation during the second half of the decade. The incorporation of new types of machinery in the second half of the decade, such as articulated tractors, cultivators, mowers and (incipiently) combine harvesters contributed to the intensity of technological change. In 1970, thus, the weight of the agricultural machinery in the islands had increased 2.5 in relation to 1965 (162,284 *horsepower* in 1970 vs. 65.106 *horsepower* in 1965), only five years before.
Larger municipalities with more agricultural cultivated surface (Llucmajor, Manacor and Felanitx) stand out, with regard to the intensity of mechanisation in absolute figures. However, Sa Pobla, a medium sized town in the archipelago, has acquired more relevance, becoming a protagonist in the start of intensive irrigated agriculture, which explains the dominant place it has occupied since the late 1960s. Analysing relative data (that is, cultivated *hp/ha*), the more intense mechanisation degree corresponds to the municipalities of Palma, Sa Pobla and Muro, becoming the paradigm of success of a new modal of industrial agriculture which is integrated in the market. In addition, the agrarian municipalities of the Pla de Mallorca (as well as areas with high irrigation growth) are the ones combining a clear commitment to the new model of industrial agriculture and the agricultural vocation of much of its workforce.
3. Furthermore, the massive expansion of agricultural machinery is observed in the countryside thanks to the consolidation of state brands in charge of its manufacturing (Ebro, Barreiros) and the penetration of international firms with factories in the Spanish territory (Massey Ferguson, John Deere). The increasing importance gained by the articulated low-powered tractors (Pascuali, BJR) can be pointed out, in a decade of growth of irrigated lands in the Prat de Sant Jordi and the municipalities of Campos, Sa Pobla and Muro.

4. The range of agricultural activities that have been mechanised (there is greater variety of complementary tools) as well as the typology of the registered machines (especially tractors, as well as articulated tractors, cultivators, mowers and the emerging introduction of combine harvesters) has expanded, which shows the growth experienced by irrigated crops. Therefore, increased mechanisation and irrigation have become key elements of the modernisation of agricultural structures in the islands and the rest of Spain.

