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TRANSITION TO ORGANIC AGRICULTURE IN MOROCCO

Hamza EL GHMARI[1], Rachid HARBOUZE[2], Hamid EL BILALI[1]*

[1]International Centre for Advanced Mediterranean Agronomic Studies – Mediterranean Agronomic Institute of Bari (CIHEAM-Bari), Valenzano (Bari), Italy
[2]Hassan II Institute of Agronomy and Veterinary Sciences, Rabat, Morocco
*Corresponding author: elbilali@iamb.it

ABSTRACT

Agriculture is a vital sector in Morocco; it contributes 13% to the gross domestic product and employs around 30% of the total workforce and 70% in the rural areas. This puts agriculture in a sensitive spot where it affects the livelihoods of a great proportion of the population. Moroccan agricultural development programs (viz. Green Morocco Plan 2008-2019 and Green Generation 2020-2030) aim to enhance the livelihoods of farmers by focusing on the valorisation of small farms and rural areas through the development of protected geographic indications (PGI), cooperatives, and organic farming. This review paper describes the dynamics and development process of the organic agriculture niche in Morocco through the lens of the Multi-Level Perspective (MLP) on socio-technical transitions. The MLP is a widely used framework that bases its analysis on transitions being the result of the interaction of niches, socio-technical regimes, and socio-technical landscape. Niches represent novelties, regimes are the incumbent and dominant systems, and the landscape includes the external factors that affect both regimes and niches and shape their development. Results show that although the organic niche is well established (11,000 ha of organic land area in 2019), it is still developing at a slower rate than expected. While organic farming does solve many sustainability challenges that Moroccan agriculture faces, it still lacks the infrastructure and human capital to succeed as a niche. All in all, organic farming is still in the first transition stages and can follow a multitude of pathways before becoming relevant in the current agri-food system.

Keywords: *sustainability transitions, Multi-Level Perspective, agri-food system, organic farming, Morocco.*

INTRODUCTION

During the first two decades of the millennium, the Moroccan economy has experienced a remarkable growth. This economic prosperity had been translated to a demographic development, which in turn increased the pressure on Morocco's natural resources (Benmansour *et al.*, 2013). In particular, agriculture knew a tremendous evolution through the modernisation of practices and the intensification of production in selected areas where farm area and resources were

more abundant, while other areas remained traditionally managed with little inputs (Errahj, 2017). This situation has created a two-level agricultural system in Morocco where small farmers produce to survive and big firms invest in intensive production systems to compete. This has made dealing with sustainability challenges difficult, as the governmental programs have to consider two different production systems at once (Haut Comissariat au Plan, 2007).

Currently, Morocco is facing the outcome of years of unsustainable use of resources as well as climate change's negative effects on the environment such as irregular rainfall, droughts, degradation of soil, desertification and pollution (Salhi *et al.*, 2020). The complexity of such challenges does not allow solving them using incremental solutions that address one aspect at a time. Instead, they require radical solutions in the form of sustainability transitions, which change the entire system into a more sustainable one (Sustainability transitions research network, 2017). The transition towards organic agriculture is an example of such transitions that aims to enhance the environmental and socio-economic performances of the Moroccan agri-food system. In this review paper, we will describe the different components at play in this transition (i.e. niche, regime and landscape) as well as propose a pathway that the transition is likely to follow.

MATERIAL AND METHODS

Sustainability transitions are a wide research field where multiple frameworks are used. In our case, we will study the ongoing transition in the Moroccan agri-food system through the lens of the Multi-Level Perspective (MLP) framework. In this context, we will consider the Moroccan agri-food sector as a socio-technical system consisting of actors, institutions alongside their underlying regulations and norms, and material artefacts and knowledge. These elements' interaction is what provides specific services for society, in this case, the production of food and fibre (Markard *et al.*, 2012). A sustainability transition occurs when a socio-technical system undergoes deep multi-dimensional change involving multiple actors and spanning for long periods. In order to study such a complicated topic, we need the help of socio-technical approaches to analyse this process (Loorbach *et al.*, 2017)

The MLP is one of the major frameworks used to study transitions through the combination of ideas from evolutionary economics, sociology of innovation and institutional theory (Sustainability transitions research network, 2017). This framework suggests that transitions are the result of the interaction of niches, regimes, and landscapes and the way they happen is through the pressuring factors of the landscape that present opportunities for niches to break through and change the socio-technical regimes (Markard *et al.*, 2012). Niches are considered as the protected space in which revolutionary ideas emerge, nurtured by pioneers and leading entrepreneurs who experiment with new configurations. These revolutionary innovations can spread widely and change the current regime but this requires the regime to be under pressure emanating from landscape developments. The MLP is particularly interested in the systemic dimensions of transitions that

are reflected by the different degrees of structuration of each analytical level (Sustainability transitions research network, 2017).

Additionally, scholars have identified certain types of transition pathways depending on the niche-regime-landscape interaction (Markard et al., 2012). Geels and Schot (2007) described one of the major typologies suggesting that the *nature of interaction* between niche and landscape developments can be a reinforcing one or a disruptive one, and that the niche can be in various stage of development depending on the *timing of the transition*. Transition pathways can be differentiated using a combination of different levels of these criteria. This typology describes four major pathways that are the *substitution*, *transformation*, *reconfiguration*, and *de-alignment and re-alignment* pathways as well as two additional pathways for the case of a stable regime (*reproduction process*) and that of a combination of pathways (*sequence of transition pathways*).

In the present paper, we will be gathering secondary data from literature and analysing it through the MLP framework in order to describe the type and features related to the pathway of transition to organic agriculture in Morocco and to define the environment components, internal and external factors, that affect the organic transition and understanding the relations between them. Secondary data was collected through multiple queries on the databases of Clarivate Analytics-Web of Science from the 10th to the 20th of July 2021. Additional grey literature, such as reports and brochures, was collected through Google research engine. The following section describes the findings in relation to each level of the agri-food sociotechnical system as well as the suggested pathway for the Moroccan agriculture transition into organic agriculture.

RESULTS AND DISCUSSION

The state of the Moroccan agri-food sector is profoundly marked by the grand challenges that affect agriculture. As a North African country, Morocco deals with major environmental setbacks regarding water and soil resources. These challenges are the natural result of the country's climate and geography, but they are additionally emphasised by the economic growth of the country leading to more urbanization while simultaneously having limited funds and frameworks for resource management. The coupled effect of bio-climatic conditions and intensive agricultural practices puts around 15 million hectares of land under threat of degradation due to lower fertility rates as well as reducing water reservoirs' capacity through siltation mechanisms (Benmansour *et al.*, 2013). Additionally, Morocco is considered to be one of the most sensitive countries towards climate change due to rain-fed agriculture representing more than 90% of the production (El Youssfi *et al.*, 2020). Some of the direct effects of climate change in Morocco are the shift in rainfall patterns that causes yield losses, and the recurring droughts that affect social stability and accentuate the existing inequality between farmers (Schilling *et al.*, 2012). El Assaoui *et al.* (2021) states that rainfall has seen a decrease of 3 to 30 % during the 1960-2000 period, and that the forecasts indicate a decrease of 10 to 30% in cumulative annual rainfall by 2100.

While we showed that climate change threatens Morocco's agriculture, it is important to signal that Moroccan policies and agricultural practices also contribute to the degradation of environmental resources; in fact, environmental degradation costed around 3.5 % of the gross domestic product (32.5 billion MAD) in 2014 (Belghazi and Sarraf, 2017). Over the last decades, Morocco's economic growth led to a significant increase in greenhouse gas emissions, 21% of which are linked to agriculture (Belghazi and Sarraf, 2017). Moroccan agriculture started becoming more intensive since the middle of the 20th century with the adoption of nitrogen fertilisation, new irrigation systems, and the introduction of mechanisation (Schilling *et al.*, 2012). Pesticide use has also been proven to cause biodiversity loss and health issues especially with the inadequate use by farmers (Farahy *et al.*, 2021).

Another pressuring factor for the agri-food system is the Moroccan diet, which relies on cereals to provide 60% of food energy supplies with an average consumption of 200 kg/year/capita of cereals (Saidi and Diouri, 2017). Cereal production being highly dependent on rainfall makes it difficult to achieve self-sufficiency; therefore, Morocco has to import up to 40% of its national needs of cereals (El Youssfi *et al.*, 2020). The dependence on the external market goes beyond imports and includes exports as well. Moroccan policies encouraged more crop production via the Green Morocco Plan (2008-2018) and did succeed in increasing the yields of many crops. The downside being the low efforts put into commercialisation resulting in difficulties in exporting excess production (El Youssfi *et al.*, 2020). Thus, Morocco is depending on the international market to import crucial staple food and to export high added value crops such as tomatoes and citrus. Unfortunately, this exchange is unfavourable for Morocco as fruits and vegetables require more water to grow than cereals, thus increasing Morocco's sensitivity to water shortage even further (Saidi and Diouri, 2017).

In the midst of this situation, Moroccan policies shifted towards more sustainable alternatives that preserve non-renewable resources by adopting newer systems of irrigation, encouraging ecologically friendly cropping methods such as conservation agriculture and organic farming, and valorising agricultural products through labels and production standards (Errahj, 2017). Indeed, it is difficult to solve the aforementioned challenges through incremental change because of their complexity and the way they are deeply rooted in the current agricultural regime. Thus, it is better to opt for a deeper and more radical transition that changes the current configuration into a more sustainable one through a proper sustainability transition, in our case, the transition to organic agriculture.

Organic agriculture can be defined as "a production system that sustains the health of soils, ecosystems, and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects. Organic agriculture combines tradition, innovation, and science to benefit the shared environment and promote fair relationships and good quality of life for all involved" (IFOAM, 2005). Organic farming has proven to be able to mitigate the negative effects of climate change and to conserve soil and water resources by

maintaining a high level of organic matter in the soil (Pimental *et al.*, 2005). Additionally, organic farming practices such as crop rotations and cover crops limit soil erosion (Pimental *et al.*, 2005), and help reducing greenhouse gas emissions as they boost the soil carbon sequestration process (Azadi *et al.*, 2011). Organic farming systems can help build flexible food systems as they encourage diverse cropping systems in a single farm (Azadi *et al.*, 2011). In the Moroccan context, organic farming has the potential to provide a better living for farmers while answering the environmental challenges in a sustainable way.

Organic farming was introduced for the first time in Morocco in 1986 through private operators growing olives and citrus in Marrakech and Benslimane regions respectively. However, the organic sector will not truly become relevant until 2011 when the first program promoting organic agriculture was signed between the government and the Moroccan association of organic production sector (AMABIO). The objectives of the program were to expand the organic cultivated land to reach 40,000 ha and increase the organic production to 400,000 T, to create the equivalent of 35,000 job opportunities, increase the national consumption of organic products, and put in place a legislation for organic agriculture within 9 years. The total investment foreseen for these actions was 1,121 billion MAD, of which 286 million MAD were covered by the state while the rest was covered by the inter-professional federation of the organic sector (FIMABIO) (Ministère de l'agriculture de la pêche maritime du développement rural et des eaux et forêts, 2020a).

Recent surveys in 2017/18 revealed that Morocco has an area of 9,500 ha of organic certified cultivated farmland, 980 ha of farmland in transition, and 273,000 ha of wild collection areas, and a total organic production of 104,600 T in 2018 (Ministère de l'agriculture de la pêche maritime du développement rural et des eaux et forêts, 2020a). The surveys clearly show that the organic niche in Morocco is not progressing as planned by the 2011 program. Some of the reasons behind this slow progress are the absence of adequate infrastructure dedicated to the handling and commercialization of products on the internal market, the unavailability of qualified technicians in the organic sector, and the shortage in subsidies of production, export, processing (Ministère de l'agriculture de la pêche maritime du développement rural et des eaux et forêts, 2020b).

In order to define which pathway the organic niche is more likely to follow, we need to figure out the nature of the niche-regime and regime-landscape interaction as well as find the timing or stage at which the niche is currently accordingly with the typology of Geels and Schot (2007).

As demonstrated above, the Moroccan organic niche is lagging behind relative to the goals set by the program for various reasons. Despite the niche having the support of the government since 2011, it is still in its early stages, as the national organic law, developed in 2013, would not come into force until late 2018. Additionally, the government recently revoked the recognition from the inter-professional federation of the organic sector (FIMABIO) in December 2020 (Agrimaroc, 2021) in a clear indication that the sector is still struggling to operate

in an optimal way. Thus we can describe the niche as underdeveloped. Based on the prior descriptions, the Moroccan agri-food regime faces multiple pressures emanating from the landscape. Environmental challenges are constantly threatening the present and future productivity, and by consequence, they stir social unrest especially considering the proportion of the population relying on agriculture for their income. It is important to note that the pressure presented by these factors is not focused on a singular moment in time, but rather it is a "disruptive" pressure. In other words, the landscape poses little pressure in the short term but it is continuously present and building up to become more imposing in the long term, as resources are depleted, climate change is accentuated, and social inequalities grow wider (Geels and Schot, 2007). Concerning the niche-regime relation, it is clear that the current agri-food regime encourages organic farming through contract programs and adopts it as a possible alternative towards a more sustainable production system. This is also true if we consider that the current regime presents a "low use of pesticides in multiple crops as well as cheap and abundant labour and a high integration between crop production and livestock which satisfies the farmer's need for manure" (Alaoui, 2009). Therefore, we can conclude that the niche is synergised with the regime. Therefore, the possible pathways with regards to the timing and nature taken by the transition in question can be either the *transformation pathway*, the *reconfiguration pathway*, or *a sequence of transition pathways*.

The *transformation pathway* (Figure 1) is especially interesting for our context as it occurs when "Moderate landscape pressure occurs early in disruptive landscape change. Niche-innovations cannot take advantage […] because they are not sufficiently developed" (Geels and Schot, 2007). The initially moderate pressure can be difficult to perceive from within the regime, which is why it is important to have outsiders to draw attention to these pressures. In our context, worldwide experts are the actors drawing the Moroccan regime's attention to environmental pressures. Additionally, outsiders can demonstrate promising alternatives and inspire the regime actors to adopt them, which is precisely the case for the organic niche as an external innovation that the Moroccan regime is starting to adopt. The *transformation pathway* achieves transition through cumulative reorientations by the niche actors who adjust themselves and pressure the regime to change its rules. Through this process, the actors of the regime might remain the same but the social network they belong to might change.

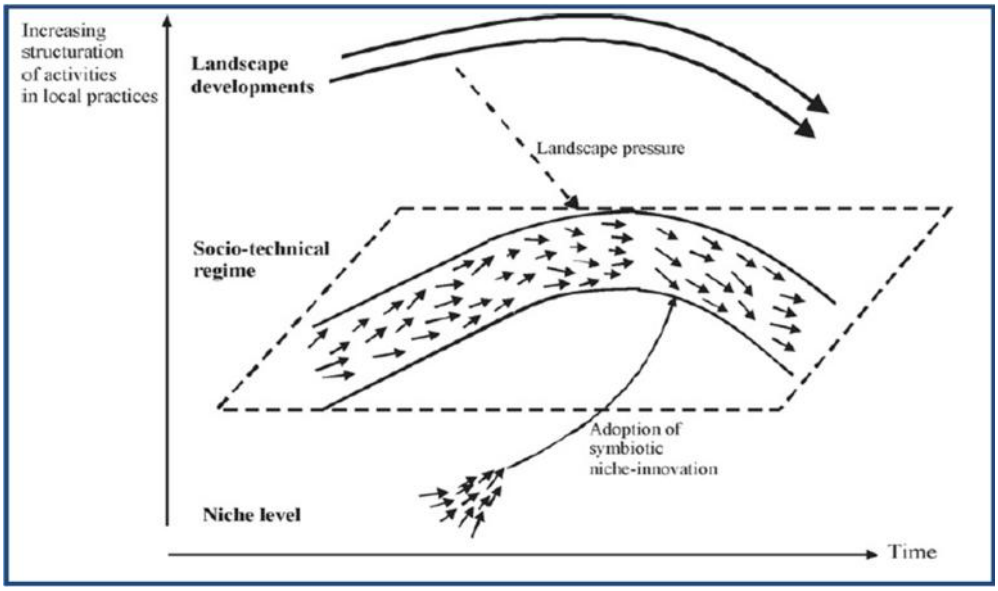

Figure 1. Transformation pathway.
Source: Geels and Schot (2007).

The *reconfiguration pathway* (Figure 2) is a similar case of *transformation pathway* where the niche innovations are symbiotic with the regime and are easily adopted. The difference between the two is that while the *transformation pathway* does not necessarily cause deep changes in the regime's architecture, the *reconfiguration pathway* causes deep changes when the adopted innovations keep causing further changes requiring further adjustments, to a point where other niche innovations are introduced to the regime as the regime actors explore new possibilities. This is especially true in our case since we are dealing with the agri-food system which is known for having multiple interlaying subsystems where newer innovations are likely to add up after a major regime change. In this type of pathway, the transition is the result of multiple niche innovations that breakthrough around the initial innovation that sparked the change.

A *sequence of transition pathways* applies in the event where the landscape pressure begins by being moderately disruptive but later becomes significantly pronounced, as in climate change posing environmental pressure that causes civil unrest or a deep economic setback. Regime actors start perceiving moderate change at first and the system begins the transition under a transformation pathway, later on as the pressure increases, more changes are encouraged and the transition becomes a reconfiguration. Finally, when the pressure becomes too high, the regime "collapses" and many niche innovations fill the "vacuum" until eventually one of them resurges as the new regime, in what we call a de-alignment re-alignment pathway. Alternatively, if the pressures happen at a timing where a niche-innovation is well developed, a substitution occurs where the innovation replaces the old regime.

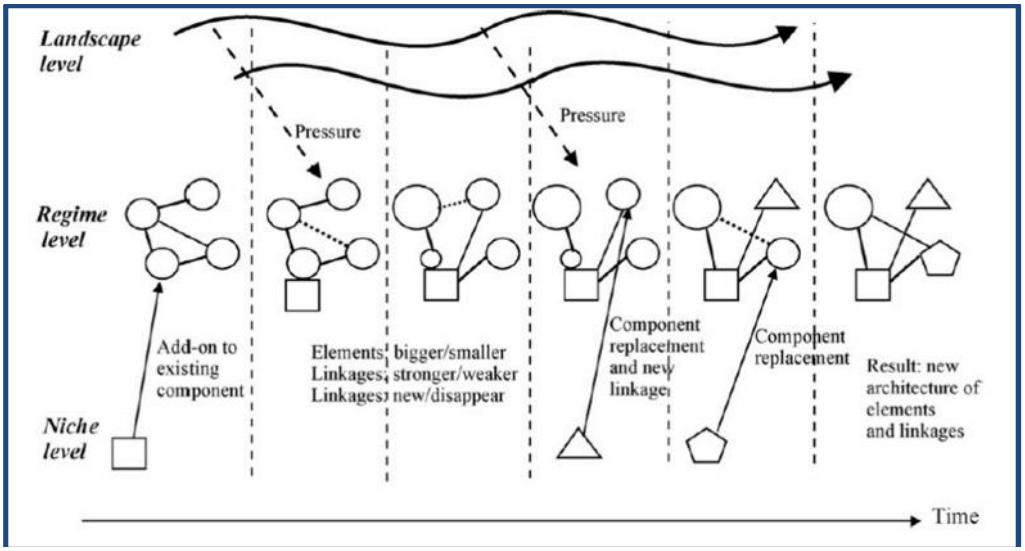

Figure 2. Reconfiguration pathway.
Source: Geels and Schot (2007).

CONCLUSIONS

The current state of the Moroccan agri-food system has proven to be lacking in sustainability be it environmental, economic, or social sustainability. As it stands now, Morocco's agriculture is depleting non-renewable resources, such as soil and water, and causing social unrest because of its dependence on a fluctuating climate without being able to reach self-sufficiency. This situation calls for a meaningful sustainability transition guided by efficient government programs and carried out by the actors of the current regime. As we have shown in this paper, organic farming can be a reliable alternative to alleviate the effects of intensive farming and enhance the performance of the agri-food system sustainability-wise. The organic niche in Morocco has a great potential to achieve this since it benefits from governmental support alongside favourable climatic conditions and a growing interest in agro-ecology. However, the organic niche is still struggling to take-off for a number of reasons mostly related to governance and awareness of the value of organic farming. Throughout this paper, we have shown how the organic niche benefits quite efficiently from the pressures that the landscape is putting on the Moroccan agri-food regime, and we suggested pathways that this transition might take based on the relationships between the different socio-technical levels and the state of the niche itself.

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