INTERNATIONAL JOURNAL OF RESEARCH IN ECONOMICS AND FINANCE, 2025, Vol. 2, No. 6, 134-143. https://doi.org/10.71420/ijref.v2i6.125

Digitalization and local agricultural products in Morocco: towards sustainable development - Case of the Marrakech-Safi Region

Faissal EDDAOUDI
National School of Business and Management, Ibn Tofail University, Kénitra.

Noureddine NAJALI
National School of Business and Management, Ibn Tofail University, Kénitra.

Amine JMEL
National School of Business and Management, Ibn Tofail University, Kénitra.

Abstract. Digitalization is rapidly transforming various sectors, including agriculture, and offers new opportunities to promote sustainable development and highlight local uniqueness. In Morocco, a country renowned for its diverse agricultural landscapes and rich culinary heritage, the integration of digital technologies into local production has the potential to transform traditional practices, enhance quality and authenticity, expand market access, and contribute to sustainable development. This research paper aims to explore the interaction between digital technologies and local products in Moroccan agriculture, assess the current state of digital technologies in this context, examine their impact on local production, and identify the various challenges and opportunities associated with their use. By analyzing existing literature, case studies, and available data, this study provides insight into the role of digital technologies in shaping the future of local resources in Moroccan agriculture.
Keywords : *Digitalization; Community Sustainability; Technology Integration; Market Infrastructure Development; True Sustainable Development; Internet of Things; IoT; Artificial Intelligence; AI; Blockchain; Agriculture in New Things.*

1. Introduction

Over the past two decades, global agriculture has been profoundly transformed by technological and digital advancements. In a context marked by the challenges of climate change, food security, and resource sustainability, the digitalization of agriculture has emerged as a key driver for optimizing production chains, improving traceability, and strengthening the competitiveness of local value chains (Ministère de l'Agriculture, 2020). Morocco, a country with a strong agricultural vocation, is no exception to this dynamic. The "Génération Green 2020–2030" initiative reflects the national commitment to integrating new technologies in support of a resilient, inclusive, and sustainable agricultural model (World Bank, 2019). Within this framework, the Safi-Marrakech region offers a particularly relevant case study. Renowned for the richness of its local agricultural products—such as olive oil, aromatic plants, saffron, and fresh vegetables—this region presents both opportunities and constraints with regard to digitalization. Despite the potential of ICT to structure marketing channels, improve market access, and enhance the value of local know-how, farmers and cooperatives in the region often struggle to effectively adopt these tools. Several barriers persist, including the digital divide, weak infrastructure, lack of training, and a limited digital culture in rural areas.

This article adopts a territorial and participatory approach to digitalization, focusing not only on digital tools (e-commerce, traceability systems, collaborative platforms) but also on the social and institutional dynamics that shape their adoption. By intersecting perspectives from sustainable development, technological innovation, and local economic development, this study offers an integrated and contextualized reading of the phenomenon. It draws on a multidisciplinary literature review, ranging from smart agriculture to the sociology of digital practices. Furthermore, it is grounded in an empirical case study from a region that remains underexplored in academic literature. Lastly, it provides practical recommendations for public decision-makers, agricultural cooperatives, and digital project leaders in rural settings.

The objective of this article is to explore to what extent digitalization can contribute to the sustainable valorization of local agricultural products in the Safi-Marrakech region, and how the obstacles to its

adoption can be overcome to make it a structuring tool for territorial development.
To address these questions, the article is structured into three main parts. The first part offers a conceptual overview of the notion of terroir and its significance in agriculture, followed by an analysis of the role of digitalization in enhancing the value of local products. The second part focuses on the objectives of the study and presents the various digital tools and applications explored throughout the research. The third part is dedicated to the presentation and analysis of the main findings, followed by a discussion of the key insights, the challenges identified, and practical recommendations.

2. Overview of the Concept of Terroir and the Importance of Its Digitalization

a. Overview of the terroir concept and its importance in agriculture

The Terroir is an important concept in agriculture, particularly in the production of foods such as wine, cheese, olive oil and other local products (Ertus et al., 2019). It refers to the complex interactions between the natural environment (soil, climate, topography) and human practices (traditional farming practices, knowledge) in a particular region (Poncet et al., 2009). Terroir gives products grown or produced in this region a unique character, distinguishing them from similar products from elsewhere (Genin and Elloumi, n.d.). The importance of terroir in agriculture depends on several factors:

1. **Influence on organoleptic quality:** Terroir can influence the taste, aroma, texture and quality of agricultural products. Environmental factors such as soil properties, chemical composition, sunlight, precipitation and temperature variations can all contribute to a material's unique sensory characteristics.
2. **Authenticity and regional identity:** Terroir is closely linked to regional culture and identity. Local objects are often seen as representing the history, traditions and culture of a particular region. It is often associated with the transmission of traditional farming practices from generation to generation (Batat, 2021).
3. **Economic advantage and competitiveness**: Local products, because of their unique characteristics and association with a particular region, can command a price in the marketplace. Local farmers and producers have the opportunity to distinguish themselves and add value to their products, which can strengthen their competitive position (Prévost et al., s.d.).
4. **Sustainability and biodiversity conservation:** The Terroir aspect focuses on sustainable farming practices. Farmers who value the land tend to adopt environmentally-friendly practices, promoting biodiversity, soil conservation and the conservation of natural resources (Abid et al., 2020).

b. The importance of digitalization in the production of local products

Digitalization plays an important role in local production, creating new opportunities and increasing its value. Here are just some of the reasons why digital is important in this industry:

1. **Improved quality and traceability :** Digitalization makes it possible to track and control every stage of production, from cultivation to processing and marketing. This enables better traceability of products and allows consumers to know the source, processes and authenticity. Technologies such as blockchain can be used to record this information securely, increasing consumer confidence.
2. **Optimizing farming practices:** Digital tools such as sensors, drones and geographic information systems (GIS) enable precise monitoring of landscape conditions, such as soil moisture levels, temperature variability and weather forecasts. This real-time information helps farmers make informed decisions about irrigation, fertilization and crop management, improving yields and productivity (WOCAT Coordination & FAO, 2011).
3. **Market access and promotion:** Digitalization facilitates direct communication between local producers and consumers, eliminating traditional intermediaries. Online platforms, social networks and websites enable manufacturers to promote their products, tell their story and reach

a wider audience, particularly on international markets. This opens up new business opportunities and boosts local visibility (Organisation des Nations Unies pour alimentation et l'agriculture (FAO), n.d.).

4. **Consumer education and awareness:** Digitalization makes it easier to provide consumers with information about local products, their sources, quality and benefits. Social networks, mobile apps and dedicated websites enable knowledge about the local area, sustainable farming practices and traditional recipes to be shared. This creates a better understanding of products and encourages consumers to make informed, responsible choices (Ben Arfa and Ghali, 2019).
5. **Sustainability and resource management:** Digitalization can help optimize the use of natural resources and manage agricultural activities more efficiently. Technologies such as smart irrigation, precision farming and data management help to reduce waste, improve input quality and reduce the environmental impact of local production (Ellouyty, n.d.).

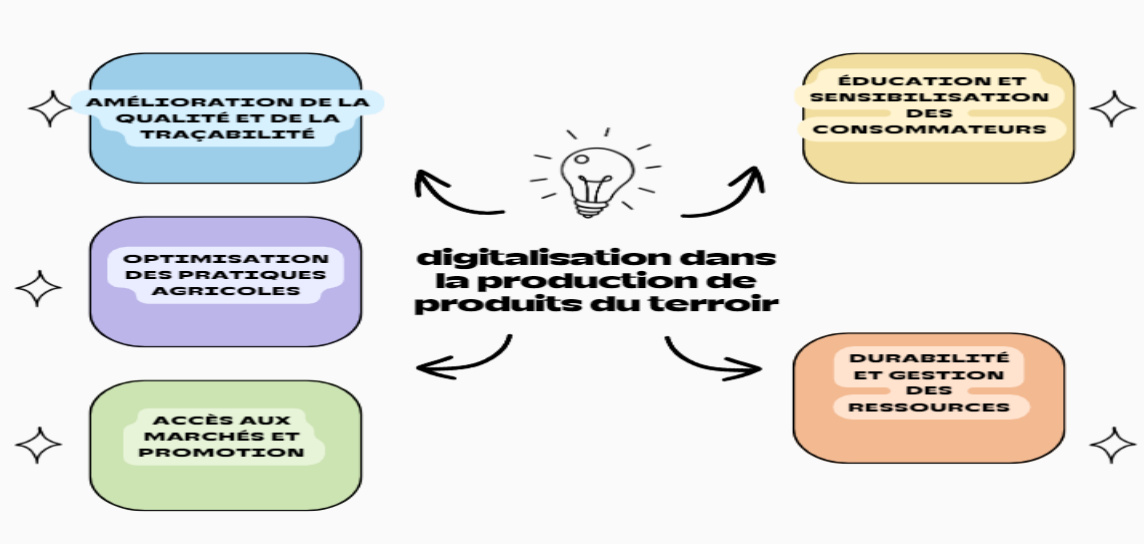
c. Agri Tech in Morocco: key players in the digital revolution

Agriculture in Morocco is in the midst of a digital transformation thanks to the rise of AgriTech. This digitalization is helping to optimize resources and improve the sustainability of agricultural practices. Players such as Al Moutmir, AgriEdge, Sowit and Arwa Solutions are playing a central role in this revolution, offering innovative solutions to modernize the sector and meet its challenges.

1. **Al Moutmir :** Created by the OCP Group, Al Moutmir uses digital technology to help Moroccan farmers manage their farms. Through its online platform and mobile application, it offers tools for analyzing soils, optimizing fertilizer and water use, and monitoring crop progress. The focus is on agricultural data and personalized recommendations for more precise resource management. In addition, Al Moutmir offers digital training to enhance farmers' skills and enable them to adopt more modern practices.
2. **AgriEdge :** a subsidiary of the OCP group, specializes in AgriTech using advanced technologies for precision agriculture. The company implements tools such as AquaEdge to optimize irrigation, FertiEdge for more reasoned fertilization, and YieldEdge to forecast crop yields. These solutions are based on the use of sensors, satellite data and artificial intelligence, enabling farmers to maximize their yields while reducing their ecological footprint. AgriEdge provides real-time recommendations for more sustainable and efficient management of natural resources.
3. **SOWIT** is an innovative Moroccan start-up specializing in precision agriculture, using digital technologies to improve farm management. Using mobile applications and sensors, SOWIT provides farmers with precise data to optimize irrigation, fertilization and yields. Using remote sensing, satellite data and artificial intelligence, the company enables smarter, more sustainable management of natural resources, reducing the ecological footprint and increasing crop productivity.
4. **Arwa Solutions :** specializes in digital irrigation management through a mobile application and connected sensors. The company helps farmers optimize their irrigation systems by providing real-time information on the water requirements of their crops. Using intelligent monitoring technologies, Arwa Solutions enables farmers to reduce their water consumption, increase irrigation efficiency and thus improve the sustainability and profitability of their farms.

These and other initiatives illustrate Morocco's commitment to integrating digital technologies into agriculture, in order to improve the sector's productivity, sustainability and resilience in the face of contemporary challenges.

Figure 1: Digitalization in the production of local products



3. Objectives of the Study and Digital Tools and Applications Explored

The goals and scope of the research article are as follows

- Goals :

Figure 2: The objectives of the study on the cooperatives examined

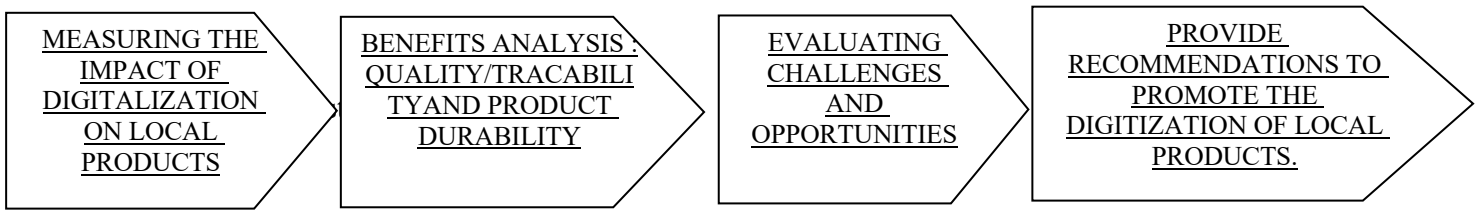
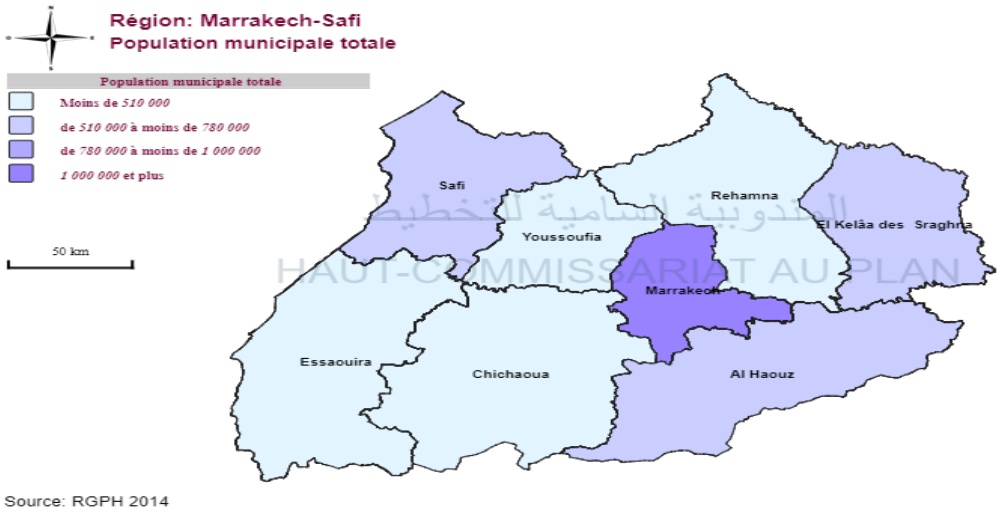


Figure 3: Geographical location of cooperatives studied



The article focuses on the digitalization of local production in the Marrakech-Safi area (a sample of 56 agricultural units). It explores various aspects of digital applications, including the use of sensors, drones, geographic information systems (GIS), blockchain and other related technologies. The article

will also address the economic, environmental, social and cultural aspects of the digitalization of local resources in Morocco. The main objectives of this research article are to improve understanding of the impact of digitalization on local agricultural production in Morocco, to examine the associated benefits and challenges, and to provide concrete recommendations for implementing digital technologies so that they can be effectively integrated into this specific agricultural sector.

a. Digital tools and applications to preserve and enhance terroir characteristics

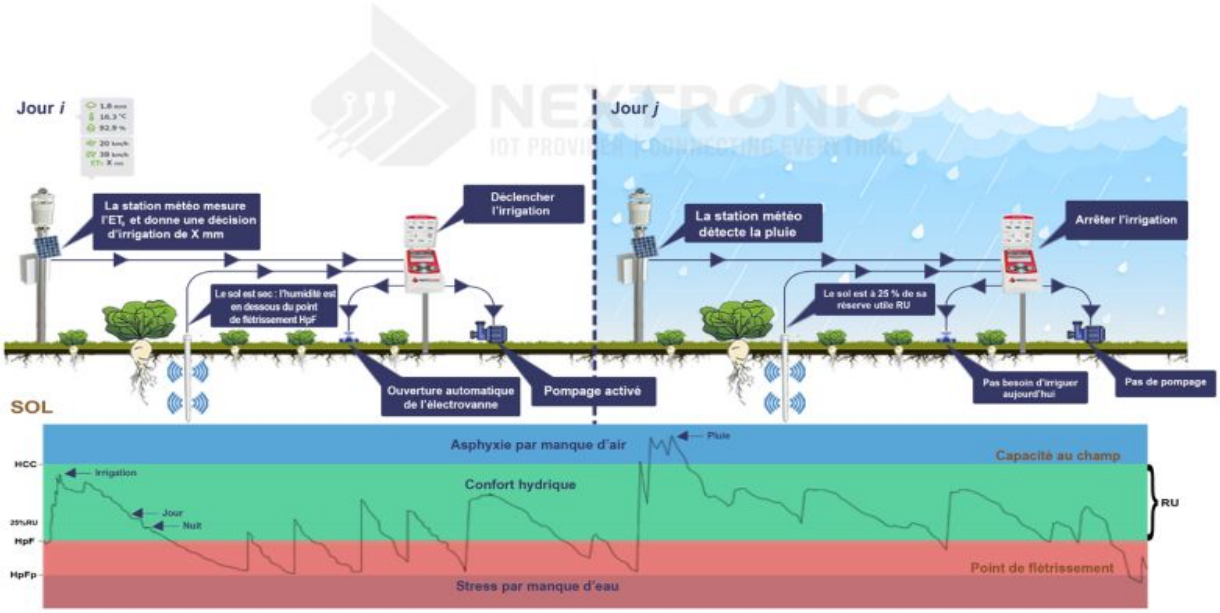
There are various digital tools and applications that can be used to preserve and enhance terroir characteristics in agricultural production. Here are a few examples:

i. Geographic information systems (GIS)

GIS makes it possible to collect, organize and analyze geographical data to better understand landscape features such as topography, soil, climate, vegetation and so on. This information is essential for adapting agricultural practices to regional specificities (El Hage Hassan, 2011). Geographic Information Systems (GIS) play an important role in the digitalization and promotion of local content in Morocco. GIS are technical tools that enable the collection, storage, analysis and visualization of geographic data. In the context of terroir products, GIS can be used to map and process the specific characteristics of terroirs, such as crop location, climate, soil types and other environmental factors. The use of GIS in community production offers several advantages. Firstly, they enable a better understanding of terroirs and their geography, which can help farmers and producers make informed decisions about crop selection and farming practices.

ii. Sensors and IoT (Internet of Things)

Figure 4 : Example of IoT sensor operation



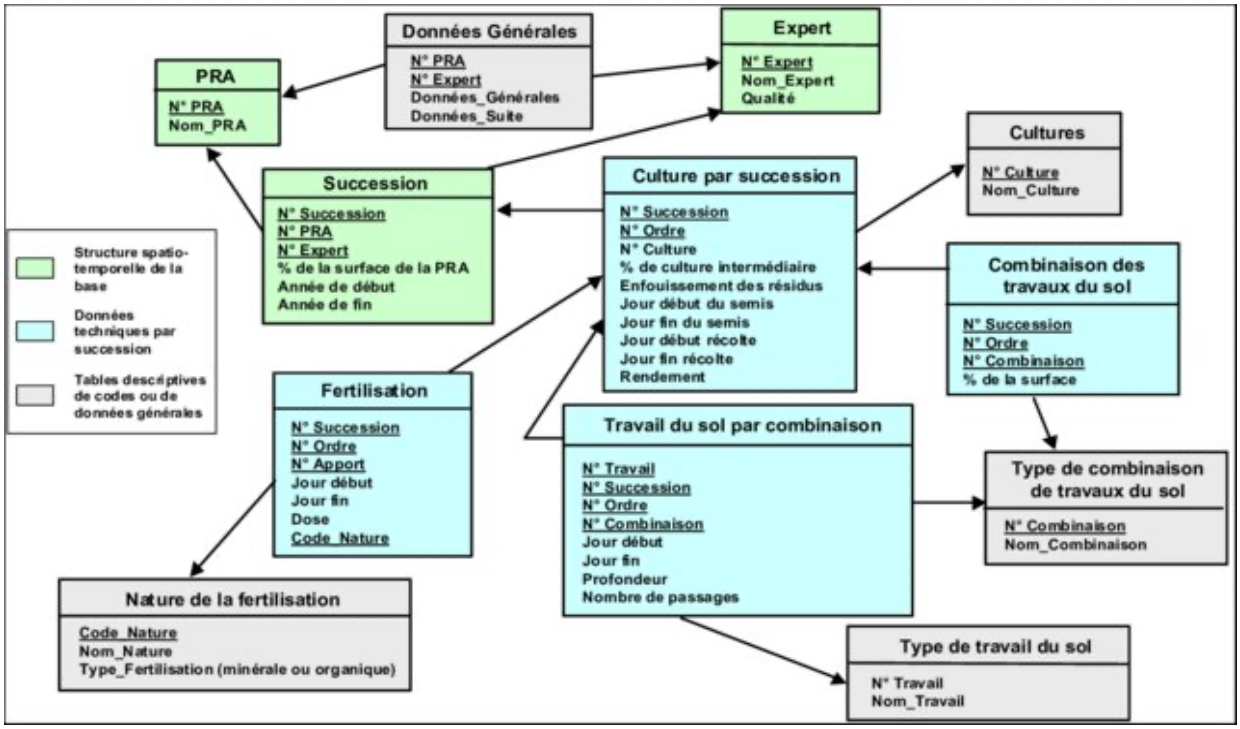
Source : THE NEXTRONIC COMPANY

Sensors embedded in soil, plants, animals or agricultural systems can collect real-time data on factors such as soil moisture, temperature, oxygen, crop growth and more. This information helps farmers to make informed decisions by adjusting the crop to the specific characteristics of the terroir. Sensors used in crops monitor and collect data on parameters such as soil moisture, temperature, sunshine and nutrient levels. This valuable information enables farmers to better understand crop needs and make agricultural adjustments accordingly. For example, thanks to soil moisture sensors, farmers can improve irrigation quality by applying the right amount of water at the right time, thus reducing waste and costs. IoT also enables remote monitoring and tracking of production conditions. For example,

using connected sensors, manufacturers can monitor environmental conditions in warehouses that store local parameters such as temperature and humidity, to ensure optimum conditions are maintained. This helps maintain production efficiency and reduce losses. New applications for sensors and IoT in local manufacturing are linked to traceability and supply chain management. By registering sensors throughout the process, from harvest to distribution, it will be possible to track the origin of products, guarantee their authenticity and boost consumer confidence. Sensors can also help detect and prevent quality problems (Fabbe-Costes & Lemaire, 2001).

iii. Computer modeling

Figure 5: Simplified physical model of the "Agricultural practices" database



Computer models can be used to map and predict agricultural conditions based on terroir characteristics. For example, climate models can help predict climate change and adjust agricultural practices accordingly (Balaghi et al., 2024). One of the areas in which computer modeling is widely used in community production is weather modeling. Climate plays an important role in determining the quality of agricultural produce. By using climate models, farmers can map the weather and anticipate seasonal changes, enabling them to plan crops, optimize sowing and harvesting dates and ensure a reduction in atmospheric risk. Computer models are also used to simulate crop growth and the efficiency of farming practices. Crop growth models consider factors such as soil type, climate, water and fertilizer application, and provide information on expected yields, production efficiency and optimal management strategies. These models help farmers to adapt their production methods, predict yields and improve inputs. Another application of computer modeling in local manufacturing concerns the simulation of supply chains. Supply-chain models can be used to simulate production, logistics and distribution flows, in order to optimize business planning and scheduling. This helps reduce costs and minimize losses (Comelli, 2008).

iv. Mobile applications

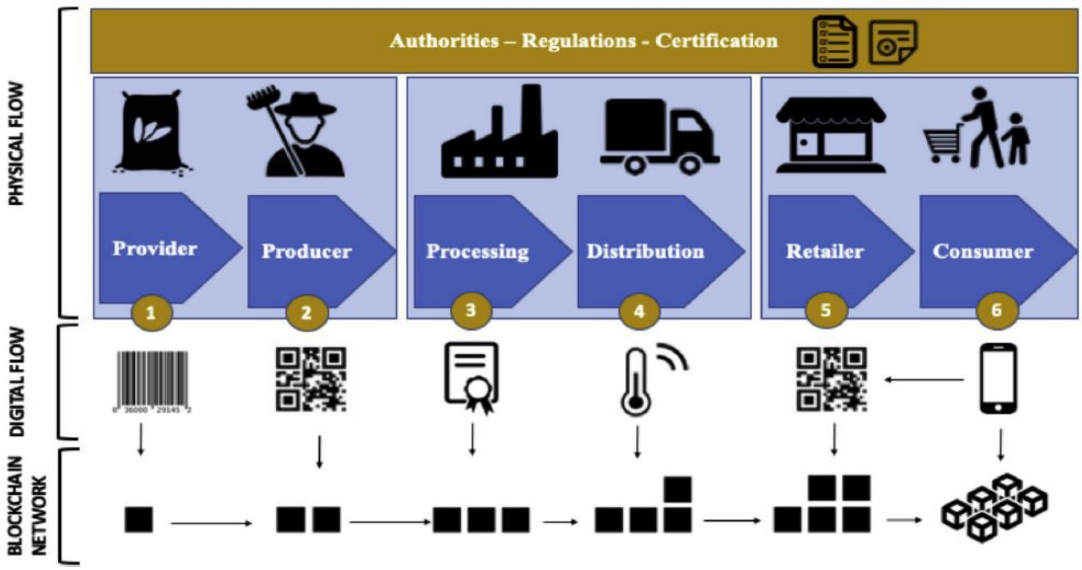
Mobile applications can provide farmers with real-time information on farming practices, crop recommendations, weather forecasts, cultivation advice and more. They can also be platforms for field monitoring, product research, communication between company players, etc. For the first time, mobile applications offer consumers rapid access to detailed information on local products. Apps can

provide full product descriptions, including geographical origin, processes, special features and possible certifications (Coulibali, 2021) This enables consumers to make informed decisions and choose locally available products that match their tastes and values. What's more, mobile apps offer geolocation capabilities, enabling customers to easily locate nearby manufacturers and local outlets (Kurtaliqi , 2019). Apps can provide interactive maps, directions, opening hours and other useful information to facilitate local shopping. This brings producers and consumers closer together, supports local economies and encourages more responsible and sustainable consumption. Mobile applications can also facilitate local discovery. By integrating technologies such as QR codes or batch numbers, consumers can search for products and receive detailed information on origin, quality and authenticity. This boosts consumer confidence in local products and enables manufacturers to demonstrate their commitment to transparency and tracking (Laurent , n.d.).

v. Blockchain

Blockchain technology can be used to create transparent and secure records of terroir characteristics, product origins, certifications, transactions and more. This boosts consumer confidence and guarantees local authenticity. Blockchain can also help combat local counterfeiting. By recording information on the blockchain, such as certificates, specific terroir characteristics and processes (Bernoussi, 2022) , it becomes more difficult for fraudsters to falsify this information. Consumers can therefore rest assured that the products they buy are genuine, protecting manufacturers from counterfeiting and unfair trade practices. In addition, blockchain can facilitate commercial transactions between developers and users. Blockchain-based smart contracts enable automatic execution of agreed terms and conditions, reducing the time, costs and risks associated with transactions. Easy, secure payments can also be made using crypto-currencies, offering an alternative to traditional payments. The adoption of blockchain in local products also presents challenges. Firstly, a solid technical infrastructure is required to support this technology. In addition, collaboration between supply chain business units is essential to ensure accurate data collection and participation in blockchain (Krachen, 2022).

Figure 6: Simplified diagram of an agri-food supply chain using blockchain (Kamilaris et al., 2019)



vi. Social networks and digital marketing

Social media and digital marketing platforms can be used to promote local products by sharing information about the unique characteristics of the terroir, sustainable farming practices, farmers' stories and so on. This helps consumers recognize and promote local products. The use of these digital tools and services helps to preserve and improve the quality of the terroir through data collection

(Nakara et al., 2014), adaptation of farming practices, product traceability and communication between players in the value chain. This enables them to enhance the value of local products and encourage sustainable, environmentally-friendly agriculture. Social networks are a powerful platform for promoting and telling the story of local brands. Manufacturers can use platforms such as Facebook, Instagram and Twitter to share animated product photos, videos of their products, testimonials from satisfied customers, as well as origin stories and traditions associated with local products. This forges an emotional bond with customers, reinforces their involvement and stimulates their interest in these products. Digital marketing also offers opportunities to precisely target audiences interested in local products. Designers can use marketing strategies such as online advertising, search engine optimization (SEO), e-mail campaigns and influencer marketing to reach their target audience. They can also collect demographic and behavioral data on consumers to personalize their messages and increase their impact (Idrissi and Smouni, 2023).

4. Results and discussion

a. Geographic information systems (GIS)

56% of cooperatives use GIS to optimize their farming practices. Typical applications include crop management, water management and farmland management. Some companies, such as COMERB PLANTES and HUILAROME, also use GIS to predict yields. Companies have seen significant benefits such as better planning, reduced costs and improved productivity.
The integration of GIS into farming practices indicates increasing efficiency and effectiveness. Joint ventures are recognizing the importance of GIS for successful operations and strategic planning, reducing inefficiencies and maximizing profits.

b. Sensors and IoT (Internet of Things)

IoT sensors and devices are used by 12% of companies for weather monitoring, irrigation and soil monitoring. HUILAROME also uses this technology for cold chain management. Benefits noted include improved efficiency, cost reduction and product quality. The adoption of sensors and IoT marks an evolution towards precision agriculture. Collaborative agencies are using this technology to access data in real time, enabling rational decision-making and more efficient use of resources, improving efficiency and productivity.

c. Computer modeling

8% of companies use computer modeling software for weather forecasting, crop quality and agricultural data analysis. COMERB PLANTES and HUILAROME also use this equipment for materials handling. Key benefits include forecast accuracy and resource management. Computer modeling enables business units to predict and plan accurately. By using these tools, resource management can be improved, yields enhanced and the risks associated with unpredictable weather conditions reduced.

d. Mobile applications

Mobile applications are commonly used for work management, inventory tracking and communication between project team members. They are also used for sales and marketing. Benefits include time savings, better organization and improved communication. The use of mobile applications means that business units can quickly adapt to modern technologies. This facilitates efficient management and fluid communication, essential for coordinating activities and making rapid decisions in a collaborative environment.

e. Blockchain

Most companies are not yet using blockchain for product traceability and management (2%). Although few companies have adopted blockchain, it represents a future opportunity to improve the traceability, transparency and security of transactions. This can boost consumer confidence and increase the popularity of products on local and international markets.

f. Social networks and digital marketing

Cooperatives are actively using social networks (97.5%), especially Facebook and Instagram, to promote their products. Benefits include increased sales, improved visibility and greater customer engagement. The use of social media for digital marketing underscores the importance of an online presence. Cooperatives use these platforms to reach more people, improve brand awareness and communicate directly with customers, which is essential for increasing sales and building customer loyalty.

g. General comments

Common challenges include member training, technical costs and equipment maintenance. Opportunities offered by the implementation of this technology include continuous yield improvement, market expansion and innovation in farming techniques. These challenges highlight the need to invest in training and technical support to successfully adopt the technology. However, the opportunities suggest great potential for increasing the competitiveness and sustainability of cooperatives. The use of digital technologies can lead to efficiency gains, increased yields and the ability to export high-quality products to new markets.

5. Conclusion

The integration of digital technologies into the agricultural sector in the Marrakech-Safi region reflects the desire to optimize farming practices, improve productivity and strengthen resource management. Despite training and cost challenges, cooperatives see great potential in this technology to increase competitiveness, expand markets and innovate farming practices. The use of GIS, IoT sensors, computer modeling and mobile applications is already underway, while blockchain remains a future opportunity to improve traceability and transparency.

6. References

- Abid, T., Rodier, F., & Durif, F. (2020). Produits alimentaires locaux : Les motivations d'achat en fonction des circuits de distribution. *Décisions Marketing, 98*(2), 127–143.
- Balaghi, R., Lahlou, M., & Alaouri, M. (2024). *GMS-MAROC : Le système d'alerte à la sécheresse et de prévision des rendements céréaliers au Maroc*. Institut National de la Recherche Agronomique, Division de l'Information et de la Communication.
- Batat, W. (2021). Produits de terroir versus produits locaux : Une perception différenciée selon deux cultures alimentaires, française et québécoise. *Recherches en Sciences de Gestion, 142*(1), 157–186.
- Ben Arfa, N., & Ghali, M. (2019). Le numérique dans la chaîne de valeur agroalimentaire : Enjeux et opportunités. Dans *Les agriculteurs dans le mouvement de numérisation du monde* (pp. 159–191).
- Bernoussi, N. (2022). *L'impact des indicateurs de qualité sur le comportement d'achat d'un produit alimentaire : Une approche expérimentale, par la valeur perçue et l'authenticité perçue. Application à l'huile d'olive d'Algérie* [Mémoire, Montpellier SupAgro]. https://tel.archives-ouvertes.fr/tel-04048613
- Comelli, M. (2008). *Modélisation, optimisation et simulation pour la planification tactique des chaînes logistiques* [Thèse, Université Blaise Pascal - Clermont-Ferrand II]. https://tel.archives-ouvertes.fr/tel-00730176
- Coulibaly, S. (2021). *Analyse intelligente des images pour la surveillance dans une agriculture de précision* [Thèse, Institut National Polytechnique de Toulouse - INPT; Université des Sciences Techniques et Technologiques de Bamako]. https://tel.archives-ouvertes.fr/tel-04186483
- El Hage Hassan, H. E. (2011). *Les apports d'un S.I.G. dans la connaissance des évolutions de l'occupation du sol et de la limitation du risque érosif dans la plaine de la Bekaa (Liban)*

: Exemple d'un secteur du Bekaa el Gharbi [Thèse, HAL]. https://theses.hal.science/tel-00647147

- Ellouyty, J. (n.d.). Les technologies au service du développement agricole au Maroc : Quelles réponses de l'agriculture intelligente aux défis sociaux et environnementaux ? Cas de la plaine du Haouz - région Marrakech-Safi. Laboratoire des études sur les ressources, les mobilités et l'attractivité (LERMA).
- Ertus, P., Petr, C., & Jacob, C. (2019, septembre). Influence des dimensions du terroir sur les intentions du consommateur : Quels efforts pour un produit alimentaire estampillé "terroir" [Communication présentée à la 14e Journée Marketing Agro-alimentaire]. Congrès AFM, Montpellier, France. https://hal.archives-ouvertes.fr/hal-02293692
- Fabbe-Costes, N., & Lemaire, C. (2001). La traçabilité totale d'une supply chain : Principes, obstacles et perspectives de mise en œuvre. *Revue française de gestion industrielle, 20*(3), 23–52. https://hal.archives-ouvertes.fr/hal-03306462
- Genin, D., & Elloumi, M. (n.d.). Les relations entre environnement et sociétés rurales au niveau local (pp. 121–149).
- Idrissi, N. A., & Smouni, R. (2023). Recours aux médias sociaux comme forme de communication stratégique des partis politiques au Maroc : Une étude théorique. *International Journal of Accounting, Finance, Auditing, Management and Economics*. https://doi.org/10.5281/zenodo.8064062
- Kamilaris, A., Kartakoullis, A., & Prenafeta-Boldú, F. X. (2019). A review on the practice of big data analysis in agriculture. *Computers and Electronics in Agriculture, 162*, 691–707. https://doi.org/10.1016/j.compag.2019.05.039
- Krichen, M. (2022). *Adoption de la technologie Blockchain pour les réseaux sans fil modernes*. https://hal.archives-ouvertes.fr/hal-04058671
- Kurtaliqi, F. (2019). *Valeur d'usage d'une application mobile et impact sur la relation au point de vente : Le cas des applications d'aide à l'achat* [Mémoire, Université d'Angers]. https://tel.archives-ouvertes.fr/tel-02420032
- Laurent, M. (2018). La blockchain est-elle une technologie de confiance. In C. Levallois-Barth (Éd.), *Signes de confiance : L'impact des labels sur la gestion des données personnelles* (pp. 179–198). Institut Mines-Télécom. https://hal.archives-ouvertes.fr/hal-01778949
- Ministère de l'Agriculture. (2020). *Stratégie Génération Green 2020-2030*. Rabat, Maroc.
- Nakara, W. A., Benmoussa, F.-Z., & Jaouen, A. (2014, septembre). L'utilisation des réseaux sociaux dans le marketing des PME : Entre risque et opportunité ? [Communication présentée au XIIe colloque francophone sur le risque Oriane]. Bayonne, France. https://hal.archives-ouvertes.fr/hal-02554525
- Organisation des Nations Unies pour l'alimentation et l'agriculture (FAO). (n.d.). *Manuel sur l'application de la télédétection aux statistiques agricoles*. Publication préparée dans le cadre de la Stratégie mondiale pour l'amélioration des statistiques agricoles et rurales.
- Poncet, Y., Koné, T., & Reyes, H. F. (2009). La diversité locale des produits de terroir en pays émergent : Un chemin malaisé. *Autrepart, 50*(2), 17–32.
- Prévost, P., Capitaine, M., Gautier-Pelissier, F., Michelin, Y., Jeanneaux, P., Fort, F., Javelle, A., Moïti-Maïzi, P., Lériche, F., Brunschwig, G., Fournier, S., Lapeyronie, P., & Josien, É. (n.d.). Le terroir, un concept pour l'action dans le développement des territoires. *VertigO – la revue électronique en sciences de l'environnement*. https://doi.org/10.4000/vertigo.14807
- WOCAT Coordination, & FAO. (2011). *La pratique de la gestion durable des terres : Directives et bonnes pratiques pour l'Afrique subsaharienne*. TerrAfrica.
- World Bank. (2019). *Agriculture and digital technologies: Tools to feed the future*. https://www.worldbank.org/