# 9 tips on how to go digital in the spices and herbs sector

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The spices and herbs supply chain is becoming increasingly digital. Digital technology can facilitate aspects of each stage in the chain. It lets you improve product quality and safety, increase efficiency and transparency, and better access finance and buyers. Digital tools can even help make your business more sustainable. When digitalising your business, think carefully about which technologies to invest in to be sure the benefits will outweigh the costs.

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# 1. Explore digital farm-to-fork solutions

Digital technologies are becoming increasingly common in each stage of the spices and herbs supply chain, including:

- Farming robotics such as pickers, drones and sensors to support precision agriculture.
- Processing digital tools and equipment to improve transparency and control over quality and food safety.
- Sales online platforms to provide access to new potential buyers.
- Warehousing digital equipment to protect products and optimise the use of warehouse space.
- Transport applications and blockchain technology to reduce costs and facilitate traceability.
- Consumption QR codes for storytelling.

Agricultural and market data can improve business decisions throughout the supply chain. Software solutions can make business processes more efficient. There are even digital tools for accessing finance and trade. While digital solutions can offer great added value, they also come with a cost. You have to carefully weigh these costs and benefits before deciding whether to invest.

Kenya's free Haller Farmers app focuses on sustainable farming techniques and practical innovations for African

smallholders. The app includes interactive features such as a 1,000 m<sup>2</sup> plot design for efficient land use, with a map of how a farm should be laid out for maximum production and minimal effort. It "empowers farmers with knowledge, fosters eco-friendly practices, and nurtures the future of agriculture".

Village Link's Htwet Toe farming app lets farmers in Myanmar connect with agronomists for advice about their farming problems. Other features include crop monitoring, land monitoring and weather analytics. Their Village Link Satellite Services is a smart farming tool for farmers and other relevant sector stakeholders.

Tips:

Start with easy wins and digital solutions that are most suitable and accessible for your business. After that you can expand to more advanced technologies.

Find solutions that integrate various aspects of your business, from agricultural data and advice to access to finance and markets. Providers may offer solutions covering more than one aspect of your business, from agriculture to processing to international sales.

See the World Bank's publication What's Cooking: Digital Transformation of the Agrifood System for more information about digitalisation.

# 2. Employ smart agriculture

Smart agriculture uses digital technology to make farming more accurate, efficient and sustainable. Many farmers already use smartphones, sensors, drones and satellite imagery to improve various aspects of farming, from soil condition monitoring to crop health assessment. Many available solutions rely on mobile technology. Sub-Saharan Africa is predicted to have 700 million smartphone connections by 2030, thanks to better availability of affordable smartphones.

The SpiceUp project has launched a smartphone application to boost the productivity and sustainability of black pepper farmers in Indonesia. It offers customised information on water management, fertilisers and agricultural techniques, along with alerts on pests and diseases based on weather forecasts. Spice collectors can use farmer QR codes to get data on for example farm size, pepper variety and yield. Project lead Verstegen suggests they "may expand SpiceUp to other products and countries in the future".

Figure 2: The SpiceUp app

Source: SpiceUp Indonesia @ YouTube (2022)

#### **Precision farming**

Precision farming solutions help to optimise production and reduce costs by using real-time data from satellite navigation, sensors and drones to guide precision irrigation, fertilisation and pest management. They enable farmers to apply the exact amount of water and nutrients plants need and so reduce waste and increase crop yields.

Though precision farming is not yet common amongst smallholders in developing countries, Kairos Agriculture's first Smart Vanilla Farm in Malaysia is a good example. This farm employs Agriculture 4.0 technologies including the internet of things (IoT), big data, artificial intelligence and machine learning. It also uses aquaponics and a full ecosystem of microbes, enzymes and vermicompost (worms).

#### **Decision support tools**

Digital decision support tools can help farmers decide when and how to plant, protect and harvest crops. These tools collect, combine and analyse data to provide support and information on how to optimise production and/or quality. They usually collect the necessary data from sensors and weather stations. Decision support tools may also incorporate ERP functions such as bookkeeping and planning.

For example, **365FarmNet** works to make it easy for farmers to get started with precision farming. They help farmers automate documentation, plan and manage time, get important weather data and apply fertilisers and pesticides. Using satellite data, farmers can create vegetation and yield potential maps, plan and visualise soil samples section by section, create application maps for fertilisation and sowing and optimise their route plans.

#### Tips:

Explore precision farming and decision support apps and tools relevant to your crop and region. Examples are Agworld, Conservis and Cropwise.

Stay updated on digital innovations in agriculture. Browse the European Digital Innovation Hubs catalogue for trends in Europe. Select 'Agriculture and Food' or 'Manufacture of Food Products, beverages and tobacco' to refine your search.

Read about the benefits and applications of digital technologies in the FAO publication Big Data for Agriculture and also read about how small farmers can benefit from large farm technology on the Endeva website.

To maximise the benefits, make sure your farm team is trained to use these technologies.

# 3. Invest in business software

Business management software such as Enterprise Resource Planning (ERP) can help you work more efficiently and eliminate human error at each stage of the supply chain. ERP tools integrate the management of main business processes to increase productivity and lower costs. Many combine applications to collect, store, manage and interpret data from various activities. This aids business processes such as raw material orders, processing, shipping and traceability. Export-related features include order processing and sending shipping documents.

It can be difficult to choose the right ERP software. There are many options, each with its own structure and coverage. Implementation costs can also be a hurdle for small exporters. However, once up and running, ERP software is likely to save time and prevent expensive mistakes. Explore which application best fits the scale of your business. Large companies may use SAP or Microsoft Dynamics.

ERP solutions suitable for the spices and herbs sector include Aptean for spices and ingredients, Parity Factory for spices and flavourings and Batchmaster for seasonings and additives. They can help spice processors manage their processing and quality checks, as well as keep products separated according to shelf life, allergen risk and origin. For exporters that work with multiple smallholder farms, suitable applications include eProd and Farmforce.

Figure 1: Aptean Food & Beverage ERP for Spices

Source: Aptean @ YouTube (2021)

#### Tips:

Explore which software and smartphone applications meet your needs. You can start by reading reviews of popular small business apps.

At the very least, make sure to document your processes in a simple way. Use a decent backup system, such as **Dropbox**, **Google Drive** or other cloud service provider. ERP software may not be interesting until your company is large enough to afford the investment costs.

Be sure you have the connectivity needed for these technologies to operate smoothly. In rural areas, this may require investing in better internet access.

Train your team to manage and maintain new technologies effectively. Teach them basic digital skills before moving on to more sophisticated software and equipment.

# 4. Automate your processing

Digital and automated processing technologies can not only enhance the quality and quantity of your products but also streamline your operations. They can be applied to various aspects of spices and herbs processing, including cleaning, sorting, sterilisation, mixing and quality assessment. Larger European companies are frontrunners. Processing companies in developing countries usually start with cleaning technology to improve the purity of their spices and herbs.

Relevant technologies for spices and herbs processing include:

- Automated cleaning equipment helps you meet European buyers' high standards with the use of techniques like airflow and sieves to remove external matter.
- Optical sorting sensors using laser and NIR (near infrared) technology ensure uniform quality by sorting products according to size or colour intensity, or detecting foreign bodies.
- Artificial intelligence (AI) for quality assessment analyses the aroma, quality and authenticity of spices and herbs using tools like an electronic nose.
- Digital moisture and density assessment tools ensure product quality and safety by using laser technology to measure moisture content and density.
- Drying and sterilisation solutions allow for precise control of parameters to ensure product safety and quality without use of chemicals or radiation.
- Fully automated production lines handle tasks like grinding, mixing, chopping and packing with minimal human intervention.

SpectrifyAl is a Sri Lankan company whose innovative Al-powered platform uses near infrared (NIR) detection for accurate and efficient quality identification of spices, herbs and tea. Its machine learning algorithms learn from data they process. This means their platform will continue to get better and more accurate over time, so customers get the most reliable and consistent results possible.

#### Tips:

Before investing in new technology, analyse the potential return on investment. Contact equipment manufacturers such as TOMRA, BHS-Sonthofen, LÖDIGE and Sesotec for insights and quotes to make an informed decision.

Search the ANUGA FOOD TEC exhibitor database for the latest processing technologies and digital solutions tailored to the spices and herbs industry.

Invest wisely. Consider buying used high-quality equipment as a way to reduce costs without compromising on technology benefits. For sales of second-hand equipment, see Industrial Auctions or Troostwijk Auctions.

Be aware that using digital solutions may make you a competitor of some of your current customers, which they may not appreciate.

# 5. Support your production and sales with big data

Big data involves collecting and analysing large volumes of information to uncover patterns, trends and insights that can inform strategic decisions. Strategically applying big data analytics can enhance your product quality and safety. You can also use it to make informed decisions on market entry/expansion and about product development and marketing strategies. In addition, big data boosts production efficiency by aiding better planning, disease management and sustainability practices.

Practical applications include:

• Quality and authenticity checks – the international testing company Eurofins uses big data from large numbers of samples to analyse the authenticity of spices and herbs in its laboratory and verify origins or

distinguish between for example natural and synthetic vanilla.

- Food safety monitoring the EU's Rapid Alert System for Food and Feed (RASFF) tracks food safety issues to facilitate a rapid response when public health risks are detected in the food chain.
- International trade analysis tools such as ITC's Trade Map and Access2Markets' trade statistics portal offer valuable insights into the global spices and herbs market by transforming big trade data into accessible formats that can help you identify demand, trends and competition levels.
- Market research research and consumer data companies such as GFK collect and compile large retail sales datasets to analyse market shares and identify consumer behaviour and trends. Direct access to such datasets may be expensive.

#### Tips:

Explore free data tools to gain insights without having to make large investments. Also look for industry reports that are based on big data, providing a cost-effective way to benefit from insights even without direct access to expensive databases.

Focus on relevant data that directly impact your business, such as market trends for specific spices or herbs you produce, to make your analysis manageable and actionable.

Use Trade Map and Access2Markets tutorials to learn how to effectively navigate and interpret trade data relevant to your products.

See our market information for the spices and herbs sector for information on topics such as trade flows, trends, requirements and market segments.

# 6. Use digital solutions to ensure traceability

Traceability is a major requirement amongst European buyers. Digital technologies help to increase transparency and traceability in the spices and herbs supply chain.

## Warehousing

Companies are investing in automated warehouses, which are operated digitally, to make logistics operations more efficient. Modern palletising solutions include robots, automated guided cranes and motion control systems, which allow optimal use of warehouse space and gentle product handling.

However, fully automated warehousing requires large investments and may not be right for your business. For example, these solutions are particularly suitable for fixed pallet sizes, while spices and herbs often come in varying packaging materials and sizes. A simpler (and cheaper) option, especially for smaller companies, is to use smartphone applications such as Zoho Inventory and Sortly for warehouse and container management.

## **Transport and supply chain**

There are a variety of digital tools to facilitate transport processes. For example, the Asset Panda app allows remote tracking, monitoring and management of everything from lorries, tankers, containers and farm equipment to contracts. Geotab allows you to track your fleet on a smartphone via a GPS server. Besides these relatively simple and cheap solutions, more complex systems are also on the rise, such as systems using blockchain technology.

### Blockchain

An important trend in transport and logistics is the use of **blockchain technology**. This technology links data or

transactions (blocks) in an encrypted ledger (chain) that is stored on many computers in a peer-to-peer network. It facilitates smart contracts, efficiency and supply chain monitoring, and lets you add your story to the final product.

Figure 4: How blockchain can help us transform our agrifood systems

Source: @ UNFAO on YouTube (2022)

Blockchain systems allow each stakeholder in the supply chain to view the progress of goods through the supply chain, monitor container movement in real time and see the status of customs documents. It can also encrypt important documentation, such as prices and contracts, to secure agreements. There is growing interest in using this technology to make supply chains more transparent in the spices and herbs sector. For example, the Spices Board of India, UNDP Accelerator Labs and GS1 are piloting a blockchain-based traceability, quality assurance and trading system.

Aveda's vanilla blockchain tracing initiative allows them to trace the vanilla they use in their products from smallholder farms and a collector co-op in Madagascar to their processor in France and manufacturing facility in the United States. This lets them "track and ensure ingredient quality and responsible sourcing practices throughout the supply chain". Aveda "plans to use the transparency gained from this technology to help drive environmental and social improvements", including organic certification and third-party verification of fair wages.

Figure 5: Aveda's vanilla blockchain tracing system

Source: Aveda @ YouTube (2021)

#### **QR codes**

If you supply spices and/or herbs that are used in branded consumer products, you can use QR codes to add information to your product and tell your story. This provides traceability and gives buyers and consumers background information about your company and product. The data linked to QR codes can easily be integrated into blockchain traceability.

Dutch spice company Verstegen uses blockchain and QR codes to create a "fair, transparent and sustainable chain from farmer to consumer". Consumers can scan the QR code on their packs of Back to the Origin nutmeg to see the Indonesian farmer who grew it, if they received a fair price and the product quality.

Figure 6: Verstegen's nutmeg chain from plant to plate

#### Source: Verstegen NL @ YouTube (2023)

Digital tools that use QR codes and blockchain technology to support traceability include:

- TE-Food is a farm-to-table food traceability solution that uses blockchain and QR codes to track food products throughout the supply chain.
- AirDAO combines blockchain and the IoT to provide information about the quality, safety and origin of food and pharmaceutical products. QR codes link to blockchain-verified information. It enables real-time tracking and verification of products, ensuring authenticity and compliance. By using smart contracts and sensor technology, Ambrosus gives buyers secure data.
- Provenance uses blockchain technology to enable brands to provide transparent and verifiable supply chain data to consumers. It supports real-time product tracking and helps brands demonstrate the authenticity and sustainability of their products.

#### Tips:

Use tools like CargoWiz, Cube-IQ and Goodloading to calculate and design packaging and optimise the packing of goods inside containers and lorries.

Use your shipping company's track and trace tool to follow your containers, and communicate any delays to your customers proactively. This can help to avoid claims.

Watch Blockchain work – Simply explained to better understand what blockchain is. Watch Revolutioning Agriculture by Leveraging Blockchain Technology and Blockchain Africa Conference 2022 – Using Blockchain Technology to Change Farming in Africa for recent presentations about how blockchain can further impact Africa's agricultural sector. Also learn about smart contracts and how they work. Read publications and articles such as Agriterra's 'Beyond the blockchain', Wageningen University's article 'Blockchain improves transparency and sustainability' and the FAO's 'E-Agriculture in Action: Blockchain for Agriculture' for inspiration on practical applications of blockchain technology and the opportunities and risks.

Monitor blockchain application developments in international transport and logistics reported by shipping companies such as MSC and Hapag-Lloyd.

# 7. Use online platforms to find potential buyers

The spices and herbs trade is mainly a face-to-face business that relies on personal contact, factory visits and sample analyses. Online business-to-business (B2B) platforms are a way to reach a wider audience, by showcasing your product quality and authenticity. In the international spices and herbs trade, these platforms are mainly used to connect suppliers in developing countries with buyers in destination markets. Actual orders are not usually placed via these platforms.

Relevant online platforms include:

- Digital trade event tools leading trade fairs like **BIOFACH** and **Anuga** have developed digital matchmaking tools to connect suppliers and buyers before, during and after the trade fair.
- Online B2B marketplaces besides well-known players like Alibaba, other platforms such as India's Agri Exchange and eSpice Bazaar cater specifically to the spices and herbs industry. There are also some online auctions serving the trade in a single spice, such as Zouthern Spicekart and Cardamom Coin for cardamom, and Agrox Cinnamon for cinnamon.
- Supplier directories platforms such as Saladplate and Greentrade (for organic food) list suppliers and their offers, allowing buyers and sellers to connect based on specific criteria.
- Social media communities professional networks such as LinkedIn facilitate networking through specialised groups like the spices and herbs buyers suppliers forum, Spice Network and Spice Trade Professionals. Facebook also hosts specialised groups, for example Spices Manufacturers and Spice's and Herbs Trading.

Note that the customs control process makes it difficult for companies from outside the EU to sell spices and herbs directly to European consumers.

#### Tips:

Regularly check the websites of leading trade fairs for digital events and matchmaking opportunities. These can be excellent low-cost platforms for networking and finding new buyers year-round.

Before subscribing to paid B2B marketplaces, inquire about the number of relevant buyers on the platform and ask for a trial period to assess its suitability for your business.

# 8. Create a digital profile to trade online and access finance

Accessing finance is one of the main challenges for smallholders in developing countries. However, there are a growing number of mobile applications that let smallholders create a digital identity. A digital identity helps them get a credit score and receive trade finance. In an increasingly digitalised market, with digital contracts

and supply chains, mobile connectivity will become crucial.

# Stay on top of developments in digital trade

Much progress has been made since the first digital agricultural commodity trade pilots in 2012-2018. The relative share of digital food commodity trade is increasing slowly but surely, thanks in part to several initiatives launched some time ago, such as the general trade platform Easy Trade Connect.

The International Chamber of Commerce (ICC) Banking Commission has developed a set of electronic rules (eRules) to support the digitalisation of trade finance practices. Called eUCP 2.1, they are a supplement to the UCP 600 private rules for trade and letters of credit and provide guidelines for the digitalised version of these trade practices.

## Get access to finance by creating a digital profile

Digital profiles and a credit score can be very helpful in obtaining finance for agricultural inputs or trade. For example, the One Acre Fund successfully digitised loan repayments for farmers in Kenya in partnership with Citi Inclusive Finance. Greater transparency and efficiency enabled them to successfully reduce repayment collection times from 12-16 days to just four days, and to lower costs by 80%.

Mobile banking on mobile phones has made making and receiving payments much safer and easier for everyone. It also helps farmers stay up to date on market prices. By making financial services accessible and convenient, initiatives like Tanzania's Tigo Pesa help improve farmers' access to financial services.

There are many digital solutions available for the agricultural sector. Some focus on a specific product group, others are more general. Most focus on the country where they were developed.

Tools available for the spices and herbs sector include:

- Apollo Agriculture a Kenyan fintech start-up that uses satellite data and machine learning to make informed credit decisions. Farmers in remote areas can access affordable credit for seeds, fertilisers and crop insurance to increase their yields. They can also use their phones to access voice-based training and make payments. Apollo partners with more than 1,000 agricultural Kenyan distributors to ensure good availability of physical inputs.
- AgUnity a low-cost and secure blockchain-based transaction record system for smartphones. By fostering financial inclusion for rural communities and giving farmers a digital identity, it creates an efficient digital supply chain from farmer to consumer. AgUnity is active in nine countries as of January 2024 and also covers traceability compliance. It focuses on nine commodities, including vanilla.
- TruTrade an online trading and payment platform in Kenya that helps small farmers connect with buyers. It digitalises informal agriculture value chains by providing digital trading records and giving smallholders trade credentials.
- UMVA platform (by AUXFIN) an e-banking platform that facilitates transactions in local currencies, between currencies or in kind. This enables farmers to sell their produce or get credit based on stock that has not yet been sold.
- Digitt + a digital wallet for the unbanked population of Pakistan, with financial services and products for marginalised farmers and farming families in rural areas.
- Agri-wallet a fintech solution that provides pre-financing so collectors can postpone mobile payments to farmers while letting farmers continue to buy agricultural inputs. It works with a virtual currency based on blockchain technology. Farmers are paid part of their income in blockchain tokens via their mobile phones, which they can spend with affiliated suppliers of farm inputs such as seeds and fertilisers.

Tips:

Make your company bankable by improving its credit rating and credentials. No matter your

company's size, financers will grade your credit profile. Learn what your business credit score means and how to improve it, or build your credentials using new digital applications like AgUnity.

Use the leading international trade finance platform, **Trade Finance Global**, as a source of information on trade finance and the latest digital developments.

# 9. Know where to look for the right digital solutions

Digital technologies can help make your company future-proof and solve specific supply chain issues. Stay on top of developments and assess which technologies best fit your company and situation. When selecting digital solutions, you need to make informed decisions. You can ask experts or a business support office for help, or ask your peers about their experiences.

## Use online marketplaces to find technological equipment

Use AgriExpo to find technological equipment for precision agriculture, measuring instruments and farm management software. Products are grouped into categories, such as agricultural drones.

## Read tech magazines to keep up with digital developments

Read online magazines such as AgriTech Tomorrow, Global AG Tech and CropLife to stay up to date on interesting digital technologies.

## Search for digital technology providers online and in frontrunning countries

The Digital Agri Hub has continued the efforts of the Technical Centre for Agricultural and Rural Cooperation (CTA). Besides their 'The Digitalisation of African Agriculture Report 2018-2019', they also have a worldwide database of digital tools for the agricultural value chain in lower and middle-income countries. As of January 2024, this database lists over 1,100 solutions grouped into 25 technology categories.

The database classification identifies six use cases:

- 1. Farm management and advisory more than 750 solutions
- 2. Market linkage more than 420 solutions
- 3. Supply chain management approximately 300 solutions
- 4. Finance approximately 260 solutions
- 5. Smart farming approximately 260 solutions
- 6. Ecosystem support 130 solutions

Countries with the highest number of available solutions are India, Kenya, Nigeria, Ghana, Tanzania and South Africa. These countries are clearly ahead in technological developments. The most used technologies are 'data analytics and business intelligence', 'artificial intelligence', 'big data', 'location-based services' and 'remote sensing'. Providers are mostly agritech companies (375), followed by the broader categories of 'agribusiness' (280+), commercial enterprises (almost 190) and non-governmental organisations (120+).

You can also find technology providers at Africa Goes Digital, the pan-African industry association of digital operators.

## Visit trade fairs or conferences to see the latest digital trends

New digital technologies are often presented at trade fairs and conferences. These are excellent places for networking. Germany has AGRITECHNICA, the leading global trade fair for agricultural machinery, and the World

Agri-Tech Innovation Summit in London is another important event for agritech digital technologies. Events outside Europe include Expo Agrofuturo in Colombia and Agritec Africa.

# Get support from local organisations

Non-governmental organisations (NGOs) and private sector organisations that are active in agricultural development are likely to play an active role in the digitalisation of value chains and companies as well.

For example:

- One Acre Fund is a non-profit social enterprise that supplies financing and training to smallholders. Its Insights and data library has several white papers and resources on agricultural innovation.
- The GSMA Foundation is an initiative providing resources and support for GSMA Mobile for Development programmes and innovations with socio-economic impact. Agriculture is one of its focus sectors.

## Join local digitalisation projects

There are many digitalisation projects for agriculture smallholders and small processors. Look for projects suited to your needs and country, and contact international development organisations.

Digitalisation projects in spice and herb-producing countries include:

- Mercy Corps' AgriFin project supports the introduction of digital technology and innovation services to smallholders in Indonesia and Africa. In 2021 the project did in-depth research into the Landscaping of Digital Agricultural System of Indonesia and proposed several interventions.
- GIZ's Agricultural Innovation Project helps Egyptian smallholders use digital solutions to access information about input supply, marketing, extension and financial services.
- Markup supports producers and processors in Kenya (also in Uganda and Tanzania). Its activities include setting up the East African Community Trade Information Portal and Kenyan trade portal and a joint venture between BAPA Trading in the Netherlands and Tanzanian spice company Companero Farmers.
- The Technical Centre for Agricultural and Rural Cooperation (CTA) has developed many digitalisation projects in African agriculture. They promote precision agriculture solutions and support access to new finance and insurance services for farmers.

Figure 8: How digitalisation is transforming traditional agriculture into next generation agriculture

#### Source: CTA @ YouTube (2019)

#### Tips:

Find digital solutions for your company at the Digital Agri Hub. Start your search in countries with the highest number of available solutions: India, Kenya, Nigeria, Ghana, Tanzania and South Africa. These countries are clearly leading technological developments and are therefore a logical starting point for finding solutions.

Read our tips for doing business and tips for organising exports. These tips can help you better understand how to do business with European buyers and what it takes to become a successful exporter to Europe.

Visit the websites of relevant digitalisation support projects, such as GIZ digitalisation projects, and check if any projects may be suitable for your business.

Globally Cool carried out this study on behalf of CBI.

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