Information management for agricultural high value product supply chains

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A major impediment to the development of agricultural production and the expansion of distribution and marketing is the organization and dissemination of information. Access to relevant information can aid farmers in improving their production and can help processors and distributors to expand their trade networks, bringing improved products to the consumer.

Significant changes on the agricultural products market concerning consumer health and product differentiation are requiring new business models. For differentiated high value, high quality products, the conventional spot market business model is replaced more and more by different relationship business models, where producers and buyers building up personal trade relations. These business models demand new means of communication, where close interaction between the supply chain partners is possible. Information technology plays therefore an increasingly important role in linking the members along a high quality product supply chain. Furthermore, the here presented communication and information management approach plays a vital role in fostering the co-learning and business evolution of a value chain. This is important in the light of dynamically changing preferences of consumers and market trends.

Product Tracking Example: The Coffee Product Track

The coffee product track runs from the field where coffee is grown to consumers all over the world. The main product tracking nodes through which coffee runs are:

- field (production)
- farm (harvesting and post harvest processing: de-pulping, washing, drying, cleaning)
- coffee cooperatives (further processing: sorting, quality check, peeling and others)
- exporters to importers (changing of ownership and transportation)
- roasters (roasting, blending, grinding)
- market
- consumer (general public or food industry)

Tracking product and processing data should help both to identify production quality and product characteristics (e.g. flavor) and to link this information to the end-point product through all levels of the product track.

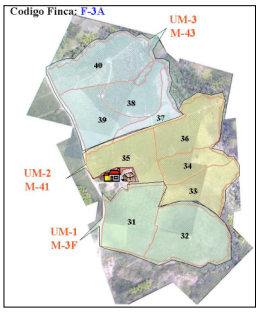

Figure 1: Farm map enables identification of management units

Tracking Code System

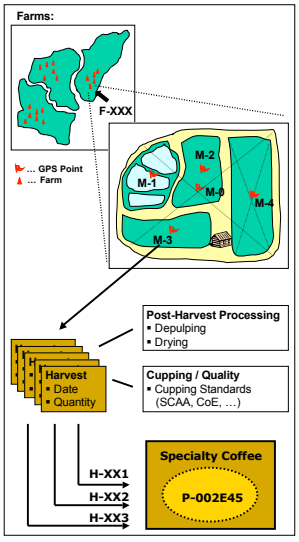

Figure 2: Basic Code Sytem enabling product tracking along the supply chain

Farm-Code:
[Example: **F-00B3A8**]
- Generated on farm registration (farm name, producer's name, contact information, location)
- Enables to link general farm information (e.g. images and farm maps) in database

Code users: All supply chain participants

Management-Unit-Code:
[Example: **M-0078F6**]
- Generated on management-unit registration in database.
- Enables to link site-information in database.

Code users: producers, coffee cooperations

Harvest-Code:
[Example: **H-0010B0**]
- Generated on harvest registration in database.
- Links harvest date and management-unit-code.

Code users: coffee cooperations, coffee quality laboratories, exporters, importers, roasters

Product-Code:
[Example: **P-00006F**]
- Generated from roaster on registering end-product in database.
- Links the different harvest-codes of one end-product.

Code users: roasters, traders, consumers

Content management and security system

The CinfO data access model (see figure 3) provides a highly flexible structure for managing the dynamic and sensitive content tailored to the user's demands. Every user is assigned to several use-cases depending on his/her role (data contribution and data demand) in the DAPA project.

The data access model is realized through a three level security scheme dividing the CinfO platform into a public, private and administration area.

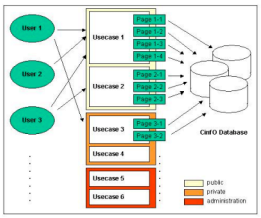

Figure 3: CinfO Data Access Model

Data Presentation

All information stored in the product tracking system is related to GIS data (geo-reference coordinates given as longitude and latitude). This feature enables interactive mapping of product and production data on digital maps on an online interface (Fig. 4 Section 2).

A special interface enables the consumer to receive coffee origin data (Fig. 4 Section 1). He/She may enter for example the product code shown on the coffee pack and receive a map showing all farms and all farm related information, where this coffee was produced (Fig. 4 Section 3).

Figure 4: CinfO Online Map Interface

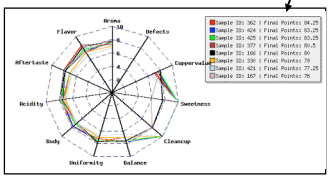

Fig. 5: Coffee Quality Module

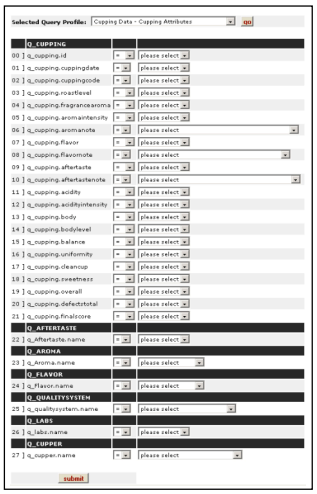

Fig. 6: Coffee Quality Module

Complex Query Module

To provide the user with a dynamic and powerful interface for retrieving data from the central CinfO system the "Complex Query Module" (Fig. 6) was created. The user can first select a certain query profile (= database view) and then elect as many restrictions as needed to receive the needed data subset. The query profiles are tailored to different users needs respect data access restrictions for certain user-groups.

The query output is shown on the screen and also available as download- file in different formats: csv-file (comma seperated value, readable with any spreadsheet program), shape-file and a special file format for Expector – a software program for statistical analyses.

The next version of this module will enable basic visual data analyses. Data linked to geographic coordinates can be queried and visualized via a map module. The the analyst can see certain trends in respect to e.g. coffee quality linked to spatial or environmental factors.

Feedback Models - Linking the farmer in

Due to the fact that coffee producers in developing countries are almost never directly connected to information systems (e.g. internet), new ways of interchanging data between farmers and modern product supply chain information system have to be found.

An intelligent feedback system for example provides the farmer with a quick overview over his productivity status. Automated processes doing complex data analyses (involving forecast models) producing easily understandable and powerful reports in different presentation. An example is shown in Figure 7: a farm map indicating the productivity status of different management units.

The key to all this systems is to identify, what data has to be managed and how to transport this information most efficient along the supply chain.

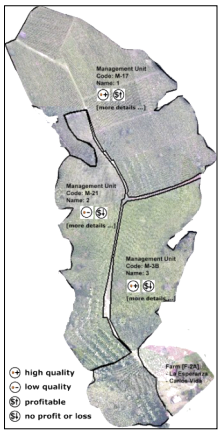

Fig. 7: Aerial view image of farm management units and their rating in production and quality

Supported by: CIAT, BMZ, BMF
Diversification Agriculture Project Aliance (DAPA)