**Traceability development in fresh vegetable and fruit sector: Hungarian case**
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**Domain: Food Chain Approach**

**Problem statement**
Establishment of the traceability system in the food sector is explained by the following factors by Trienkens and Van der Vorst (2007): differentiation of product processes, in homogeneity of basic materials and semi- finished of basic materials and semi-finished products, mixed sources of batches, perishable character of the product, presence of bioactive material. Van der Vorst et al. (2004) carried out an international benchmarking, main features of the traceability system for vegetables-fruits were: very diverse chain structure very diverse chain structure, traceability based on law and consumer demand, more branding, chain performance of traceability few hours to grower, little use of ICT, use of bar codes (EAN). The main bottlenecks in fruit and vegetable supply chain were next: traceability is lost at retailers and traders, unit of traceability strongly depends on the packaging, regulation is leading to traceability being unsystematic, lack of standards for coding, too small batches to make traceability cost effective.

Establishment and further development of the traceability system effect a change in the features of transactions (asset specificity, complexity of transaction / uncertainty, frequency of transaction) (Williamson, 1979) and difficulty of performance measurement (Holmström and Milgrom, 1994), and interdependence/connectedness of a transaction to other (Milgrom and Roberts, 1992) or analysis of food safety and quality. The critical areas of organizational issues: information distribution of intermediate and final food products features and coordination of activities between all the supply chain's agents and governance option in relation to strategic positioning (Reynaud et.al. 2004). Information distribution (asymmetry) is closely associated with quality and safety features of the product and with experience and credence product features (Martino and Perugini 2006). Information asymmetry leads to opportunistic behaviour and contractual hazards (Williamson, 1996). Costs of the coordination within the supply chain are closely correlated with the conception of interdependence (Thompson (1967).

**Objectives**
Main objectives of the study:
- to analyse fresh produce control system in Hungary,
- to analyse and describe traceability system in retail sector ,
- to analyse and describe traceability system of Pos,
- to draw conclusion and to make proposal for development.

**Procedures**
Analysis of the traceability system was carried out in four domains:
- System of official control (4 expert interviews by telephone)
- Large-scale retail chains (16 export interview by telephone)
- Producers' cooperatives (27/51 cooperatives by survey)
- Large-scale producers (46/320 producers by survey)

Organizational system of official control underwent a significant transformation during the years past. Control of certain fields, propagating materials, quality control of fresh vegetables and kinds of fruits, control of heavy metal- and plant protecting chemical content and hygienic control belonged to independent organizations, which were reorganized into an unified system during the years 2006-2007. In the field of official control, four half-structured expert interviews were made (telephonic interviews of 50-60 min duration).

Regarding the retail chins, interviews were conducted with experts in vegetable-fruit purchase, operating in 16 chains. (Telephone interview, 50-60 min. duration). Among the retail chains 3 hypermarkets (CORA, Auchan, TESCO) 3 supermarket (TESCO, SPAR, SMATCH), 3 discount chains (Penny, Plus, Profi) 2 C+C chains of department stores (METRO, Interfruct ) and 4 retail chains (Coop Hungary, CBA, Reál, Heliker) were included.

Traceability systems used by producers' cooperatives was examined by means of a questionnaire (postal questioning) survey. At the time of the survey 51 producers' cooperatives had permanent or temporary authorization to operate. Of the questionnaires sent off, 27 (54%) were returned. The favourable proportion of return may be attributed to telephone contact established before and following the postal dispatch.

**Results**
The main conclusions, drawn from official control interviews are as follows:
- Traceability systems differ from one to another according to the sales channels. In case of direct and sales on the wholesale market, the system of traceability exists and operates partially exists and operates partially only. Lack of traceability documentations and lack of transparency of the sales channel  represent a significant problem.
- In case of major producers, producers' cooperatives, major wholesalers and retail chains, a traceability system was established and operates on a satisfactory level. Main problems  originate from the lack of regular official control, problems of laboratory conditions and problems of quick checking up of traceability documentations (paper-based traceability system, scarcity of labour force, lack of special knowledge). Minimum performance of traceability is not defined on level of the sales channel, thus checking up time is very slow and in several cases, it surpasses the duration of the consumption of the product. For sanctioning quality faults and food safety deficiencies serve first of all penalties, the amount of which is relatively low as compared with the hazard and the damage caused.
- The main problems associated with the control of plant protecting chemical – and heavy metal content are: the sample number, necessary for adequate analysis of hazard is low (about only 50% of the justified). Examinations, carried out by companies (producing, trading ones) extend to a few products and some market actors only. Companies make laboratory examinations mainly in case of export sales. Own laboratory is possessed by a few market actors only. Within the frame of official control, institution of automatic laboratories is now in progress. Costs of laboratory examinations are relatively high. The proportion of laboratory examinations of preventive character is low. Also the proportion of product withdrawals and recalls is low.

The main conclusions drawn from retail trade interviews are as follows:
- The purchase system of vegetables-fruits is strongly differentiated, extending from local, small-scale chains (local ÁFÉSZ shop-nets) to regional (Coop Hungary, Reál ,

CBA) purchase system and country-wide purchase system (international retail chains). A part of the retail chains has category manager-like connection with the wholesalers (e.g. regional wholesalers of Reál and a part of the Pro-Coop ZRt., e.g. Bács Zöldért).

- The traceability systems show significant differences depending on the degree o centralization of the purchase, product features (length of the production period, perishability, quality keeping of the product) and the proportion of repacked products. Traceability of products causes the greatest problem in case of repacked mass goods and when a few products originating from a few suppliers are packed together
- Traceability system according to phase's levels is applied by retail chains, main target of which is the determination of product liability and shift of hazards, respectively. The main purpose is first of all the treatment of quality reclamations and only secondly the prevention of food safety problems.
- In compliance with food safety requirements, the role of official control is determinative. There was a precedent for self-examinations or laboratory development in case of a few retail chains only. Regular inspection and control on the spot on behalf of suppliers is scare, they fail to perform regular hazard analyses.
- Main form of the paper-based traceability system is the use of labels and tickets. Identification of the product is done by the use of bar codes (EAN)
- Retail chains possess internet accessibility, but it is limitedly applied in purchasing activity because of differentiated preparedness of suppliers (infrastructural deficiencies, problems with specialist knowledges).
- Economic and managerial benefits of traceability systems are not comprehended by retail chains. They regard the paper-based system as efficient. They are aware of the length of transit time, surpassing consumption time, but this is mainly explained by the problems of official control.

Main conclusions in association with the traceability system of producers' cooperatives are as follows:

- Producers' cooperatives became unambiguously aware of the importance of the development of the traceability system. In sales relations, expansion and further development of the traceability system was assigned to the third place of 8 factors by the respondents. Among future tasks (3-5 years) traceability system was regarded as the most important issue beside the strengthening of purchaser-supplier relations and branding activity on behalf of the producer and cooperative. Advantages of the traceability system are considered according to the following: precondition of market (first of all export market) penetration, tool of adaptation to purchasers' and consumer demands, reduction of costs originating from safety hazards.
- Regarding purchasing, purchase from producers or other producers' cooperatives are determinative. In sales relations, a most important role is played by sales to wholesalers, retail chains and direct export sales. the main form of coordination is the contract, within which forms shorter than one year are preferred, while the proportion of those for longer than one year is low (18.1%).
- The tools applied most frequently in supplier relations to purchasers are: positive or negative list of plant protecting chemicals, advice, prescription of quality assuring system, input assurance, prescriptions relating to variety and to f propagating material.
- the most frequent forms of quality assurance systems are as follows: EUREP-GAP, HACCP, Good Processing Practice
- The traceability system is exclusively paper-based, completed by the use of EAN-code. A smaller part of the producers' cooperatives possesses product recalling program, hazard handling system for treatment and registration of claims

- Regarding data transfer technologies mobile phone, fax (100%) are most frequently used, and wide-band internet (88, 9%).

**Table 1. Main characteristics of traceability system in Hungarian fresh vegetable and fruit supply chain**

| Factors | Retailers | Producer cooperatives | Producers |
|---|---|---|---|
| Characteristics | Mix of medium concentrated oligopol and atomistic market structure. Increasing concentration and market power | Atomistic market structure. Increasing role and market share. | Atomistic market structure. Diverse of size and level of technology and knowledge. |
| Forces of traceability | Mainly laws and regulation, little affect of consumer behaviour. | Mainly laws and regulation, power of retailers. Consumer behaviour on export markets. | Mainly laws and regulation, power of wholesalers. |
| Governance forms | Contracts with suppliers, mainly less than one year. | Contracts with members, mainly more than one year Joint planning of variety structure. | Contract with buyers (wholesalers), mainly less than one year. |
| Traceability performance | No exact time to suppliers or producers | No exact time to members of cooperatives | No exact time |
| Traceability forms | Based on paper documents (labels), parallel with using barcode (EAN) Little use of ICT | Based on paper documents (labels), parallel, with using barcode (EAN) Little use of ICT | Based on paper documents. Little use of ICT |

**Conclusions**

The main characteristic of the sector's traceability system
- The integrated traceability system is not implemented. Mainly sequential coordination and traceability forms are characteristic.
- There is no clear traceability performance level for chain actors.
- There are not any vertical organizations to coordinate traceability system and transparency in chain.
- Incentives of traceability system based mainly on laws and legislation, less on economical ones.
- At the companies there are not any integrated chain information systems, little use of ICT, only telephone and fax (though most of them has internet) are charcteristic.

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