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# MODELS FOR SHORT FRUITS' CHAIN

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**Abstract:** *The paper presents models for short chains of fruits, considering integration as the main mechanism of coordination agents' activities on the chain. The research answer the question how efficient are activities of fruits' chain in this particular form of integrated activities of collecting fruits, store and process them in juices and jams and sell them to the market, in a single economic unit. The objective of the research is to assess the efficiency of such a business. In achieving this purpose, economic data regarding investment, production, revenues and expenses have been analysed, for an associative form of processing and selling fruits, which develops such a business. The results show that investment is feasible, because revenues are higher than expenses, the rate of return is 5%, and the return of investment is 5.66 years, less than the machineries' period of operation. The model is useful for farmers owning orchards, who want to apply for structural funds and to develop, as such, their business in the direction of integrating activities downstream the chain.*

**Key words** *short chain, fruits, efficiency, integration*

**JEL classification:** *Q13*

## INTRODUCTION

The paper aims to identify models for short fruits' value chain within the wider concern for increasing performance. It offers solutions for farmers encountering problems in selling the output. Previous research (Manole, 2006; Turek, 2008) found the difficulties that farmers encounter in delivering their small quantities of fruits, difficulties to enter the hypermarkets and supermarkets, which require large and homogenous batches of products. These problems can be solved by integrating post-harvest activities into one single economic unit, creating, as such, the short value chain of fruits.

The fruit value chain is defined as the sum of activities and operators and relationships among them. Each activity adds value to the product and changes its usefulness (sometimes agricultural products are not useful to consumers in the form they are harvested, so they are subject to storage, processing). The short value chain means reducing the number of activities and / or the number of operators. Since activities add value to products, they cannot be reduced. What can be reduced is the number of operators. Reducing the number of operators and maintaining the number of activities implies that the agents remaining on the chain carry out several operations, by integrating upstream or downstream activities, a phenomenon known as vertical integration. In order to cope with the growth of business complexity by integrating more activities, it is recommended that agencies at the same level of the value chain join a cooperative or association to have more economic power, a phenomenon known as horizontal integration.

The short value chain development model proposed by this paper is where the activities are integrated vertically and horizontally. The model is integrated both vertically, because in the cooperative or association all post-harvest activities of collection, reception, storage, sorting, processing, conditioning, packaging, marketing are carried out in a single economic unit, and horizontally, because the cooperative comprises several farmers, which are located at the same stage of the value chain.

In order to finance the investments necessary for the implementation of the model, the members of the cooperative can access the funds of the National Rural Development Program, measure 4.2. Support for investment in the processing / marketing and / or development of agricultural products, the objective Establishment and / or modernization of processing and

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marketing units. The beneficiary is an associative form, so it is entitled to 50% of the eligible expenditure of the project to be financed through the National Rural Development Program.

The model can be implemented in any fruit-growing area in the country, most notably those in the sub-Carpathian regions of Arges, Valcea, Prahova, Dambovita, Buzau, Olt and Dolj counties, as well as in the North-West of Romania, Satu-Mare, Bihor and Maramures. The total area occupied by fruit plantations in 2014 was 145,000 ha. There is a reduction in the area occupied by fruit plantations from 206,000 ha in 2007 to 145,400 ha in 2014. Fruit production increased in the analyzed period from 1,085,800 tonnes to 1,115,200 tonnes, which means, in terms of surface reduction, an increase in average fruit production. The apple plantations occupy an area of 57,500 ha, plum plantations occupy an area of 70,700 ha, and the other fruit trees occupy an area of 17,200 ha. We appreciate that the areas planted with plums in Romania are high compared to the consumption requirements of the population expressed during the harvest period. Plums are very perishable, and it is recommended to process them and to capitalize, as such, the production.

Since the largest areas are cultivated with apples and plums, it is justified to develop short value chain models for apples and plums. Therefore, the investment objective is to set up a fruit marketing and processing cooperative with apples and plums. Fruits' value chain and market in Romania were studied in numerous papers (Ion, 2005, Manole, 2005, Turek, 2008). This piece of research emphasizes, particularly, the role of integration and it aims at designing a model for short chain in agriculture. The hypothesis tested in this piece of research is that short value chain of fruits is efficient. The short value chain is a business where post harvest activities are integrated and performed in one single economic unit (Ion, 2016). In order to test the hypothesis, economic data regarding investment, production, revenues and expenses have been analysed and indicators of economic efficiency have been assessed. The research objective is to identify the feasibility of the business which integrates post harvest activities of collecting and processing fruits and selling juice and jams.

## **MATERIAL AND METHODS**

The need to make an investment in fruit processing is based on consumer demand for fruit juice, a product with added value, which has another consumer utility compared to fresh apples. Fruit processing is also necessary due to the high perishability, which is subject to continuous degradation processes from the time of harvesting, and seasonality, by processing, the apple consuming period being extended.

The technical objectives of the investment are:

- to establish a fruit-processing plant to extend its life, mitigate the seasonality of the supply of fruit and obtain higher added value products demanded by consumers;
- to establish a local fruit collection network for the raw material supply of the processing plant;
- to ensure the temporary storage, sales, bookkeeping and marketing services for cooperative members.

The financial objectives of the investments are:

- to purchase machineries and equipments for fruit processing;
- to purchase land for the location of the plant;
- to build the construction of the factory and the warehouse.

The structure of production is presented in Table 1. The cooperative produces 980,880 litres of apple juice per year and 7,280 kilograms of plum marmalade. The apples are harvested from August to October and the apple juice is produced from August to November. The plums are harvested and the marmalade is produced from July to September.

Table 1 Production structure

Product	VII	VIII	IX	X	XI	Total
Apple juice (l/year)		166160	160800	332320	321600	980880
Apple juice pieces.BaginBox3l/year)		55386.7	53600.0	110773.3	107200.0	326960
Plum marmalade (kg/year)	2400	2480	2400			7280
Plum marmalade (jars/year)	4081.6	4217.7	4081.6			12381

Source: author's calculations

### Market and marketing mix

Product policy is focused on getting two products, apple juice and plum marmalade. The goal of product policy is to diversify the range by introducing into production and launching new products on the market, depending on consumer demand. Thus, as the market matures and grows the notoriety of the cooperative products, pear juices, cherries and other fruits, or combinations thereof, and marmalade of other fruits can be introduced into production without the need for additional investment in machinery. The product policy focuses on the traditional recipe for the production of apple and marmalade juice without the addition of chemicals. This information can be used in communication policy and justifies the setting of higher sales prices than those of competition.

In terms of product packaging and conditioning, the Bag in Box is chosen for apple juice, due to the lower price compared to other materials and smaller sizes before use. In the case of the marmalade product, although the best economic results are recorded in the packing of marmalade in wood boxes, the glass jar was chosen to be the packaging material, since the sale in the box implies the existence of a vendor to split the product. Considering that the current purchasing model in Romania is self-service (supermarket and hypermarket), where the buyer is in front of the products without a seller, the marmalade product will be packed in jars. They can easily be placed on the store shelves where the consumer can buy the product himself without the help of a seller.

Promotion policy. The products are launched under a brand name, which will be accompanied by the specification of "cooperative". The main values transmitted through the promotion policy are the safety, freshness and quality of the products given by the use of fruits collected from local producers, members of the cooperative, of natural ingredients, without the addition of chemical substances.

The main marketing tools used in the promotion policy are online marketing, participation in fairs and exhibitions, promotional sales and prize competitions.

Pricing policy. Product prices are slightly higher than those perceived by consumers as similar. Therefore, in order to differentiate the products of the cooperative from those of the competition, the target audience, mainly by brand and label, is informed about the source and quality of the raw materials used. The price surplus is justified because it is perceived by consumers as an emotional investment in the development of Romanian agricultural production and in supporting the phenomenon of association.

Distribution policy. The distribution channel is short: producer (cooperative) - retailer - consumer. The main customers are small grocery stores and large supermarket and hypermarket stores. At present, Carrefour, Metro and Mega Image are running programs to provide their own stores with products from local manufacturers. The cooperative will apply to these programs.

The revenues are presented in Table 2. If the quantity of each assortment and the selling price remain unchanged, the annual product revenue is equal to 4,312,385 lei per year. The revenue structure is 98% revenue from the sale of apple juice and 2% revenue from the sale of plum marmalade.

The value of the total investment is 1,171,718 lei, consisting of the contribution of the members of the cooperative and the non-reimbursable assistance from the European Fund for Agriculture and Rural Development (EFARD). The share of the investment from the members' contribution is 60.5% and that of the EFARD is 39.5%. The investment is allocated in the first year of operation of the cooperative so that the total value of the income, which is the sum of the

operating revenues and the total investment, is 5,484,103 lei in the first year and 4,321,385 in the following years.

Table 2 Revenues from operational activity and investment (lei)

Specification	Year 1	Year 2	Year 3	Year 4	Year 5
Total revenues, of which:	5484103	4312385	4312385	4312385	4312385
Apple juice	4250480	4250480	4250480	4250480	4250480
Plum marmalade	61905	61905	61905	61905	61905
Investment financing	1171718				
- Own contribution	709440				
- Grant from (EFARD)	462278				

Source: author's calculations

The cooperative's total operating expenses include fixed and variable costs (Table 3). Fixed expense refers to wage and amortization, and variable to raw material and material expenses. The total expenses include the operating and investment expenses, which are found to be related to the EFARD project for the purchase of fixed assets in the amount of 1,171,718 lei. In the total operating expenditures, the highest weight is held by the material ones, namely 72.8% in the first year of operation (when the investment expenses were taken into account) and 93.5% in the years 2, 3, 4 and 5.

Table 3 Expenditure from operational activity and assets' acquisition (lei)

Specification	Year 1	Year 2	Year 3	Year 4	Year 5
Total expenditure, of which:	5277188	4105470	4105470	4105470	4105470
Materials	3842475	3842475	3842475	3842475	3842475
Salaries	174007	174007	174007	174007	174007
Amortization	79387	79387	79387	79387	79387
Other expenditure	9600	9600	9600	9600	9600
Assets acquisition	1171718				

Source: author's calculations

## RESULTS AND DISCUSSIONS

The total annual revenues are 4,312,385 lei, the total annual expenses are 4,105,470 lei, which includes the amortization, and the profit, calculated as a difference of the two indicators, is 206,915 lei (Table 4). Thus, the rate of return (resource consumption rate), calculated as a ratio between total profit and total expenditure is 5%, and the profit margin (calculated as a ratio between net profit and total income in this case) of 4.7%, which indicates that the business is profitable.

Furthermore, the economic efficiency of investment is assessed, based on data from Table 5. It was considered that the effective duration of machineries' operation is the standard operating period of the equipments of 10 years. Regarding the normal production capacity expressed in terms of value, it is expressed as the annual income.

Table 4 Economical and financial results

No.	Specification	Year 1	Year 2	Year 3	Year 4	Year 5
1	Total revenues (lei)	5484103	4312385	4312385	4312385	4312385
2	Total expenditure (lei)	5277188	4105470	4105470	4105470	4105470
3	Results (lei)	206915	206915	206915	206915	206915
4	Rate of return (%)	3.9	5	5	5	5
5	Profit margin (%)	3.7	4.7	4.7	4.7	4.7

Source: author's calculations

Table 5 Investments' indicators

No.	Indicator	Value (lei)
1	Investment value ( $I_t$ )	1171718
2	Production capacity expressed in terms of value (Q), of which:	4312385
2.1	Apple juice	4250480
2.2	Plum marmalade	61905
3	Expenses (Ch)	4105470
4	Profit ( $P_a$ )	206915
5	Effective duration of machineries' operation ( $D_e$ ), years	10

Source: author's calculations

In assessing the economic efficiency of the investment, the annual income by product type was also taken into account in order to determine the value of their specific investment. Also, yearly production expenditure on total activity and annual profit were considered.

Table 6 Economic efficiency of investment

No.	Indicator	Value
1	Specific investment ( $I_s = I_t/Q$ , lei)	0.27
1.1	Apple juice	0.27
1.2	Plum marmalade	19.23
3	Profit ( $P_a=I_t$ )	206915
4	Total profit ( $P_t = P_a \cdot D_e$ )	2069150
5	Final profit ( $P_f = P_t - P_r$ )	1862235
6	Economic return on investment ( $R = P_f/I_t$ ) %	159
7	The term of recovery of the investment ( $I_t/P_a$ , years)	5.66

Source: author's calculations

In Table 6, the economic efficiency of investment is assessed. The specific investment is 0.27 lei. It is noticed that the annual profit ensures the recovery of the investment in 5.66 years. Considering the fact that the business assumes the creation of a complex unit, combining production, processing and marketing activities, demanding from a financial point of view, the business is feasible. This is fully confirmed by the economic return on investment that exceeds the value of the investment: the total profit (recorded over the entire period of use of the machineries) is higher with 59% than the investment.

## CONCLUSIONS

The paper aimed at answering the question how efficient is the short fruits' value chain, when activities of collecting fruits, store and process them into juices and jams and sell them to the market are developed in a single economic unit. The economic and financial results show that such a business is feasible, because revenues are higher than expenses, the rate of return is 5%, and the return of investment is five years, less than the machineries' period of operation. As such, the hypothesis we assumed that short value chain of fruits is efficient is validated. The model of short value chain can be implemented by farmers in their efforts of reduce losses, ensure income stability and developing, as such, their businesses. The European Fund for Agriculture and Rural Development offers opportunities for financing part of such businesses of farmers who want to integrate activities down-stream agriculture.

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