VALUMICS
Food Systems Dynamics

H2020 VALUMICS Project
Italian processed tomato value chain: market competitiveness, efficiency, and pricing mechanism

Research Findings Brief
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Economic and governance analyses

This brief summarises key findings from economic and governance analyses using a suite of tools to provide in-depth understanding of the functioning of the Italian processed tomato value chain. The scope of the analysis includes tomato producers and processors in the leading Italian tomato producing region of Emilia-Romagna.

Processed tomato market in Italy

Italy is the largest producer of processed tomato in the EU and among the largest producers in the world, representing 49% and 13.6% of the EU and global production, respectively. Italy is also the largest EU country in exports of finished processed tomato products deriving 35% of total sales revenues from exports[1]. More specifically, for the season 2017/2016, Italy accounted for 22% of total tomato paste exports and 80% of canned tomato exports in the world.

Production of tomatoes for processing is spatially concentrated in a northern (mainly Emilia-Romagna region) and southern (mainly Campania and Puglia region) production areas in Italy. Out of 5.16 million tons of processed tomatoes, 53% is produced in the north production area and 47% is produced in the center and south production areas. The tomatoes are mainly processed into four different types of processed tomato products: tomato puree (*passata*), pulp/chopped tomato (*polpa*), tomato paste (*concentrato*), and whole tomato (*pelati*). Regarding the production method, 90% of tomato cultivation is conventional, 10% is organic production (IBO, 2020)[2].

Governance of the north Italian processed tomato value chain

Governance analysis is a tool to identify lead actors, trading practices, inter-firm relations, and structural elements along the value chain to better understand if fairness, in terms of perceived market power and fair value distribution, is or could be an issue in the north Italian processed tomato value chain.

The VALUMICS analysis of "Governance of north Italian tomato to processed tomato value chain" suggested in agreement with other studies that "dual-level relationship governance"

[1] ANICAV (2018, 22 October). Pomodoro: ANICAV "Campagna 2018: annata negative per l'industria di trasformazione con calo delle produzioni e incremento dei costi industriali ("*2018 campaign: negative year for the processing industry with a decrease in production and an increase in industrial costs*"). Retrieved from http://www.anicav.it/news/2018/10/22/491
[2] Interbranch Organization North Italy Processing Tomato (IBO) (2017, 18 July). Report Conclusivo Campagna 2017, Parma.

model best describes the current governance form of the north Italian value chain (Samoggia et al., 2019a, Deliverable 5.1 Ch8).

Dual-level governance

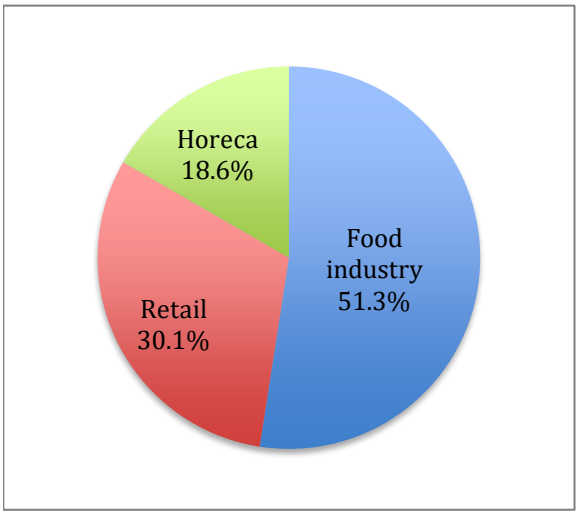
Strong connection of producers and processors through IBOs. Retailers are becoming lead firms in relations to processors.

At the first level, the governance relationship between tomato producers and processors is defined as relational, because the dependence between producers and processors is mutual. Both actors of the value chain are connected through the regional Inter-Branch Organization (IBO). The power inside the IBO North Italy Processing Tomato in terms of votes is equally distributed between producers and processors. Processed tomato is produced on a contractual basis. Tomato production and commercial relationships within the IBO North Italy Processing Tomato are regulated by general rules of a Framework Contract and specific contractual conditions set in detailed supply contracts. The framework contract regulates in detail production and delivery of produced tomatoes in the area of IBO North Italy processing tomato (programming of production, quality and safety characteristics of the produce, contract conditions and respect of production regulations). All negotiations between production and processing industry are channelled through the Producer Organizations (POs). Processors cannot contract with POs that have been excluded from the IBO North Italy Processing Tomato for not respecting the rules, and vice versa, POs cannot supply processors that have been excluded from the IBO North Italy Processing Tomato. Some of the companies are present both in the production and processing stage of the value chain and are registered as cooperatives or single private companies.

Inter-Branch Organisations

Producers and processors aim at strengthening market concentration and social collaboration through IBOs, ensuring higher competitiveness and sustainability through a mutual agreement that is beneficial for all

Figure 1. *Market Channels for the Processed Tomato of the IBO North Italy Processing Tomato*



Source: IBO North Italy Processing Tomato, 2017a

At the second level, governance relationship between processors and retailing may be defined as modular, where processors provide products to the pre-defined specifications of the "customers". Nevertheless, when it comes to private labels, the governance relationship between processors and retailers becomes captive – retailers being the lead firm and processors are suppliers. More than half of the processed tomato goes to food industry (51.3%), 30.1% goes to retail distribution, and 18,6% to HORECA (IBO North Italy Processing Tomato, 2019).

Market competitiveness, efficiency and technical change in the Italian processed tomato industry

The analysis of competitiveness, efficiency and technical change are tools to provide an in-depth understanding of the underlying factors driving the competitive advantage of processed tomato value chain actors in north Italy.

The analysis of competitiveness, efficiency and technical change reveals certain degree of non-competitive behaviour in the input (the relation between farmers and processors) as well as in the output (the relation between processors and retailer) processing market. The market imperfections are, however, more pronounced in input processing market. In both cases, the

Market power

The market power imbalances have considerably changed in favor of farmers since 2010, especially after creation of the regional IBO.

distribution of estimated mark-up and mark-down indices suggest that only small number of companies are characterized by considerably high degree of non-competitive behaviour. Then, the analysis observes a significant change in 2010. In particular, the mark-down index dropped down by approximately 10% in this year and only slightly recovered in the years after that. The market power imbalances have considerably changed in favour of farmers (they get higher price for their products). On the other hand, the mark-up index experienced opposite pattern. As a result, the shift in the relation between the price for the raw material with respect to marginal revenue product was compensated by the shift in the relation between the price of processing product and marginal costs. That is, the market imperfections did not decrease in the period 2006 - 2018 but were reallocated within the Italian tomato value chain.

In addition, significant differences exist when considering the size of companies. Small companies have higher mark-down index in the input market as compared to medium, large and very large companies. This indicates that small companies may take the advantage of specialized products and niche markets. On the other hand, the distribution of mark-up index indicates higher mean values for large and very large companies which is in line with our expectations about higher bargaining power of larger companies.

In general, the results support the existence of a significant change around the year 2010 and may be explained by the evolution in the relation among tomato processing chain actors intervened since 2000's. Producers and processors were undergoing a time of crisis and developed strategies at chain level that in 2011 brought to the formalisation of a body (IBO) based on the concept of mutual cooperation. The system constantly faces some challenges and requires adjustments to consolidate the effectiveness of the established instruments. The current research support that there have been limitations in the market power imbalances and that market imperfections may be reallocated. Part of these achievements may be the result of mutual knowledge and awareness based on long-term relationship and acknowledgment of reciprocal dependency.

Productivity growth

Small tomato producers have taken the advantage to improve scale efficiency by increasing the scale of operations, resulting in growth of total factor productivity at the producer level.

Technological change did not contribute significantly to the productivity dynamics. This holds for both producers and processors as well as different size distributions. Similar findings were observed for the processors' scale efficiency. Whereas tomato processors and medium and large tomato producers are characterized by almost optimal scale of operations (optimal size), small tomato producers have taken the advantage to improve the scale efficiency by increasing the scale of operations in period 2006 – 2018 and scale efficiency improvements represented the main source of total factor productivity growth on producer level. Then, even though considerable space for improvements exists on both producer and processor level we have not observed significant change in the dynamics of technical efficiency. In particular, the average overall technical efficiency on the producer level is 81% and on the processor level 76%. This suggests that the tomato producers and tomato processors operating on the technological frontier have significantly lower costs, approximately by 19 % and 24%, respectively, as compared to the sample average. Then, the decomposition of technical efficiency into persistent and transient part suggests that tomato processors as opposed to tomato producers are characterized by low level of systematic failures. The persistent technical efficiency of tomato producers accounts for 10 % and represent a considerable space for potential improvements in efficiency of inputs use.

Pricing mechanism along the value chain

Analysing the pricing mechanism at different levels of the value chain is a tool to understand price negotiations and power imbalances between different actors.

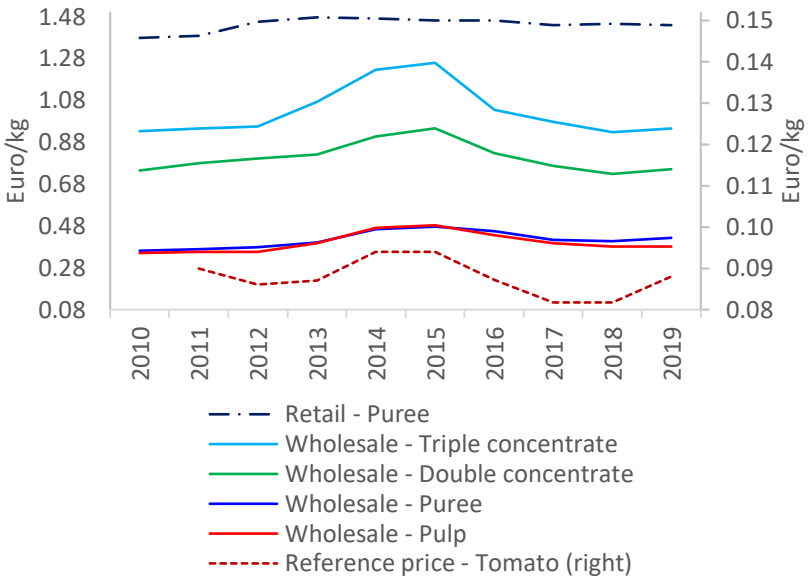
The price formation between processed tomato producers and processors is regulated through the IBOs, which coordinates the chain step, without themselves being involved in production, processing or trade between POs and processors. In particular, the role of the IBO is to streamline the price negotiation between POs and processors and ensure that the framework contract rules are applied in the price negotiation process. The price negotiations within the framework of the IBOs result in the determination of a reference price, which by itself is based on the historical developments in the actual producer prices of the processed tomatoes. The

Reference price formation

Regional IBOs provide an EU-unique framework of negotiating the annual reference price for processed tomatoes, resulting in fairer distribution of value between producers and processors.

reference price serves as a starting point for individual negotiations between the POs and processors. Final price of raw tomatoes is adjusted depending on the quality and other attributes of the harvested tomatoes. At the global level, producers of processed tomatoes in EU receive higher prices compared to the USA and China. This price difference might be explained, among many factors, by the presence of IBOs in Europe. At the EU level, Italian producers also receive higher prices compared to Portugal and Spain, which are also large producers of the processed tomatoes in the EU.

Figure 2. *Price of the final processed tomato products in Italy, 2010-2019*



Sources: IBO North Italy Processing Tomato for the producer price, Chamber of Commerce Piacenza for the wholesale prices, Italian National Institute of Statistics for the retail price of tomato puree.

Unfair trading practices

Reverse auctions of selling processed tomato products to retailers have become an unfair trading practice within the industry as retailers push for the lowest price, thus indirectly affecting the price setup of non-auctioned tomato products.

At the wholesale level, prices of the processed tomato products (tomato puree, tomato pulp, double and triple concentrates) are highly correlated with each other, and also with the reference price of the processed tomato (Figure 1). However, at the retail level, price of tomato puree is rather weakly related with prices at the wholesale and producer level. We attribute higher degree of price relationships at the producer and wholesale level to the fact that individual contractual negotiations are guided by the reference prices at this stage of the processed tomato value chain. Thus, the role of the IBOs is of great importance for both tomato producers and processors to achieve fair distribution of value along the chain.

In contrast, some processed tomato is sold to retailers via reverse auctions (i.e. the seller with the lowest price offer wins). Within the auction system, retailers provide a certain starting price to processors and processors propose their selling price. In the second round of the auction, retailers usually take the lowest offer. This system, indirectly influence the price setup for the non-auctioned tomato products. Selling tomato products at auctions is increasingly discouraged. In 2019, Chamber of Deputies passed a law to ban the practice of auctions for the purchase of agricultural products[3]. Now, such law is to be voted in the Senate, the upper house of the bicameral Italian Parliament.

Due to the different market organization structures along the value chain, the price margin is fairly low between the producer and wholesale prices in Italy, whereas the margin between the wholesale and retail prices of the processed tomato products are much higher, being about three times higher at the wholesaler–retailer level compared to the producer–wholesaler level. This implies that as the processing ratio is high, a small increase in price of raw tomato could lead to a significant reduction in processors' profit4. In general, price formation under the IBO ensure higher competitiveness and sustainability of inter-value chain relations for both tomato

[3] Chamber of Deputies (2020). Sale at a loss, prohibition of double-bottom auctions and regulation of ethical production chains. https://temi.camera.it/leg18/provvedimento/sotto-costo-divieto-di-aste-a-doppio-ribasso-e-disciplina-delle-filiere-etiche-di-produzione.html.
[4] FAO (2017). Fruit and Vegetable Processing – agribusiness handbook. FAO Investment Division.

producers and processors through a mutual agreement that is beneficial for the participating actors; on the contrary, further legal efforts are required to achieve the fair distribution of value at the processor-retailer level along the chain.

Concluding remarks

The results indicate that the upstream actors of the chain, i.e. producers and processors aim at strengthening market concentration and social collaboration through Inter-Branch Organization (IBO), ensuring higher competitiveness and sustainability through a mutual agreement that is beneficial for all.

This was confirmed by both price developments and margins obtained by producers and processors after 2011 and establishment of the IBO, and in the reduction of market power imbalances between them.

The results further indicate that price dynamics present at the producer and processing levels are not reflected at the retail level. One of the reasons might be that retailers are not part of the IBO, and the price-setting mechanism is entirely different at this stage of the value chain. The adoption of auctions for retail purchases pushes processors to squeeze their margins during the negotiation process.

Overall, the tomato processing case analysed in the present research shows that the sustainability, integrity and resilience of the chain are related to the managerial governance of the chain. Thus, chain actors can contribute to finding a balance between competition and collaboration, so to aim for all chain actors' higher level of competitiveness.

Key Outcome of economic and governance analysis of the Italian processed tomato value chain

- ***Dual-level governance***
- ***IBOs play a crucial role in price setup and balancing of power between producers and processors***
- ***Market power switched towards producers***
- ***Efficiency of small producers comes from the increasing scale of operations***
- ***Unfair trading practices remain downstream of the value chain***

Key sources for further information

This brief summarises results form the VALUMICS tomato case study on economic and governance analysis as reported in the deliverables listed below.
To discuss the research presented in this brief, please contact *duric@iamo.de* or respective authors:

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Deliverable reports:

Samoggia, A., Riedel, B., Del Prete, M., Bertazzoli, A., Ghelfi, R, Esposito, G., and Altomore, F. (2019) Governance of northern Italian tomato to processed tomato value chain, Chapter 8. *In* Barling, D. and Gresham, J. (Eds.) (2019) **Governance in European Food Value Chains**. VALUMICS "Understanding Food Value Chains and Network Dynamics", funded by European Union's Horizon 2020 research and innovation programme GA No 727243. **Deliverable: D5.1**, University of Hertfordshire, UK, 237p https://doi.org/10.5281/zenodo.4956324

Svanidze, M., Čechura L., Đurić, I., Jaghdani, T. J., Olafsdottir, G., Thakur, M., Samoggia, A., Esposito,G., and Del Prete, M. (2020). **Assessment of price formation and market power along the food chains**. The VALUMICS project funded by EU Horizon 2020 G.A. No 727243. **Deliverable: D5.5**, Leibniz Institute of Agricultural Development in Transition Economies (IAMO), Germany, 114 pages. https://doi.org/10.5281/zenodo.5161247

Čechura, L., Žáková Kroupová, Z., Rumánková, L., Jaghdani, T.J., Samoggia, A., Thakur, M. (2020). **Assessment of Economies of scale and technical change along the food chain**. The VALUMICS project funded by EU Horizon 2020 G.A. No 727243**. Deliverable: D5.6**, Czech University of Life Sciences, Prague, 169 pages. https://doi.org/10.5281/zenodo.5161347

Proceedings and publications

Samoggia, A., Monticone, F. (2021, June 9-11). *Governance in the Italian processed tomato value chain: the case for an Interbranch Organisation* [Conference poster]. 10th AIEAA Conference, Rome, Italy.

Čechura, L., Jaghdani, T.J.,& Samoggia, A. (2020, September). Imperfections in Italian Tomato Food Chain. Proceedings of The 60th Annual Meeting of the Gesellschaft für Wirtschafts- und Sozialwissenschaften des Landbaues e.V. (Society for Economic and Social Sciences of Agriculture) (GEWISOLA), Halle, Germany http://ageconsearch.umn.edu/record/305591 DOI:10.22004/ag.econ.305591

H2020 VALUMICS – Understanding Food Value Chains and Network Dynamics

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