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# POTENTIAL OF VERTICAL AND HORIZONTAL INTEGRATION IN THE HUNGARIAN FISH PRODUCT CHAIN

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**Abstract:** After the economic and political transformation, the output and resource utilization of the Hungarian fish production sector decreased less than in other livestock sectors, and it managed to preserve its income position. As a consequence of the relatively low level of the implemented innovative developments, though, for all the EU assistance available the cooperation efforts did not prove to be very efficient. The relatively favourable income position of several farms led them to a kind of “leisureliness”, and as a result, the level of the applied production technology in many cases did not even reach that of the 1970s. All these circumstances led to the degradation of the innovations and to the expiration of the horizontal and vertical integrations in the sector, leaving the commercial and cooperation forms being typical in an otherwise stable classical free-market environment. Problems were further increased – amongst other things – by the volatile cereal prices, 27% VAT rate, and the introduction of road toll. After long years, certain farms were to face losses, and the decline of profitability at sectorial level, thus the need for innovation and producers’ co-operations has become imperative. As a solution option to these problems, a model of a product chain containing both horizontal and vertical elements and comprising the entire sector has been developed. Present study introduces this new model, which is established on foreign examples primarily, but takes the Hungarian specialities into account too.

**Keywords:** aquaculture and fisheries, fish product chain, innovation, cooperation, horizontal and vertical integration

## Introduction

It has become evident by now that marine and inland catchments of fish cannot be increased any further, and that the global demand for fish and fishery products is increasingly becoming to be satisfied with products coming from the aquacultures. As a consequence of this and several other factors, aquaculture – i.e. the production of aquatic organisms – has by now become the most rapidly developing sector of food industry in the world.

The fish production sector in Hungary has three independent sub-sectors: (1) aquaculture (extensive and intensive), (2) inland fisheries (fulfilling commercial, recreational and restocking functions) and (3) fish processing and trade. These areas are also included in the CFP<sup>1</sup> and the EMFF<sup>2</sup> of the European Commission. The two major fields of aquaculture are (a) extensive pond fish farming and (b) intensive industrial fish production. While the former type of production is largely exposed to risks caused by the weather, the production of the latter type can fully be programmed, which makes a big difference between them. Another base of national fish processing is provided by the direct economic utilization of the

production potentials of the natural waters (as large as 141 thousand hectares), which serves two major production aims: (a) commerce and (b) recreation. Fish processing in Hungary is mainly directed at primary processing which implies a low level of added value creation, though. The per capita fish consumption in Hungary keeps, slowly though, increasing year by year (5.1 kg/capita/year). This is significantly below the EU average (23.3 kg/capita/year), and ranks our country the last but one on the list of the 27 EU states (EU EC, 2012).

Domestic fish production sector to date is responsible for some 2.5–2.8% of the gross output (GO) of domestic livestock production in Hungary, and for about 1% of the total of the GO of domestic agricultural production. In terms of gross added value (GVA), the GVA of the entire fish production sector<sup>3</sup> in year 2011 totalled 3.6 billion HUF. This equals 0.015% of the GVA of the entire national economy; 0.34% of the GVA of agriculture; and 2.4% of the GVA of livestock production. The significance of the fish production sector, however, reaches far beyond what these figures may indicate: it provides the underpinning of a number of supplies and services sectors, of the predominant part of the entire recreational fishing and angling sector, and of several environment and

<sup>1</sup> Common Fisheries Policy

<sup>2</sup> European Maritime and Fisheries Fund

<sup>3</sup> Including aquaculture and inland fisheries

nature preservation programs coupled with all their implied economic and social outputs.

Fish in Hungary in recent years has been predominantly produced by extensive fish ponds, and by intensive fish farms using geothermic energy in the first place. The decline of marine fishing, though, will probably open new market potentials for closed recirculating fish production systems that use water as a medium of production. Aquacultures in Hungary produce mainly Common carp, herbivorous fish species (Bighead carp and Silver carp, Grass carp) and predatory fish (European catfish, Pikeperch, Pike) feeding on the natural food supplies of the fish ponds and on supplementary feed. The most important product of domestic intensive fish production using complete feedstuffs is the African catfish, but the volume of Sturgeon produced by similar technology also keeps increasing.

Some 85–88% of the 14–16 thousand tons of the domestic fish for food production in Hungary comes from the pond fish cultures (26.1 thousand active water surface areas); the remaining volume is produced by intensive fish production systems (mainly RAR systems) using advanced production technologies. While the annual volume of the output of the aquacultures in Hungary is heavily affected by the whether due to the large share of pond systems, the actual output average has been showing a moderately rising tendency over the past 5–10 years. In terms of statistics, the gross output of fish production sector in 2012 totalled nearly 21.5 million tons, 15 thousand tons of which were contributed by fish for food with 2 349 tons of that coming from intensive production systems (Bojtárné 2013).

The fish production sector in Hungary is only partly capable of satisfying current customers demand for fish – Common carp and other carp species (*cyprinids*), and African catfish in the first place –, especially so in terms of assortment and quality. The ever growing customer demand, therefore, can only be satisfied by the importation of fish and fisheries products. The volume of imports of fish and fisheries products exceeds exports by 14 times both in terms of quantity and value.

Fortunately, the political and economic changes taking place in Hungary in the nineties did not hit the fish production sector (gross output, production infrastructure etc.) as heavily as the other sectors of the livestock husbandry. The organizational frames and the market channels of the fish production sector, however, were significantly restructured. Due to the solid technological background and to the survival of the product chains established in the early eighties, though, fish production sector managed to sustain its profitability, relying basically on the pond fish production. The privatization of the fish ponds that used to be owned by earlier cooperatives and state farms proved to be successful in the nineties; most of them were bought up by professional investors, which was interpreted by many as a “guarantee of future success”. For all the domestic consumption stuck at a low level, the absorp-

tion capacity of the domestic market remained to be stable and reliable thanks to the secure international export markets (Germany, Poland, e.g.) and due to the dropping out of some larger competitor companies (failed business management and new trustees, e.g. in Biharugra). The appearance of the multinational retail chains caused certain temporary problems to the specific profitability of the sector, the growth of the “angling market”, however, was able to provide ample compensation for these losses. There were some undesirable processes going on, though, like the relatively low level of innovative developments and the inefficient attempts of cooperation (e.g. the formation of producer groups). For all the available EU subsidization schemes (FIG<sup>4</sup>, EFF<sup>5</sup>), these problems persisted, which in the case of many relatively profitable companies led to the loss of motivation to develop, and in turn, resulted that many of the applied technologies of the day were found to be even below the level of the 1970s. As a rule, this led to the withdrawal of the innovations in the sector, and to the collapse of the vertical and horizontal integrative relationships. Thus, the sector appeared to be producing those patterns of commerce and cooperation that were characteristic of the classical open market capitalism. Similarly to other sectors of agriculture, willingness to cooperate is rather low even today (Takács et al. 2013). However, this is exactly the opposite of what happened in the Western countries, where the existing mechanisms and cooperation modes of vertical and horizontal coordination (producer organizations, technical platforms, and clusters e.g.) have grown stronger and more sophisticated.

By now, the sector has lost or is losing its most important export markets for several reasons: Poland has recovered from the KHV<sup>6</sup> epidemics, fish production sector subsidized by the EFF funds in Romania began to produce, the capacity of pond fish farms in Croatia has substantially been increased due to EU funding, owing to its relatively low logistics charges Czech Republic has practically no competitors in the German market, and so on. These problems are made even more severe by the high level, unpredictability and volatility of the grain prices, by the 27% high level of VAT, and by the introduction of the road toll, to mention just the most important of the causes. After a long time, having to encounter losses and face the reduction of their profitability at sectoral level, some businesses began to show willingness to innovate and cooperate in order to “survive”.

The primary objective of this survey paper is to investigate the mode of the formation of a vertical type of integration that incorporates the entire chain of the production, and to reveal the positive and negative impacts of such on the entire sector. The secondary objective of our paper is to make a complex overview of the theoretical background of the integration regarding to the food chain especially, because we can find too many conflicts between the general theories.

<sup>4</sup> Financial Instrument for Fisheries Guidance

<sup>5</sup> European Fisheries Fund

<sup>6</sup> Koi Herpes Virus disease

## Materials and methods

After a short overview of the concept of integration, we will survey those major problem points of the sector that can be combated by the creation of an integration model covering the whole product chain. This will be followed by the analysis of a theoretical version of the integration model, and its potential feasibility.

The data and information that underpin the survey were retrieved primarily from secondary sources, like sector specific materials, studies and papers, and conference publications. The structured compilation of the problem points was largely furthered by the thematic workshop organized by Szűcs I., co-author of this survey paper, at the Research Institute of Fisheries and Irrigation in 2013. Further on, interviews were made with the managers of several fish producing enterprises and with representatives of professional groups.

The identification of the problem points was followed by the development of an integration model that contains vertical and horizontal elements, is extended to the entire product chain, and is based on partial capital uniformity. We believe that this model will be able to provide an efficient tool to cure the problems that currently exist. The key elements affecting the feasibility of the model are the presence of mutual “confidence” among the actors of the product chain, and the subsidization potentials provided by the EMFF in the 2014–2020 planning period. The novel model demonstrated herein is underpinned by international examples primarily, but has been adapted to the Hungarian particularities at the same time. The key elements of the model are: (1) fish feed production, (2) centralized stocking material/fingerling production, (3) fish production (extensive and intensive) coupled with ecological services, (4) complex, i.e. primary and secondary fish processing, (5) sales on a common platform, (6) mass catering services, (7) community marketing activities, (8) cluster based on technological platforms and product chain.

## Theoretical background of the integration

Kornai (1984) differentiates 4 clear-cut types of the coordination mechanisms, such as: (1) bureaucratic coordination, (2) market based coordination, (3) ethical coordination (reciprocity), and (4) aggressive coordination. Bureaucratic coordination is characterized by hierarchical relationships; the legal regulation of the interactions is typically administered in the form of directives. This hierarchical relationship can be of a monetary type, where the coordinated party is financially dependent on the superior party. The central body gives instructions, withholds certain assets or incomes, and redistributes (allocates) them according to some kind of principle, either in an arbitrary or in ethical ways. Market based coordination, typically, takes place between seller and buyer, there is a transfer of finances and goods between the parties; the two parties are equal, they enter into market relationships on their own will in order to obtain mutual benefits, and observe the competitive open market environment. The rules, therefore,

are based on common interests, and the relationships have a monetary character. Of ethical coordination is typical that the parties are equal, they enter into a relationship on their own will, their motives are one-sided (charity) and mutual, money does not play a direct role, i.e. the relationships do not have a monetary character. In aggressive type coordination the parties are not equal, rough demonstration of power and abuse of dominant position are acknowledged elements of the relationship, coordination is exercised via instructions. This type of coordination provides benefits only for one of the parties; the aggressive coordinator party may take up monopolistic or oligopolistic market positions. There has never existed a society in the history of mankind entirely and exclusively operated by one or the other type of the 4 modes of cooperation. The aggressive and ethical types are considered to have the deepest roots going back in the early history, but bureaucratic and market based coordination are also known to have a long past history. In real life, these modes of coordination exist side by side. The societies and economies of many centuries have produced an extremely wide variety and combination of these core types, and old combinations keep being outcompeted by novel ones all the time. The science of historical causality analysis deals with the investigation of the interrelationship between the social/economic environments and the actual dominating type of the cooperation modes in that given environment, and the share and relative importance of the individual core types in that given combination (Kornai 1984).

According to Bárány et al. (2013), relationships of integration and cooperation are based on the supply chains and on the product chains. The product chain is defined as the complexity of the enterprises taking part in a production process, and the technological, financial, legal and organizational interrelationships that take part between them. Every product appears as the actor of a production chain (abstraction), the actors can be identified, their number can be quantified, their market power can be assessed, and their relationships in terms of commodity trading and finances can be qualified. The enterprises and the consumers have common interests in that the demands are satisfied by them in an uninterrupted and smooth way. In order to ensure this, however, there is required more than just a problem-free relationship of integration and cooperation between the actors of the supply chain: there is a need for the unproblematic allocation of tasks, and smoothly going coordination within the supply chain, too (Bárány et al. 2013).

Different authors give different – narrower vs. broader – definitions of vertical coordination and vertical integration. Fertő (1996) finds that the international and the Hungarian interpretations of vertical integration differ in that the Hungarian definition handles the vertical interpretation and the vertical coordination as synonymous notions. We do not support this view. We claim that vertical interpretation and vertical coordination are not identical notions: they are different in terms of content. Szentirmay & Gergely (2005) find that most of the literature sources in Hungary interpret vertical coordination mechanisms as such marketing systems whose primary, almost single driving force is the realization of market benefits through cooperation between the actors of the product chain.



Makrovszky (2004) also concludes that the literature sources dealing with the integration of the product chains view product chain relationships and product chain integration, and/or their characteristics from different angles. He presumes that „the product chain integration is a type of a chain of market relations that embodies the market based and market directed allocation of the responsibilities and tasks between the actors of the product chain, and that uses integration as a tool of the improvement of competitiveness of the parties”.

Bárány et al. (2013) understand coordination as the cooperation of the stakeholders toward the achievement of set goals. Integration, on the other hand, is a type of – minimum one year, more often medium- or long-term contractual – cooperation that observes the mutual economic interests of the parties, and in which one of the parties i.e. the integrator guarantees market and/or production security for the other i.e. integrated party. Moreover, the integrator gives expert and/or fiscal advice to the integrated partner or partner organizations (Juhász 1999; Bárány et al. 2013). Csete et al. (1996), and Hajdu & Lakner (1999) also supports this view of contract based vertical integration between two or more enterprises with different profiles.

Martinez (1999) gives the following definitions of vertical coordination and integration: Vertical coordination: Includes all the ways of synchronizing vertical stages of a marketing system (for example, open market prices, contracting, strategic alliances, and vertical integration). Vertical integration: Method of vertical coordination representing the greatest degree of control that a firm can gain over another stage of production. Coordination of two or more stages occurs under common ownership via management directive.

Barkema & Drabensott (1995) differentiate two types of vertical coordination according to the participating members: internal and external coordination. In an external coordination the flow of the products and information takes place between external enterprises (independent actors of the economy), whereas in internal coordination the individual elements of the product chain are comprised by a given enterprise. Szentirmay & Gergely (2005) recognize vertical integration as one of the extreme examples of vertical (internal) coordination in which the individual stages are concentrated in an economic organization. This means that of the different types of coordination mechanisms of the food industry product chain, the vertical type of integration proves to be the one showing the highest level of harmonization, and which is today, in most of the cases, centred in independent economic entities. Clement (1997) differentiates contractual and ownership types of integration having similar characteristics as shown above.

Integration can be of horizontal (cooperation of organizations with uniform production profiles), or vertical types (comprising the successive stages of the activities of a given product chain), or the combination of these. In a market economy environment, integrational relations – basically – are also operated on a market basis; they are driven by financial and economic incentives, and are, at the same time, regulated by legal provisions. Horizontal integration between the parties can be established via contracts, without influencing the ex-

isting individual organizational frames. Examples of this can be seen in the past history of the food industry in Hungary – and in the international practice of today – when agricultural producers cooperate in order to implement technical developments, or to find markets for their products. Cooperation, for example, can provide an up-to-the-point institutional realization of this version. The known types of horizontal integration are such as: (1) integration aimed at the organization of the uniform production/service activities on a common basis, (2) producers’ organizations aimed at sales activities exclusively, (3) producers’ organizations aimed at purchasing and selling activities. Vertical integration is a type of economic organization that comprises more than one phase of the production process stretching from the raw material to the end-product, and that is characterized by capital uniformity and/or by the comprehensive uniformity of the interests of the parties. In terms of the position taken by the integrator in the sequence, we can differentiate downstream (forward), and upstream (backward) types of integration. In animal production it is usually the processor who takes the position of the integrator, but there are also international examples of foodstuff producers, or the producers of genetic breeding stock or stock for fattening playing the role of integrators (Bárány et al. 2013).

Both agriculture and the food processing industry are interested in the vertical type organization of the food industry, however different their motives are. Relying on literature sources (Bowring 1957; Czégai 1989; Hobbs 2000; Szentirmay 2003; Manning & Baines 2004; Szentirmay & Gergely 2005; Begum 2005; Bamiro et al. 2006; Khoi 2007; Soosay et al. 2008; Szöllősi 2008) we can arrive at the following conclusions: The vertical type of integration has advantages in that it has a lower requirement for current assets; it has a higher influence on the prices; it provides higher security of the preservation and penetration of the markets; the uninterrupted nature of production ensures uniform, high quality and large quantities of products. It is important that the requirement for the quality assurance and traceability of the entire food production chain has by now become of special importance. Vertical integration can provide better bargaining positions and higher security of production and sales for the members of the integration when it gets down to the negotiations with the representatives of external retail and wholesale companies; also, it provides a higher efficiency of the marketing costs, and a better flow of information throughout the system. Due to the magnitude and concentration of the product supplies, the risks of the integrated small producers will reduce. Due to the coherence of the actions, incomes within the fish product chain are more likely to be levelled; the incomes generated by the phases that produce higher added value are distributed in a proportional fashion. By linking the individual elements of the product chain, their profit making potentials add up, which provides for the maximization of the profits at the enterprise level. The output of the individual elements of the product chain is certain to be utilized as the input of the subsequent stage. The costs of the input products can be minimized, which improves cost efficiency. There are better conditions provided for the continual technical and product development

activities. The coordinated and more advantageous acquisition of the capital resources of the developments is a special advantage, and also, there is a better chance of meeting the requirements and using the benefits of state funded projects.

Farkasné (1997) and Szentirmay (2003) voice common opinions in that it is the financing system that gives the principle cohesive power of the integration chains. In agreement with this, and considering the major advantages of integration from the point of view of business management, Széles (2003) attributes special importance to current assets financing. Due to the low level of the income earning capacities and financing difficulties of the farm businesses, integration centres of these are formed in places where there is an availability of pre-financing, lending and borrowing instruments.

Csete et al. (1996) presumes that the integrations are aimed to compete for more advantageous market positions on a common platform than the members would be able to achieve in individual competitions. In this context, we can say that the integrations strive to maximize their joint profits, which is supported by the higher performance, the uniform level of quality and better cost-benefit ratios in comparison with the external competitors, which, in turn, is the result of the optimization of the coherent operation of the entire production chain. From this it follows that looking at the integrations from the economic point of view, their significance lies in the improvement of the quality, performance and efficiency; in the maintenance of firm market positions in an efficiency oriented competing environment; in taking advantage of capital concentration and asset sparing; in the reduction of risks linked to uncertainty; in the continuity of activities and product developments; in taking advantage of profits derived from the specialization underpinned by the division of labour and responsibilities, and on cooperation; better financing options; the institutional concentration of the issues of services, promotions, standardization, quality assurance, and international relationships.

To round up the issue of the integration, we can conclude that due to the intensified competition on the markets, the enterprises are urged to cooperate, which in turn leads to the concentration of the assets, of expertise, and of market roles and sizes. As a result, there is a certain type of capital uniformity produced “sealing” the different types of activities together, which is embodied in a vertical type of structure. The interests of the individual “cost” and “profit” centres – fully or partly – cease to exist, and the dynamics of the changes brings about a new and more efficient type of system. When there is a high level of capital uniformity, each of the activity phases down to the point of output sales functions as a pool of “cost centres” that are united by the uniformity of the capital within a single framework. This is the point when the requirements of high level professional management and quality assurance i.e. the harmonization and optimal utilization of the production capacities are being met. There is only one single “profit centre” left, the one of the sales of the outputs. This

centre is responsible for the maximization of the incomes, for the strengthening of the market positions, for the provision of market growth, and for the reinvestment of the “cash” from the sales in the “cost centre” points of the product chain.

We tend to support the viewpoints of Barkema & Drabenscott (1995) and Szentirmay & Gergely (2005) noting, though, that we do not think that coordination along a product chain is a synonym to vertical integration. The coordination mechanisms described by Kornai (1984) can be found both in the horizontal and vertical types of integration, but their proportionate importance varies according to the actual type of integration. In other word, the coordination mechanisms of an actually operating product chain with partial or full uniformity of capitals will most often contain the traits of the aggressive, bureaucratic, ethical, and market based types of coordination at the same time. We can also conclude that a product chain cannot be considered a vertically integrated product chain i.e. a vertical type of integration if the individual actors (elements) of that chain are linked by market coordination i.e. a seller-buyer relationship only, and if that chain is operated solely by the „invisible hand” of the Adam Smith’s 18th century concept.

We presume that effective horizontal and vertical integrations can be developed (1) by an organic process (spontaneous development), or (2) by inducing processes, in many cases, however, as a consequence of economic pressure. In the latter case, it is the integrator organization/company (a processing enterprise, or the proprietor of a „genetic” property, or a foodstuff producing/trading company) itself that brings about the integration, and typically, appears as owner in each of the elements of the product chain. The actor who develops an entire integration is motivated primarily by the inherent possibilities of reducing risks linked to the production, supply and sales. Our experiences show that only vertical and horizontal integrations with partial or complete capital uniformity of the participating actors are the ones that can be successful in the long run.

## Results and discussion

### *Current concerns of the fish product chain*

One of the weaknesses of the sector lies in the current state of the general production infrastructure and technology (earth structures, built structures, machinery, technical equipment etc.). Unlike other sectors of agriculture, the production processes of the fish production sector are only partially mechanized, which entails a very low level of technical efficiency.

Among the problematic issues of domestic pond fish production is that the ponds are predominated by cyprinids cultures and there is a relatively low proportion of more valuable predatory fish found; there are significant losses seen in many places due to the high number of thefts and to damage caused

<sup>7</sup> Environmental Management Program of Fisheries

by birds, especially losses caused by the extreme population growth of the great cormorant and pygmy cormorant. It also has to be noted that the ecological services provided by the inland fisheries are only rarely returned (EMPF<sup>7</sup>): The fish ponds in Hungary were built more than 50 years ago, and the maintenance of their cultivation condition is not satisfactory. The applied keeping and feeding technologies in many of them are found to be below the standard of the 70s-80s of last century; and the professional capabilities of the farmers are often unsatisfactory. The requirements of the KHV represent a real threat to the sector, too.

The selling prices show a high volatility in terms of both time and place, which is especially true of the Common carp. Both price setter and price taker enterprises are present in the marketplace, but the selling transactions in many cases do not appear to be invoiced. Most of the producers have weak bargaining positions, forced sales, therefore, are not rarely found in November and early December, mostly as a consequence of the insufficiency of the storage capacities. Fish food products have a VAT rate of 27%, which is outstandingly high taken the rest of the EU states, and is the primary obstacle of the formalization (clearance) of the economy of the sector. Another problem is that while the pond-side selling prices have been stabilized at the level of those ten years ago, the production costs (foodstuffs, labour, gasoline, electricity, water supply, and logistics) have increased substantially.

The cost of water supply is one of the crucial concerns of the sector. Fish farmers in the neighbouring countries – our competitors in the market – are charged significantly less for water supplies, which ruins our effective income potentials and price setting positions very heavily. In many places, our producers depend upon monopolistic service providing companies, not to mention that many of them are to face serious difficulties with recharging the ponds in arid seasons. Due to the governmental provisions of substantial charge refunding, water supply charges in 2014 ceased to be a heavy burden for the Hungarian fish production sector any longer. As declared in the relevant law, the agricultural producers are authorized to use water supplies for their operations free of charge, which applies to the fish production sector, too. The actors of the sector strongly hope that the provisions will continue to be in force in the long term.

As regards the market issues, the relatively low level of domestic fish consumption is associated with an even lower level of domestic fish production, which is extremely season dependent and is dominantly restricted to month December. It is a problem of the demand side that fish products have little popularity among the consumers, most of them have little information about fish dishes except for the traditional ones. This gives promotions an extremely high importance. The lack of sophisticated product promotions is apparent both at the national and regional levels, the responsibility for this lies with each of the local actors of the product chain.

The majority of the processing companies produce a narrow range of fish products, of that mostly products with low added values. Except for a few companies, the utilization rate of capacities is low, which is also true of the level of applied

technologies leading to a relatively high level of specific fixed costs. The processing technologies and equipment commonly used in the neighbouring countries are not in general use in Hungary; the different phases of the processing are predominantly done by hand. All these problems sum up to induce relatively high production costs paired with low added values. Yet another issue of concern is the need of the continual updating of the hygiene conditions of the processing factories to comply with the requirements of the food security standards.

As a follow up of the 37th Scientific Conference on Fisheries and Aquacultures of Szarvas, 2013, the actors of the product chain issued the Declaration of Szarvas (2013) which concludes the following: “After the economic transition period, the fish production sector in Hungary – unlike others sectors of the animal husbandry – was uniquely capable of preserving its size and importance, moreover, it was capable of renewing and improving itself. By now, however, the situation has changed, and the sector is suffering from a competitive disadvantage against the competitor fish production sector of the neighbouring countries, and being in a crisis, it is facing severe market and economic difficulties. The responsibility to combat these difficulties lies with the producers, the producers’ organizations and other actors of the sector in the first place, but there are several points of concern, however, that require governmental intervention to be settled.”

We claim that there is a need to strengthen the cooperation among, and develop the integration of the actors of the product chain in order to provide for the more efficient utilization of the market potentials. The fish producers must be encouraged to join the food quality assurance systems, to observe the community provisions, to install the informational backup support tools of production and sales, and to jointly step up in the markets.

### **Potentials of vertical and horizontal integration in the Hungarian fish product chain**

Vertical integration is common in many fields of the food industry, the individual sectors, however may have significant differences. In a classical example of fish meat production it is a concentrated fish processing enterprise that steps up as the integrator of the producers. As Isaksen et al. (2007) summarizes, managers of fish processing firms are subject to an almost stochastic supply of the most important input factor; namely fish. Uncertainty is also persistent in the other end of the value chain, where prices and output fluctuate heavily. This underlines the need for vertical integration.

One of the most important drivers of the success of the export-oriented, intensive *Pangasius* production in Vietnam over the past 10 years was underpinned by the setting up of the integrated production system (Belton et al. 2011): the vertical integration systems between fish farmers and processing/export firms have dramatically shifted toward long-term contract coordination. Among a number of driving forces for this shift, the level of risk faced by primary producers, stringent quality requirements for processing and changes in production



technology have been the main ones (Hobbs 2000). As Khoi (2007) claims, the processing/export firms should forge strategic partnerships and develop closer coordination relationships with their suppliers, because investment in quality management is crucial to improve customers' satisfaction and bring benefits for all the chain actors.

A well operating vertical integration is similar to a symbiotic relationship, since it provides advantages both for the integrating and the integrated parties alike. It is advantageous for the integrator, on the one hand, for the reason that the integration enables them ensure the inputs in a given quality, under given payment conditions and in given instalments. On the other hand, it is advantageous for the integrated party because integration provides them predictability, security of sales, and allows reducing their own working capital tie-ups (Hermansen et al. 2011). This is ensured by the integrator by providing contracted extension services for the integrated party, by pre-financing the production, in many cases by providing the fingerlings and feedstuff for fattening, and by guaranteeing the acceptance and off-site transfers of the finished stock of fish. In case an all-round integration is achieved among the parties, every subsequent vertical element of the chain necessarily becomes part of the integration chain on the basis of common interests and/or capital uniformity: (1) the production/distribution of the means of production, and the distribution of keeping technologies; (2) the distribution of the technologies of feedstuff growing and production, and feeding; (3) selection/breeding operations, the production of parent and milter brood-stock fish; (4) propagation and incubation; (5) juvenile stock rearing; (6) fish rearing/fattening; (7) primary and secondary processing; (8) transportation and logistics; (9) trading. In such integration, each of the elements of the chain appears as a "cost centre", with the trading activity phase being the sole "profit centre".

Currently, the domestic fish product chain is made up by nationally owned enterprises with individual equity interests, though, and each of them act both as a "cost" and as a "profit" centre. They are characterized by spontaneously settled deals, interim price agreements, and elementary price-fixing cartels between the market actors – worth of note is that all this is taking place in a competitive open market environment. This type of product chain was common with most of the food production chains in Europe back in the early 1900s, but those have succeeded in undergoing an organic process of development. In general, the need for coordination is pushed forward by the intensified competition in the marketplace, by the vulnerability of the individual members of the product chain, and by the lowering rates of profitability, which causes the capital, the expertise, the commodity stocks, and in the final issue, the market importance to become concentrated. It was quite common, that the concentration and integration of the production chains were in temporal terms preceded by the concentration taking place in the retail trade sector. The concentration process of the customers and competitors is of substantially a larger scale than that of the producers' organizations of the Hungarian fish production sector, not to mention that the dominant position of the retail trade is quite obvious.

Sectoral integration can be developed on the basis of a high level or complete uniformity of the capitals, but it can just as well be achieved at levels significantly lower than these. We are convinced that only complete uniformity of capital can provide for the success of integration in the long run. It is a general experience in Hungary that the competing market actors (small-scale fish farms, fish processing enterprises, etc.) – who show a price accepting attitude in the market – are unwilling to enter into medium- and long-term cooperations on their own will unless they are forced to by some external circumstances (better chances of subsidization, market pressure, a drastic drop of profitability etc.). Potential risks, for example, are not big enough threats for the majority of the domestic fish producers to urge them to set up a joint fish processing enterprise, and to operate it as a joint profit centre in the form of an Ltd or cooperative. They will, however, be aware that such cooperation forms are successfully operated by their international competitors, and that these cooperations will sooner or later most definitely outcompete them in the market, yet, they tend to settle the problem by concluding that "the conditions are completely different there".

In this chapter we will describe two integration varieties: (1) one based on complete uniformity of capital, and (2) one having only partial capital uniformity. By definition, (1) in a company with a complete uniformity of capital, the entire fish product chain – from the foodstuff production through the processing to trade – is controlled by a single proprietor or group of proprietors. The proprietor is interested in each of the phases of the product chain, which allows for the avoidance of conflicts in the distribution of the incomes, and for the realization of optimal returns of the investments in the individual phases. The distribution of the incomes, of course, can take different shapes. There is the possibility of handling each individual element of the chain as an individual "profit centre", in which case internal accounting pricing is applied in relations between the individual elements. It is important, that internal accounting pricing within the product chain facilitates the optimization of the cash flow, which in turn, will contribute – by means of liquidity – to the maintenance and growth of the competitiveness of the product chain. The product chain can also be operated by applying the cost price setting on the semi-finished products (the internal accounting price in this case is equal to the cost price), in which case there is only one single "profit centre" formed, i.e. the end-point one of processing. In accordance with the proprietary interests, the different elements of the product chain are financed by the profit generating branches. In this scheme, instead of being responsible for profit maximization, the lower levels of the product chain are interested in minimizing the costs and in assuring the quality standards of the inputs, given that the profitability and competitiveness of the entire product chain rests upon the production of outputs with high added values. It must be noted, though, that in addition to producing high quality inputs for the processing stage, the production of high quality feed mixes and fingerlings is just as important. Further advantages of the integrated product chain with capital uniformity are summed up as follows:



- The quality control, the provision of food security, animal health, and product traceability can all be made more efficient when organized along a product chain. The whole-chain supervision and the process-based approach can be applied more efficiently when the production of high quality output is a primary issue. The “from-pond-to-plate” and, vice versa “from-plate-to-pond” approach can be better observed.
- The proprietor is capable of gaining a comprehensive view of the integrated product chain controlled by him, which allows him to adapt the entire production chain to the actual market conditions, which in turn, facilitates the satisfaction of the customers’ demands at a higher quality level and at more competitive prices.
- Better bargaining positions can be achieved both in the input (feedstuffs) and output (fish products) phases of the product chain. Given that the conflict of interests within the integrated product chain has already been eliminated, these are the only vulnerable phases left.
- There is a large potential involved in the RDI activities, since they appear to be much more efficient when implemented throughout the product chain rather than just in given individual segments. (Except for some instances, innovation as for now does not appear to be one of the strengths of the domestic fish production sector.)
- Due to the shortness of the biological cycle, the production, and the product transportation needs to be optimized. A closed system can offer more simple ways for the achievement of this aim: there is a way to reduce the costs of logistics and storage, and to bring the organization of the production to an optimal level.
- Given that the management of the product chain is centralized, as a result of the resultant economy of scale, the overall costs can be reduced.
- There is a possibility of achieving optimal business sizes (at company, enterprise and premises levels), of harmonizing the individual stages, and ensuring economies of scale.
- There is an easier way of outsourcing certain activities (cleaning, disinfecting) in order to improve efficiency, primarily in terms of labour costs.

In our view, the integration model (1) of the above outlined type is typically formed when the product chain there appears a large and capital intensive multinational company interested in foodstuff production, or fish processing, or there appears a powerful financial investor.

The establishment of an institutional form aimed at the asserting of the market interests of the fish production sector has long been an issue of debate among the actors of the sector. Considering that the currently persisting problems of the product chain originate primarily from the difficulties of the availability of markets for the products, rather than from the production itself, we support the establishment of an integrator organization having a trading house type philosophy, and embodied in the (2) integration model with partial capital uniformity. The central concept of the trading house, though, should go hand in hand with satisfying the demands placed

on the integrator of the sector. The cooperation is aimed to ensure the sustainability of the production by the marketing of improved and healthy commodities with competitive profit margins, and by the achieving of the most advantageous market conditions.

The business group type integration model organized on the basis of partial capital uniformity is demonstrated by Figure 1. The central element of the model involves the trading activities carried out by the National Trading House of Fish Ltd. (NTHF Ltd.) functioning as a “profit centre”. This is the organization that will directly appear throughout the entire output (except for direct marketing) market, and in the most important input markets, including financial markets as well. It fulfils, naturally, a monopolistic position, and has direct contacts with the most significant buyers (e.g. angling associations, retail chains, the gastro sector, fishmongers’, external markets). It has a solid financial background, has safe relationships with the financial institutions and insurance companies, has access to updated market information, and is involved in warehouse activities. Furthermore, it operates an own franchise network of fishmongers’ shops wherein services are provided by the regional premises that are either owned or leased properties. The trading centre serves the fish producers and foodstuff producers with wholesale stocks of grains and other types of foodstuffs. It operates logistics services on owned and leased bases. It has an ownership interest in its own network of fishmongers’ shops and in some of the most important fish processing enterprises. If need be, the NTHF Ltd. could provide pre-financing for the production activities (fish production, fishing, fish processing, feed production, stocking material/fingerling production). It would also be responsible for operating a comprehensive system of quality assurance and product traceability; it would dispose of trademarks, and would coordinate the community marketing activities. Due to its monopolistic market position, it would be able to achieve higher and less volatile output selling prices, and due to its size, it would be able to ensure lower and more predictable purchase prices of the inputs.

Another important issue is that of the ownership. According to the logic of the model, neither of the actors would be allowed to acquire majority ownership of any of the key quasi community enterprises operating as “cost centres”. Examples of these are companies dealing with stocking material/fingerling production and breeding, that would be operating an extension network of keeping technologies; companies dealing with foodstuff production and operating an extension network of feeding technologies providing services for the fish producing farms. The major owners of the system would be the fish producing/processing/fishing enterprises and the independent fish processing factories, which means that they would make up 100% ownership of the NTHF Ltd. The fish producers would be the owners of the feedstuff producing companies (Ltd.), the fish producing and the fishing enterprises would own the companies (Ltd.) responsible for the selection/breeding and stocking material/fingerling production; in the latter one, however, the NTHF Ltd. would also

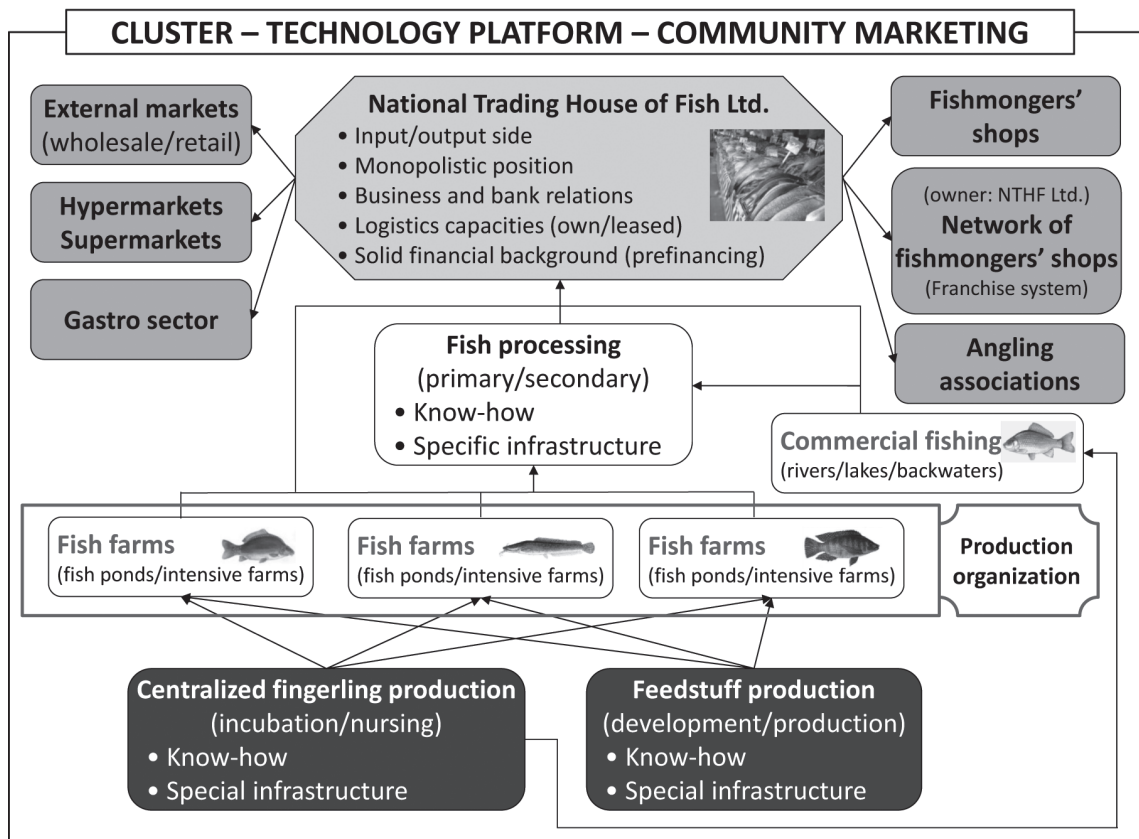


Figure 1. Plan of the centralized vertical integration of the fish product chain in Hungary with partial capital uniformity

Source: own development

have some proportion of ownership interest. The producers and the groups of producers would be united in production organizations. There would be a sectoral cluster and a technological platform set up operating along the entire production chain, and which would be responsible for the professional cooperation between the actors of the product chain, and for the innovations and the flow of information within the sector, primarily.

We do not think that the cooperative model could make a viable option with any of the levels or actors of the integration; we consider it to be a somewhat outdated and idealistic type of model not fitting the current economic and social environment. Due to some of the cooperation principles (e.g. one vote per member principle) involved, and due to the unsuitability of the system for the allowing of market actors with nearly equal (small) market roles and importance, this system can only temporarily be viable (fixed life cycle). Numbers of Europe-wide practical experiences also show that the cooperatives tend to restructure themselves, or in other cases, they fail to sustain their operation. Below, we will survey the most significant benefits of the integration model:

- general price advantage resulted by the larger volume and uniformity of the commodities stocks;
- the establishment of institutionalized “price cartels” that reap benefits for the entire sector;

- better negotiation positions of sales with the retail chains;
- a step-by-step exclusion of intermediate traders (e.g. exports) by leaving the generated incomes with the producers to support their development;
- the avoidance of the negative effects resulting from the seasonality of the fish supplies (e.g. aggregated management of the supplies in summertime);
- better chances of the achievement of balance, and a higher degree of predictability in the marketplace;
- uniform systems of quality assurance and product traceability;
- better utilization of the capacities and resultant lower variable costs in the jointly operated fish processing enterprises;
- prompter and more sophisticated logistics services due to the establishment of logistics centres;
- higher efficiency and lower costs of jointly operated marketing (own financing and support);
- planned coordination of the joint acquisition of the crucial inputs of the production;
- coordinated import activities based on a uniform trade policy;
- the dissemination of production and management experiences within the integration;
- a system-based management of the issues of animal health and food safety in the sector;

- comprehensive sectoral information system;
- due to the more effective management of the liquidity problems that might occur due to the cyclicity of the production, the difficulties caused by occasional derailments of the sales markets (overproduction, drastic price drops) can be avoided;

The founding members make their actual markets available for the NTHF Ltd., and thus, only those producers that are currently using the regulated market channels can get “authorization” to enter the fish market. Another important requirement is the provision of the traceability of the products from the producers to the customers (from-pond-to plate), for the reason that the customers are keen to be informed of the country of the origin, of the circumstances of the production of the fish they buy. Of special concern are the issues of medicines (preventive and curative) and hormones uses, the application of the performance enhancers, and the use of genetically modified foodstuffs, et cetera. These requirements are relatively easy to be met (and documented) by the larger pond fish farms; the smaller ones, however, may have to face difficulties that tend to increase with the reduction of the size of the farm. The principles of the organization have to be implemented on two platforms: the production within a given community has to be carried out on a uniform technological base, on the one hand, which provides for the documentation of the conditions of the production (keeping, feeding, and treatments), which in turn, is the guarantee of the safety of the production process. On the other hand, producers are expected to organize themselves so they can step up with ample stocks of commodities in the market. There is an integrator required to organize and coordinate the production, to buy up and process the fish, and to sell them in the market.

## Conclusions

Given the current economic environment, getting organized is a primary interest of the Hungarian fish producers. We believe that the problems of the domestic fish production sector cannot be solved unless the entire product chain is taken into consideration. The consumers’ demands cannot be satisfied in an efficient and competitive way, and the fisheries products cannot find safe markets unless the activities of the producers, processors and traders are coordinated. These considerations, at the same time, urge the need for the research of the product chain relationships, for the continued investigation of the value generation and submarket processes of the fish production sector, similarly to what is taking place in other sectors of the animal husbandry (Szöllősi 2009; Cehla et al. 2012).

If the production is to be sustained and the competitiveness of the sector is to be maintained, a higher than the currently existing level of integration (vertical and/or horizontal) has to be achieved. These efforts can be well furthered by the resources of the 2014–2020 planning period of the European Union (EMFF), which provide 50% funding intensity for the investments in the product chain.

According to the present level of the Hungarian processing industry and the present level of cooperation among the stakeholders requires substantial changes that requires great efforts. We know well that our proposed centralized vertical integration is a little bit “idealistic model” that can’t be established short term without common accordance, none the less it is a real solution for the problems of the Hungarian fish product chain.

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