



A Systemic Framework for Evaluating Competitive Intensity in the Agricultural Supply Chain

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ABSTRACT: This research focuses on the systematic analysis and structural classification of indicators utilised to assess the intensity of competition within the agricultural supply chain. The study employs a methodology based on observation, comparison, statistical analysis, and systematisation to provide a comprehensive description of competitive intensity in the agrarian sector. A key outcome of this investigation is the identification of 13 principal indicators that characterise competitive intensity, which are subsequently structured across four main criteria. This structured, integrated classification is presented for the first time, enabling a more accurate assessment of market competition across the various vertical links of the agricultural supply chain. The systematic approach developed herein offers utility for governmental bodies and industry players in formulating policies and strategic decisions regarding the competitive landscape of agricultural product markets.

KEYWORDS: competitive intensity, supply chain, concentration, Panzar and Rosse model.

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Introduction

The agricultural sector possesses unique competitive characteristics compared to other economic sectors. These specific traits are conditioned by the structural features of agricultural product markets and the complex, multi-stage nature of their supply chains. Given this complexity, assessing the competitive state and level across different links of the agricultural supply chain—such as resource provision, primary production, agro-processing, and retail—requires diverse methodological approaches and indicators (OECD, 2021).

The primary objective of this research is to systematically analyse and evaluate indicators that characterise competitive intensity in the agricultural supply chain. Competition intensity reflects the degree of pressure market participants face and how strongly subjects operating within a market compete against each other (Aswathi, 2023).

The agricultural value chain is inherently multi-tiered, involving four main stages: resource supply, agricultural production, agro-processing, and retail trade (leading to final consumers). Competition occurs both within each stage (intra-link) and across the supply chain links (inter-link). This complexity necessitates the use of a wide range of indicators to measure intensity, making the systematisation and structuring of these criteria essential for the appropriate application of measurement methods in varied situations.

Significance of Competition Intensity Measurement

Measuring competitive intensity is crucial from several perspectives:

1. **Strategic Decision-Making:** Evaluating the degree of competition enables market participants to operate with more optimal and accurate strategies.
2. **Government Regulation and Intervention:** Adequate measures (such as regulation or intervention) by state bodies are challenging to implement without first assessing the competitive environment. Reliable measurement tools are also necessary to evaluate the effectiveness of state measures aimed at improving competitive conditions.
3. **Legal Compliance:** The proper application of competition legislation requires a sound assessment of the competitive environment.

Due to the complex nature of the competitive environment, relying on a combination of numerous indicators enhances reliability. Since individual indicators often provide only limited information about competitive intensity, combining several indicators leads to higher-quality results (OECD, 2022). Therefore, identifying and structuring these varied indicators is vital.

Key Indicators for Assessing Competitive Intensity

The analysis identified various measures used for assessing competition, which can be grouped based on the scientific literature and legislative practices (e.g., in Germany, Azerbaijan, and the USA).

3.1. Concentration Indicators

These indicators are widely used to measure the degree of market concentration:

- **Concentration Ratio (CR):** This ratio measures the market share held by a specific number of dominant players, indicating the degree to which market share is concentrated among them. An increase in the CR often signifies an increase in the market power and bargaining power of major players, making it difficult for smaller entities to compete (due to economies of scale, for instance) (Organisation for Economic Co-operation and Development, 2018).
- **Herfindahl-Hirschman Index (HHI):** The HHI calculates concentration by summing the squares of the market shares of all participants. A value of 10,000 indicates a perfect monopoly (zero competition), while lower values suggest a more competitive environment. For example, the US guidelines consider markets with an HHI above 1800 as highly concentrated, while those below 1000 are considered "unconcentrated" (U.S. Department of Justice & Federal Trade Commission, 2023).

Indicators Related to Market Entry and Dynamics

These indicators reflect how open and stable the market is:

- **Barriers to Entry:** These measure the ease with which new players can enter the market. Three common indicators are: 1) Initial costs and investment required (Entry Costs); 2) Scale Effect, where large-scale producers benefit from lower unit costs, making competition difficult for smaller, newer entrants; and 3) Government Regulatory Barriers (e.g., licensing and certification requirements) (OECD, 2021).
- **Entry and Exit Rates:** These dynamic indicators are calculated by dividing the number of entrants (or exits) per year by the total number of subjects operating in the market. High entry rates alone do not guarantee high competition if dominant subjects remain, and new entrants subsequently fail and exit the market.
- **Market Subjects' Average Age and Volatility:** The change in the average age of market subjects indicates the replacement rate of older companies by younger ones. Volatility in Market Share refers to year-over-year changes in the market shares of subjects, where higher volatility generally suggests fewer competition problems.

Efficiency Indicators

These measures assess firms' performance and pricing behaviour relative to costs:

- **Mark-up and Lerner Index (L):** Mark-up is the level of trade margin applied above the cost of a product. The degree to which price (P) exceeds marginal cost (MC) indicates market power and can be quantified using the Lerner Index: $L = (P-MC)/P$. In highly competitive conditions, firms are forced to apply lower mark-ups.
- **Profit Level:** While influenced by factors such as operational efficiency, profit level serves as a key criterion for assessing competitive intensity. Intense competition typically threatens the ability of market subjects to earn high profits.
- **Panzar-Rosse Model (H-statistic):** This model assesses the transmission of input price changes to a firm's total revenue. A weak transmission suggests the use of market power in pricing, whereas a higher transmission value implies greater competition. In conditions of perfect competition, the H-statistic equals 1; in pure monopoly, it is zero or negative. (Jacob, 2009)
- **Boone Indicator:** Calculated as the elasticity of profit with respect to marginal costs. In a highly competitive market, the Boone indicator is higher because efficient firms gain higher profits relative to less efficient ones (Boone, 2008).

Structuring and Classification of Competition Indicators

To achieve a practical evaluation, the 13 identified key indicators must be structured systematically. This systematic classification is based on four main criteria:

Criterion 1: Character of Competitive Intensity

- **Static Indicators:** These measure competition at a specific point in time. Examples include Concentration Level, HHI, Mark-up, Profit, Price Transmission, Panzar and Rosse Model, and Barriers to Entry.
- **Dynamic Indicators:** These view competition as an ongoing dynamic process, allowing for the tracking of how less efficient subjects are replaced by more efficient ones over time. Examples include Entry and Exit Indicators, Average Age of Market Subjects, Market Share Volatility, and Boone Indicator.

Criterion 2: Qualitative Attribute

- **Structural Indicators:** Focus on market structure. Examples: Concentration Level, HHI, Barriers to Entry, Entry/Exit Indicators, Average Age, and Market Share Volatility.
- **Effectiveness Indicators:** Focus on market performance. Examples include markup, Profit, Price Transmission, the Panzar and Rosse Model, and the Boone Indicator.
- **Subjective Evaluation:** Based on opinions derived from surveys. Examples: Surveys

among businesses and consumer surveys.

Criterion 3: Form of Characterisation

- Direct Indicators: Measure aspects of competition directly—examples: Mark-up and Barriers to Entry.
- Indirect Indicators: Provide evidence of competition based on related outcomes. Examples: Concentration Level, HHI, Profit, Price Transmission, Panzar and Rosse Model, Boone Indicator, Entry/Exit Indicators, Average Age, Market Share Volatility, and Surveys.

Criterion 4: Coverage of Competitive Intensity

- Intra-sectoral (Between Subjects within the link): Measures competition among entities in the same stage of the supply chain. Examples: Mark-up, Profit, Boone Indicator, Barriers to Entry, Entry/Exit Indicators, Average Age, and Market Share Volatility.
- Inter-sectoral (Between links of the Supply Chain): Measures competition (or market power dynamics) between different vertical links of the agricultural value chain. For instance, high concentration in the retail link (supermarkets) allows players to use their bargaining power against preceding links (farmers or processors). Examples include Concentration Level, HHI, Price Transmission, and the Panzar and Rosse Model.

In the table below, the leading indicators of competition intensity (13 indicators) are organised by different criteria.

Table 1

Structuring Competition Intensity Indicators

		Concentration Ratio	Herfindahl-Hirschman Index (HHI)	Mark-up	Profit Level	Price Transmission	Panzar and Rosse Model	Boone Indicator	Barriers to Market Entry	Market Entry and Exit Indicators	Average Age of Market Subjects	Market Share Volatility	Surveys among businesses	Consumer surveys
	Static Indicators	X	X	X	X	X	X		X					

Character of Competitive Intensity	Dynamic Indicators							X		X	X	X		
Qualitative Attribute	Structural Indicators	X	X						X	X	X	X		
	Effectiveness Indicators			X	X	X	X	X						
	Subjective Evaluation												X	X
Form of Characterization	Direct Indicators			X					X					
	Indirect Indicators	X	X		X	X	X	X		X	X	X	X	X
Coverage of Competitive Intensity	Intra-sectoral			X	X			X	X	X	X	X		
	Inter-sectoral	X	X			X	X							

Source: author's own development

Conclusion

Assessing the intensity of competition is essential for characterising the competitive environment, which requires a multi-faceted approach. This study underscores the necessity of systematically classifying and structuring the diverse indicators used for evaluation. Given the complexity of competition assessment, a systematic approach becomes highly relevant.

The research achieved its goal by systematically analysing and structuring the indicators, identifying 13 key measures structured across four primary criteria. For a detailed evaluation of the competitive environment within the agricultural supply chain, these indicators must be applied in a combined form. The specific number and composition of indicators chosen depend on the architecture of the value chain of the specific product market being analysed. The most frequently used indicators for assessing competition intensity in the agricultural supply chain include Concentration Level, HHI, Mark-up, Profit, Surveys, and Price Transmission.

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