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CONCENTRATION ANALYSIS ON THE SERBIAN ICE CREAM MARKET

Analiza koncentracije na tržištu sladoleda Srbije

Abstract

This paper presents the results of research on the concentration levels of the impulse ice cream market in Serbia. It shows the theoretical characteristics of the indicators of market concentration. All the data presented here are illustrated by the example of the impulse ice cream market in Serbia. The aim of this paper is to make a comprehensive analysis of the concentration of the ice cream market in Serbia, including the adequate definition of the relevant market, the calculation of various indicators of market concentration, investigating the existence of entry barriers, testing and measuring current levels of market saturation. The synthesis of all these segments creates the opportunity to present the real situation in the market and demonstrate the historical dynamics and potential for future development of the ice cream market in Serbia.

Key words: *market concentration, market share, ice cream market, Serbia*

Sažetak

Rad predstavlja rezultat istraživanja nivoa koncetracije na tržištu impulsnih sladoleda u Srbiji. Prikazane su teorijske karakteristike pokazatelja tržišne koncentracije. Svi prezentovani pokazatelji ilustrovani su na primeru tržišta impulsnih sladoleda u Srbiji. Cilj rada je da se napravi sveobuhvatna analiza koncentracije tržišta sladoleda u Srbiji uključujući pravilno definisanje relevantnog tržišta, obračun različitih pokazatelja tržišne koncentracije, ispitivanje postojanja ulaznih barijera, kao i merenje nivoa trenutne saturacije tržišta. Sintezom svih navedenih segmenata stvara se mogućnost da se predstavi realno stanje na tržištu i ukaže na istorijsku dinamiku i potencijale budućeg razvoja tržišta sladoleda u Srbiji.

Ključne reči: *tržišna koncentracija, tržišni udeli, tržište sladoleda, Srbija*

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Introduction

The issue of market concentration is related to the notion of competition. Competition is a form of struggle, race between individual market participants or competitors. Each competitor is trying to offer the very products that the consumers want. His goal is to satisfy the needs of consumers as much as possible, in order to gain as much profit. All competitors in the market have the same goal, which leads to the creation of competitive pressure. Therefore, each competitor wants to be better than other players in the market in order to attract consumers' attention and take the biggest market share possible. This process of competition leads to economic efficiency because consumers are offered better products and services, of better quality and at lower prices.

Current trends in the global market, such as transition and liberalization of goods and capital, have led to a reduction in competition. This is primarily due to an increase in the concentration of market power of a small number of large companies. However, one should bear in mind the fact that it is the big companies who are bearers of economic development in certain industries, and thus, a reduction in the number of competitors does not necessarily mean a reduction in economic efficiency. This is the reason why competition is often mistakenly associated with the number of competitors. In some situations, competition may be more intense among several large competitors who continually invest in innovation, than among a large number of little ones who do not have sufficient funds to seriously engage in research and development.

The first stage in the process of analysing concentration is defining relevant market precisely. When defining the relevant market, it is necessary to take into account the existence of substitution between products belonging to the same relevant market. Substitution of products is seen from the perspective of consumers and in terms of product properties, their use and price. All three criteria must be fulfilled cumulatively so that a particular set of products may be classified in the same relevant market.

For an understanding of the relevant market, it is necessary to consider its specifics and what distinguishes it from other markets. Furthermore, it is necessary to analyse the practice of the players in equivalent markets in other countries. These procedures precede the stage of computing the indicators of market concentration, and they need to be considered together with the calculated indicators in order to achieve full understanding of the market being analysed.

In addition to the Introduction and the Conclusion, the paper consists of three parts. The first part defines the relevant market. The second part describes market activities of the leading manufacturers of ice cream in the world, as well as the specifics that characterize the ice cream market. The third section provides a theoretical basis for indicators of concentration and their empirical application on the impulse ice cream market in Serbia.

Determining relevant market in the ice cream industry

In order to measure the degree of competition in any relevant market more reliably, first of all it is necessary to properly define and determine the relevant market. The relevant market has two dimensions: the relevant product market and the relevant geographic market. According to the Law on Protection of Competition [21], Article 6 Paragraph 2, relevant product market is defined as a set of goods and services that consumers and other users consider interchangeable in terms of characteristics, the common use and price. The Decree on the criteria for determining the relevant market [18], in Section 2 Paragraph 1, defines the relevant product market in the same manner, as a set of goods and services that consumers consider interchangeable in terms of their characteristics, common use and price. Paragraph 3 of the same Article further specifies that the substitutability of goods or services based on the criteria of the assessment of the possibility that the customers purchase other goods or services, which are substitutes for the goods or services observed, represents substitution of demand.

It is clear that the basis for defining the relevant market is substitution of products, from the perspective of consumers and other users, based on the three dimensions mentioned above. In terms of the ice cream market, in general, all kinds of ice cream can be divided into three categories [6]: impulse ice cream, take home ice cream, and catering ice cream. The question is whether in the territory of the Republic of Serbia all these categories represent single relevant market or a number of individual relevant markets. In order to obtain a response, it is necessary to apply a cumulative analysis of the three above-mentioned criteria to test the substitutability of the three categories of ice cream.

In terms of their characteristics, the key difference between the three categories lies in the type and size of the packages. Impulse ice cream is packaged in small individual packages in foil, while take home ice cream and catering ice cream are packed in much larger solid injection moulded packaging. The size of packaging influences the choice of individual consumers, but also on the structure of requisition for ice cream by retailers, primarily because of limited storage space.

Bearing in mind general properties of the three categories of ice cream according to the current categorization of frozen dessert products [16], it can be concluded that the take home and catering ice creams generally belong to cream and milk ice creams (ingredients: milk fat, non-fat milk solids, no vegetable fat or vegetable proteins) and ice creams (ingredients: milk and/or vegetable fat and fruit), while a significant portion of impulse ice creams, in addition to the three categories, also belong to the categories of frozen fruit ice creams (ingredients: water, sugar, fruit, and additives) and frozen flavoured ice creams (ingredients: water, sugar and additives).

Furthermore, impulse ice cream is the result of impulse buying in the street that happens in order to meet the current needs of the individual for cooling and refreshment. The purpose of the take home ice cream is subsequent consumption of ice cream at home by family members, while the purpose of catering ice cream is further sales of ice cream to the guests of hotels and restaurants as dessert. Due to the different uses by final consumers, retailers of different formats structure their requisitions for these three categories of ice cream differently. Namely, minimarkets predominantly focus on impulse buying of single-wrapped ice creams (sticks, cones, cups), because the purchases of the final consumers in these formats are of high frequency, and low average values of bills. Larger commercial formats (supermarkets, hypermarkets, big discounts and cash/carry facilities) buy all three categories of ice cream, focusing predominantly on the range of take home ice creams and a little less on the catering ice creams. If they sell impulse ice creams, they sell them in packages containing several individual pieces. Finally, catering ice creams are the object of direct interest of the representatives of the HoReCa market, to which the ice cream is delivered directly, without trade intermediaries. As far as prices are concerned, it is clear that the prices of ice cream vary considerably between the three categories, and that they represent a key platform for substitutability of different categories of ice cream from the perspective of both end consumers and retailers.

The analysis of the current EU practices has shown that a clear distinction between industrial and artisan ice cream is made according to the manner and scope of production, and also according to the retail outlet and where it is consumed. However, due to the lack of relevant data and the approximated small market of artisan ice cream in the Republic of Serbia, in this paper further attention will be focused exclusively on industrial ice cream. In terms of industrial ice cream, according to the retail outlet and where ice cream is consumed, the European Commission makes a clear distinction between the impulsive, take home, and catering ice creams. In the case of Van den Bergh [6], referring to the ice cream market in Ireland, the defined relevant product market is the market of single-wrapped industrial impulse ice creams. The decision of the European Commission states that such ice creams are intended for direct human consumption near the place of purchase. It also states that take home ice creams are distinguished from impulse ice creams both in the packaging (in terms of the larger quantity) and price, and also in the place of consumption, or purpose. They are not intended to be consumed immediately near the place of purchase, but are intended to be consumed at home. The European Commission further notes that catering ice creams are served in hotels, restaurants and other catering establishments as dessert. In the same case, some of the features of impulse ice creams are highlighted such as, for example, the fact that their sale is of seasonal nature, that it is limited to four months (May to August). It is pointed out that their production is capital intensive and requires high investment in working capital (inventories of raw materials, work in progress and finished goods inventories) during the year. On the other hand, the European Commission recognises that the sale of impulse ice cream lasts for a short period of time and that is heavily dependent on the weather, so this business is classified as a highly risky business. Manufacturing of take home ice creams and catering ice creams lasts throughout the year, but the sales are also distributed throughout the year, so that the risk of these business lines is significantly lower.

At the ice cream market of Germany, in the case of Langnese-Iglo [7], the determined relevant market is the impulse ice cream market of sales through all distribution channels other than home delivery. The arguments for distinguishing the impulse ice cream market as special are similar to those in the case of Van den Bergh. In the process of approval of the acquisition of Scholler by Nestlé [8], the European Commission has specifically examined the effects of a possible takeover on the four individual relevant product markets. These are: the impulse ice cream market, the take home market, the catering ice cream market, and the market of ice cream produced for other brands, i.e. private label. This is yet another confirmation that the current European practice distinguishes impulse ice cream market as a separate relevant market, i.e. that it distinguishes relevant ice cream markets according to the categories of ice cream. Therefore, further in the paper, we will analyse the impulse ice cream market as the relevant product market. The relevant geographic market in this paper will be the national market of the Republic of Serbia.

Practice of the players and specificities of the ice cream market

The products of the ice cream industry have certain specificities. They are characterised by extreme seasonality. If our observation is confined to the impulse ice cream only, then the very method of purchasing is a particular specificity as well. Namely, in these products, the location of the outlet where the product is sold is a major sales factor, but also the position and exposure of the product in the outlet. It is therefore necessary that the availability of these products to the consumers at the highest level. The fulfilment of this goal causes other problems. It is a well known fact that the selling price of a product depends on the attractiveness of the location of the outlet in which it is sold. Thus, for example, the outlets located in attractive locations sell their products at much higher prices than the worse positioned retail facilities. This is practically rational behaviour of retailers based on economic arguments. The outlets in attractive locations pay a much higher rent, so these retailers are forced to charge much higher margin in order to maintain their operations within the limits of profitability. Following this logic, due to their position, the volume of requisition and the attractive location, some retailers could achieve much higher sales prices of ice cream compared to other competitors.

On the other hand, there is the question of whether such behaviour of retailers threatens the interests of consumers who would pay "monopoly" price in attractive locations which would be much higher than the cost price plus the normal amount of profit. To make their products available to all of their customers at affordable prices, it is not uncommon, both in Serbia and abroad, that manufacturers of ice cream determine maximum retail prices for their ice creams. This raises the question of whether determining maximum prices is punishable by law and whether this practice threatens the interests of consumers, as a key interest group that the Competition Law covers.

If we look at the practice of the European Commission in the area of punishment for price fixing, we find the following statement: "The restrictions referred to in Article 4 (a) of the Regulation 330/2010 (BER) [9] are related to Retail Price Maintenance – RPM, i.e. the agreements and concerted practices which have as their direct or indirect, goal determining the fixed or minimum sale price, or a fixed or minimum level of sale price which the buyer has to adhere to in the resale." It is clear from this paragraph that the practices that threaten competition, according to the practices of the European Commission, are defining minimum and fixed price, but not defining maximum price. This is also confirmed by the Serbian Commission for Protection of Competition in its Opinion no. 1/0-06-523/09-2 where it says [12]: "The use of specific support measures or submitting a list of recommended prices or maximum prices to the customer by the supplier shall not constitute RPM per se."

Defining the maximum price is not contrary to the interests of end consumers. On the contrary, this practice is in their interest, because it prevents retailers from imposing significantly higher prices for end consumers in specific circumstances (e.g. concerts of popular musicians and major sporting events) or at specific locations (for example, the central city zone). This is also what the European Commission says in its guidelines [10]: "... for example, in an exclusive distribution system, the distributor may want to increase the price of a product due to a reduction in competition between brands. Then, the use the provisions on maximum prices may limit such price increases."

Another important feature of the products of the ice cream industry is the cold chain distribution. Namely, these products must constantly be stored in minus zero temperature until the point of consumption in order to retain all of their service properties. Practically, if the cold chain for the products of this industry should be interrupted at any stage, from the time of manufacture to the point of final consumption, they would practically no longer be fit for use. Therefore, the practice in the world, including Serbia, is that the manufacturers provide freezer cabinets in the retail outlets.

On the other hand, the manufacturer provides a warranty on his product in terms of the quality of the product and its shelf life. For products such as ice-cream, it is very important to keep them in the cold chain regime, in order to fully preserve all their service properties. If the manufacturers were to leave the task of providing and maintaining freezer cabinets to retailers, that would increase the risk of inadequate storage and thus contamination of the products of this type, which ultimately could have negative implications on the reputation and image of the manufacturers.

This practically means that, in order to maintain the cold chain and ensure that their products maintain the quality of all service properties when they reach the end users, manufacturers must make considerable investment in refrigeration. Also, is very important that the ice cream does not mix with other products in the same refrigerated chambers, because they can easily take on odours of other products. To prevent unscrupulous retailers from keeping ice cream in the same refrigerator with other foods with strong odour, manufacturers of ice cream provide freezer cabinets where they can keep only ice cream. This practice is globally referred to as *freezer exclusivity*.

The question is whether the practice of *freezer exclusivity* is in violation of the rules of competition. In the case of Delimitis [11] (also upheld in the case of Langnese-Iglo [7]) the CFI argues that in cases of exclusivity in the freezers: "account must be taken of the number of retail outlets tied to the manufacturers in relation to the number of retailers not so tied, the quantities which are sold through such retailers, and the duration of such agreements."

In similar cases, the European Commission has commissioned detailed studies of the market and based on the results of the analysed the relevant market and made decisions. Thus, for example, in the case of Van den Bergh [6], they first selected a representative sample that included 501 retail outlets. The respondents were managers of those retail outlets who responded through direct contact and the answers to the following questions were provided:

- How many retail outlets have freezer cabinets that are owned by an ice cream manufacturer, and what is the share of each individual ice cream manufacturer?
- The ratio of outlets that have one, two, three or more freezer cabinets, and the average number of freezer cabinets per outlet.
- How many outlets have freezer cabinets from a single manufacturer, and how many from more of them?
- Are retailers willing to replace the existing freezer cabinet with a new one from another supplier?
- Why do outlets not have their own freezer cabinet?
- Is there demand for another brand of ice cream in the outlets that have a freezer cabinet of one manufacturer?
- And other questions relevant for assessing the situation in the relevant market.

Thus, in the case of Sagit (and its competitors Nestle, Sammontana and Sanson), which was presented before the Italian Competition Commission (Italian Competition Authority - ICA) [17] a detailed economic analysis found that a relatively small percentage (27%) of the total number of outlets were bound by Sagit's distribution agreements with exclusivity clause. Since the same model agreement with exclusivity clause was also used by other competitors as well, which resulted in the fact that 57% of the total number of outlets were bound by exclusivity clauses, and the remaining 43% were not, it was concluded that new competitors were able to access sufficient number of outlets and organize their distribution network, the size of which would not be inferior to the distribution networks of current market participants, on the basis of which it was deemed that the application of exclusivity clauses did not have a significant impact on the prevention of competition.

If such practice did not exist, there would be no investment in such devices because suppliers would have no incentive to supply freezers that the retailer would then use to store competitive product in. In this case, only large retailers, who have sufficient financial resources, could procure freezers. This would lead to the strengthening of major retailers and medium size and small retailers would virtually disappear (or at least weaken) from the ice cream retail market. The ICA has found that the freezer exclusivity clause was necessary to protect the investment of Sagit company in freezers, i.e. to protect Sagit from free riding by other competitors.

In the analysis of ice cream market concentration, it is important to take into account market specificities and bear in mind the described practice of global players, as well as the decisions of regulatory bodies to avoid initially making wrong conclusion based solely on concentration indicators. The indicators provide a basic picture of the market, but for the comprehensive analysis it is necessary to consider other factors such as the previously mentioned specificities, market entry barriers, market saturation etc.

Concentration indicators in Serbian ice cream market

When relevant market is properly defined, it is possible to measure market concentration in it. The issue of effects of concentration on competition in the relevant market is one of the main reasons for researching concentration. Economic theory has developed methodological procedures and statistical methods to measure market concentration in the relevant market. The most common indicators of market concentration are presented below through the analysis of the concentration in the ice cream market in Serbia.

Absolute market share

Any analysis of market concentration starts with calculating absolute market shares. The first step, after determining the relevant market, is to calculate market shares for all the companies operating in the relevant market [19]. It is common that the analysis of market concentration and market share calculation is performed on the basis of historical data. It may be that the changes that occur in the final year underestimate or overestimate the market share of individual players. Therefore, it is extremely important to include market dynamics into the analysis of market concentration. Also, when analysing market concentration, it is necessary to pay attention to the future as well. For example, if there are new technologies that are available to market participants, but individual participants still do not use them, then it can be concluded that the historical market shares are overvalued in terms of their future competitive significance. Absolute market shares indicate the shares of individual players in the overall market. Table 1 shows the trends in absolute market shares in the impulse ice cream market in Serbia. Since we are dealing with impulse ice cream market, we will consider the total number of single-wrapped pieces of ice cream sold and not the sales value.

The reason for this observation stems from the specifics of the sale of impulse ice creams. As previously mentioned, impulse ice creams are consumed immediately upon purchase. Therefore, at the time of purchase, the consumer buys only a single piece, i.e. one ice cream. Even if the consumer's appetite is bigger, let's say s/he can eat more than one ice cream, for example three, one after the other, s/he never buys three ice creams at the same time, but only one, so when s/he finishes eating the first one, s/he buys the next one. It is precisely this fact that, at the time of purchase, impulse ice cream consumers buy only one ice cream, which supports the conclusion that it is more relevant to observe the shares of individual players according to the number of pieces of ice cream sold rather than according to value.

Table 1: Dynamics of absolute market shares of the participants in Serbian ice cream market

Absolute market shares	2004	2005	2006	2007	2008	2009	2010
Total Frikom	46.39%	47.61%	59.38%	60.74%	75.40%	81.30%	81.81%
Total Somboled	3.34%	1.70%	0.56%		0.03%	0.01%	
Total Nestle(Delta)	37.80%	39.29%	39.13%	36.97%	22.98%	17.03%	16.48%
Total Donze	8.22%	7.51%	0.03%	0.00%	0.00%	0.01%	
Total Unilever	2.81%	2.00%	0.20%	0.09%	0.20%	0.12%	0.08%
Total Other Producers	1.41%	1.89%	0.70%	2.17%	1.22%	0.86%	0.68%
Total Private Label				0.02%	0.18%	0.67%	0.96%

Source: MEMRB

Relative market share

After calculating the absolute market shares, we will also calculate the relative market shares. The relative market share is the ratio of the number of sold ice creams by the observed company and the number of ice creams sold by its main competitor. Table 2 shows relative market shares of individual competitors in Serbian impulse ice cream market.

Market concentration ratio – CR_4

Market concentration ratio is defined as the sum of market shares *n* of the largest companies in the relevant market [13]. It represents the sum of their absolute market shares and is calculated using the following formula.

$$CR_n = \Sigma_{i=1}^{n} S_i$$

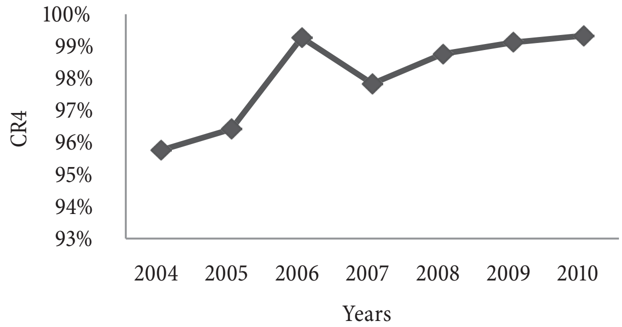
where:

S_i – market share of company *i*

n – number of companies in the market.

The concentration ratio ranges from 0, but it is never equal to zero, to 100. The closer the value of this ratio is to the upper limit the more concentrated the market. The advantage of this concentration indicator is that it takes into account only the biggest players and their market shares, so there is no need for an exhaustive collection of data from all market participants. However, this indicator does not show the relationship between the leading competitors. The number of the competitors that the concentration ratio is calculated for can be taken approximately. The most commonly used one is CR_4, so we will also take it into consideration in analysing the ice cream market in the territory of Serbia. If the concentration ratio is less than 50%, it is considered that there is low concentration of participants in the market. If CR is between 50% and 80%, the market is a moderately concentrated. Highly concentrated market is any market where concentration ratio exceeds 80%.

Figure 1: CR4 in Serbian impulse ice cream market



Source: The authors' calculations

The Herfindahl-Hirschman Index (HHI)

The Herfindahl-Hirschman Index (HHI) is defined as the sum of squares of individual market shares of individual companies. This gives proportionally greater weight to the companies with greater market share. Based on experience, regulatory bodies of the USA consider that the level of the HHI index may approximate the level of market concentration in a certain way [19]:

- Low concentration market: HHI below 1500
- Moderately concentrated market: HHI between 1500 and 2500
- Highly concentrated market: HHI over 2500

The HHI has certain specificities [3]. Firstly, the HHI is highly sensitive to small changes in market shares, especially of market leaders. Therefore, calculating the market shares of the leading companies requires a high level of precision. The HHI will be lower when the market shares of the parties are equal. When there is a market leader or more companies whose market share is way ahead of other competitors, the HHI will have higher value. Another important feature of the HHI is that it reflects

Table 2: Dynamics of relative market shares of the participants in Serbian ice cream market

Relative market shares	2004	2005	2006	2007	2008	2009	2010
Total Frikom	122.73%	121.19%	151.74%	164.28%	328.11%	477.24%	496.47%
Total Somboled	7.20%	3.56%	0.94%	0.00%	0.04%	0.02%	0.00%
Total Nestle(Delta)	81.48%	82.51%	65.90%	60.87%	30.48%	20.95%	20.14%
Total Donze	17.73%	15.78%	0.06%	0.01%	0.00%	0.01%	0.00%
Total Unilever	6.05%	4.21%	0.33%	0.16%	0.26%	0.14%	0.10%
Total Other Producers	3.03%	3.97%	1.18%	3.57%	1.61%	1.06%	0.83%
Total Private Label	0.00%	0.00%	0.00%	0.03%	0.23%	0.83%	1.17%

Source: The authors' calculations

the market shares of all the companies in the market. On the one hand, this is an advantage of this index, but on the other, and it is also its limitation, as in some markets there are a large number of individual players and it is very difficult to collect accurate data on the market share of each of them. In such situations, it is necessary to adopt an arbitrary decision on the number of competitors with significant market shares and include them in the HHI index. The third characteristic of the HHI index is that it can be interpreted as a "numbers equivalent". That means you can easily calculate how many companies there are in the market with equal market shares would result in a specific HHI index. The HHI is calculated by the following formula:

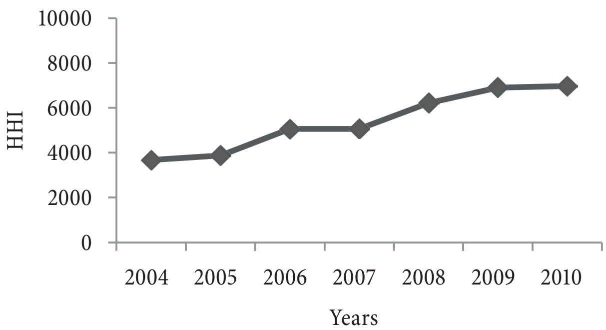
$$HHI = \sum_{i=1}^{N} S_i^2$$

where:

S_i – absolute market share of company i

N – total number of companies in the market

Figure 2: Dynamic trends of the HHI index

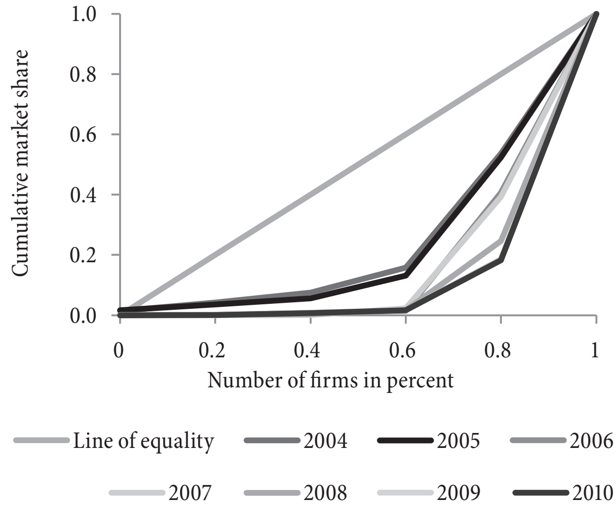


Source: The authors' calculations

Concentration curve (Lorenz curve) and Gini coefficient

Lorenz curve and Gini coefficient are also used for measuring concentration. They virtually represent a measure of inequality of market shares. This measure is expressed as the difference between the actual allocation of market shares and that which would occur in the case of perfectly competitive markets. The initial concept was developed in the research of distribution of income and wealth in society [1]. The closer the Lorenz curve to the line of equality of market shares, the lower the market concentration level.

Figure 3: Lorenz curves for impulse ice cream market in Serbia by years



Source: The authors' calculations

Gini coefficient has the advantage over other indicators because it effectively shows the distribution of market shares between companies, which cannot be seen when we look at other indicators such as the CR4 and the HHI. It is a measure of inequality of market shares. Gini coefficient GC is a ratio of area between the Lorenz Curve of the distribution and the line of equality (uniform distribution) to the lower triangle.

$$GC = 1 - \sum_{i=0}^{K-1} (Y_{i+1} + Y_i)(X_{i+1} - X_i)$$

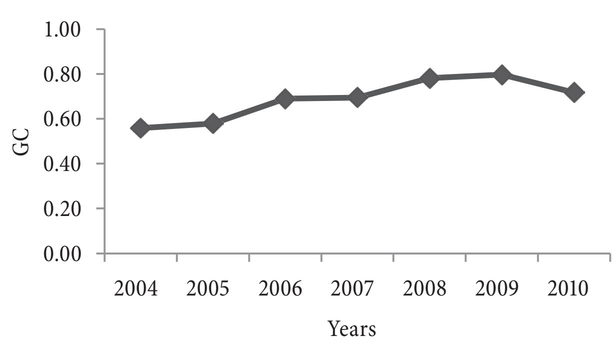
where:

Yi – cumulative empirical market shares

Xi – cumulative uniformed market shares (assumption of perfectly competitive market).

The closer Gini coefficient to zero, the more uniformed market share of the observed companies, i.e. the lover the level of market competition.

Figure 4: Dynamic trends of Gini coefficient in ice cream market



Source: The authors' calculations

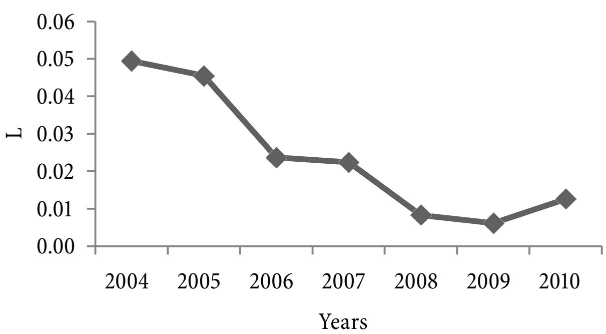
The Linda index

Linda index measures the degree of inequality between the average market shares calculated for different sub-samples of companies. This index is practically a combination of different concentration ratios. Since the ratio between two sub-samples is calculated in several iterations, it can be said that this index measures the oligopolistic equilibrium [4]. It is calculated based on the following formula:

$$L = \frac{1}{n(n-1)} \sum_{i=1}^{n-1} Q_i$$

where Q_i is the ratio of average share of the first *i* companies and average market share of the remaining *n-i* companies. Lower value of this index represents higher market concentration.

Figure 5: Dynamic trends of the Linda index in ice cream market



Source: The authors' calculations

The Rosenbluth index

Rosenbluth index is similar to the CR index, but unlike the concentration ratio CR, when calculating the concentration index, it also takes into account the ranks of individual companies [2]. This index is calculated by the following formula.

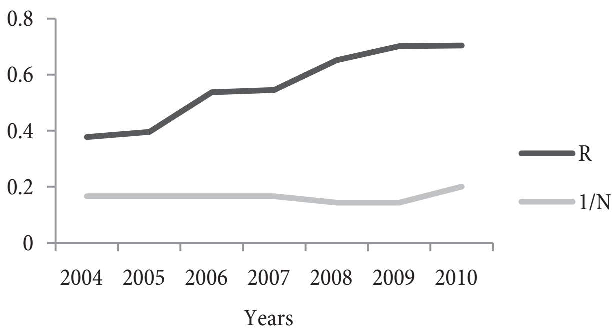
$$R = \frac{1}{2\sum_{i=1}^{N} is_i - 1}$$

where

- *i* rank is the position of the company,
- s_i market share of company *i*
- *N* number of companies in the market.

The close the value of this index to 1/N, the lower the level of market concentration. The figure below shows the dynamic trends of the R index in relation to the curve 1/N.

Figure 6: Dynamic trends in the R index in impulse ice cream market in Serbia



Source: The authors' calculations

The Horvath index

The Horvat index or the Comprehensive Concentration Index is a hybrid index that combines discrete and aggregate indicators of market concentration. Unlike the HHI index, when calculating the Horvath index, the shares of market leaders are not squared, and the shares of other players in the market are multiplied by (2-S_i) [14]. The Horvath index is calculated by the following formula.

$$CCI = s_1 + \sum_{i=2}^{N} s_i^2 (2 - s_i)$$

where

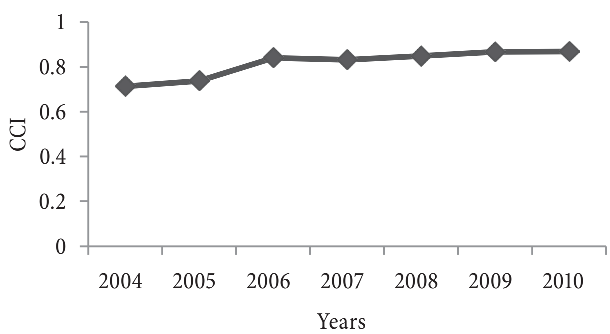
S_1 – market share of the largest company

S_i – market share of company *i*

N – the number of companies in the market.

If the value of this index is lower than 0.4 then the concentration is low.

Figure 7: Dynamic trends in the Horvath index in impulse ice cream market in Serbia



Source: The authors' calculations

After a detailed explanation of individual indicators of market concentration, now we are going to present their summary review in one place and, based on them, comment on the level of market concentration of the impulse ice cream market in Serbia.

Table 3: Summary review of all the calculated indicators

	2004	2005	2006	2007	2008	2009	2010
CR4	95.75%	96.41%	99.26%	97.83%	98.76%	99.12%	99.32%
GC	0.56	0.58	0.69	0.69	0.78	0.80	0.72
HHI	3670	3877	5058	5061	6215	6901	6965
L	0.05	0.05	0.02	0.02	0.01	0.01	0.01
R	0.38	0.40	0.54	0.55	0.65	0.70	0.70
CCI	0.71	0.74	0.84	0.83	0.85	0.87	0.87

Source: The authors' calculations

All the indicators of market concentration lead to the conclusion that the impulse ice cream market in Serbia is highly concentrated. However, as market concentration is always viewed dynamically, it is necessary to include in the analysis the potential of future competitors, and also analyse entry barriers and market saturation. Market shares and market concentration levels provide useful initial information about the competitive situation. However, it is always important to bear in mind the fact that market shares and concentration levels provide only part of the overall picture on total market competition [20]. To obtain a complete picture of the competition, it is necessary to include in the analysis other factors such as entry barriers, market saturation, the possibility of using technology in the relevant market, technological advances, etc.

Since the data on the market shares were available for years until 2010, the analysis also included publicly available information regarding the analysed market. Based on the balance of the entry of new competitors in the ice cream market in Serbia in the period 2010-2012, it is clear that there are three new competitors. In addition to the already existing ones, these are: Ice Cream Factory, Swisslion Takovo, and Cermat. Also, in recent years, there has been growing presence of private label ice creams. These facts confirm the existence of freedom of entry into the ice cream market in Serbia. Non existence of high entry barriers to the market of ice cream is also reflected in the fact that it is neither expensive nor complicated to start the production of ice cream. It is necessary to have processing equipment, which includes a pasteurizer, a homogenizer, tanks for the preparation and storage of ice cream mixture, cooling machines, machines for finalization of ice cream, and a system for centralized cleaning (the CIP systems). Thus, for example, a current manufacturer of frozen foods could launch production of ice cream with additional investment of around 2-3 million EUR, with the annual production capacity of 1,000 to 5,000 kg of ice cream.

It can be concluded that the ice cream market in the Republic of Serbia is unsaturated. One of the main indicators of non-saturation is the consumption of ice cream per capita compared to the EU average. In Serbia ice cream consumption per capita is 2.6 litters (1.69 kilograms), while average consumption in the EU is 2.6 times higher at 6.8 litters per capita (4.4 kilograms) [5]. In the neighbouring country of Croatia, annual ice cream consumption is 5.5 litters, which is twice as much as in Serbia [15]. It is clear that there is ample room for market growth and that room can be filled with both new and existing players in the market.

As we can see, the ice cream market in Serbia is highly concentrated, but on the other hand, market saturation is extremely low, and entry barriers are not significant and are practically non-existent. All this suggests that, in the future, we can expect additional entry of new players in this market, as already happened in the period of 2010-2012, the increase of competitive pressure, but also the growth of the entire market, which stems from the low level of current consumption of ice cream in Serbia. The ice cream market in Serbia is a clear example that high market concentration is not necessarily accompanied by setting high entry barriers and consequently by hindering competition in any other way.

Conclusion

The ice cream market in Serbia consists of three separate relevant product markets as follows: the impulse ice cream market, the take home ice cream market, and the catering ice cream market. This division comes from the fact of their diversity in terms of characteristics, use and prices from the viewpoint of end users. In terms of characteristics, the most prominent ones are impulse ice creams, with the majority being in the categories of frozen fruit ice creams and frozen flavoured ice creams, while the take home and catering ice creams comprise mainly cream and milk ice cream. In terms of their use, impulse ice creams are the result of impulse shopping in the street that takes place in order to meet the current needs of the individual for cooling and refreshment. On the other hand, the take home ice creams are designed for subsequent consumption at home by family members, while the catering ice creams are designed for resale to the guests of hotels and restaurants in as dessert. In terms of price, it is clear that there are significant price differences between these categories, as per unit in kilograms. This type of division of the ice cream market is justified and confirmed through examples of global practice in the field of protection of competition. Consequently, the designated relevant market, which is the subject of concentration analysis in this paper, is the impulse ice cream market in the Republic of Serbia.

The impulse ice cream market is characterized by certain specificities that need to be taken into consideration when analysing concentration. With these ice creams, the location of the outlet where the product is sold is a major sales factor, but also the position and exposure of the product in the outlet, which is a characteristic shared by all impulse products. Another important characteristic of the ice cream market is the cold chain distribution system, which is necessary in order to preserve all the service properties of the product until consumption. To do that, the manufacturers invest heavily in freezers that they supply to retail outlets.

All the indicators of market concentration are based on a combination of the number of market participants and their market shares. Bearing in mind the specificities of the sales of the impulse ice cream, which are reflected in the fact that consumers buy only one ice cream at the time of purchase, the market shares of individual players were calculated relative to the number of pieces of ice cream sold.

Based on the available data, the analysis of the concentration of the impulse ice cream market in Serbia has shown that the market is highly concentrated, but also that there are no entry barriers or any restrictions of competition of any other kind, which was confirmed by the entry of new competitors into the market in the period between 2010-2012, which was not included in the analysis. In this way, we have demonstrated that the ice cream market in Serbia is a clear example of the fact that high level of market concentration is not necessarily accompanied by setting high entry barriers and consequently by hindering competition in any other way.

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