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## **DEVELOPMENT OF COFFEE MARKET AND CHANGES IN COFFEE CONSUMPTION AMONG POLES**

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**Abstract.** The paper presents results of a survey concerning coffee consumption together with results of visual and instrumental coffee analyses. The investigations focused on the type of additives used when preparing coffee. Based on the survey it was found that 58.3% respondents use sweeteners and 92.7% coffee whiteners (mainly milk with 3.2% fat content).

**Key words:** coffee, consumer, coffee whiteners, survey, colour

### **INTRODUCTION**

Coffee is one of the most important foodstuffs and commodities worldwide. In terms of its value the coffee market is a leading market, next to the markets of crude oil, copper, aluminium, flour and cereals, with the annual turnover in 2008 exceeding 70 billion dollars [<http://www.studium.agrobiznesu.up.lublin.pl>].

In 2013 a total of 145 194 thousand of coffee bags (a unit of measure used in coffee turnover, equivalent of 60 kg), i.e. 8.77 million tons [<http://www.ico.org>]. Among the 49 coffee producing countries the leaders are Brazil, Vietnam, Indonesia and Colombia. These countries supply over 50% world production of this raw material.

Data of Euromonitor indicate that in 2013 the value of the coffee market in Poland exceeded 5 billion złotys. Forecasts for the nearest future predict a steady increase by over 1% annually and in 2016 the value of the coffee market is to reach almost 5.5 billion złotys [<http://www.portalspozywczy.pl>].

Every year a total of 400 billion of coffee cups is drunk worldwide [<http://bsolutions.pl/>]. In Europe it is the Scandinavians that drink the greatest amounts of coffee. In Scandinavia the consumption is as high as 10 kg coffee per capita, while in Poland it is 3 kg [<http://www.ico.org>].

In the first 7 months of 2013 advertising expenditure of coffee producers was almost 5-fold greater than those of tea producers. It was a considerable change in relation to 2012, when this difference was 1.5 fold. Jointly expenditure of the hot beverage sector (coffee and tea) in 2013 increased by 14% and amounted to 153.2 million zlotys. These are the data from the latest analyses of the media house Equinox Polska [Ożarek 2013].

In Poland ground roasted coffee and roasted coffee beans have the greatest value share in the market (49-53%), followed by instant coffee (35-49%), coffee mixes such as coffee 2 in 1, 3 in 1, ice coffee (6.5%) and cappuccino (5%) [Kobielska 2009, after: Nielsen]. The most popular brand among natural coffees is Tchibo Family, while Nescafe Classic ranks highest among instant coffees [Ratajczak and Siuda 2012].

Coffee mixes (i.e. 2 in 1 coffee and 3 in 1 coffee) are products, which formulation contains a mixture of sugar, glucose syrup, hydrogenated vegetable fat, instant coffee powder (ok. 10-20%), grain coffee extract, stabilisers, milk protein, milk powder, emulsifiers, an anticaking agent, salt and a food colouring agent.

Coffee mixes constitute a new sector of the coffee market, present in Poland since ca. 2002. Since that time it has been expanding, taking over a considerable market share of cappuccino. This sector is stable and still in the upward trend. The sector leader is Nescafe with a 60% share, followed by Jacobs with 15%. Coffee mixes are also produced by Mokate (8% market), Tchibo, Mac Coffee and Gellwe [<http://www.platforma.mokate>].

In 2010 average expenditure for coffee purchase in households was approx. 8.9 zlotys a month (per person), accounting for approx. 2.75% all expenditure for food and beverages. It is estimated that in 2015 the expenditure for coffee will increase to 10.8 zlotys. Coffee definitely has the greatest share in total food expenses in single-person households (3.7%). The amount of money spent on coffee in relation to the total food expenses decreases with an increase in the number of children raised in the household. In households of childless families money spent on coffee accounts for 3% food expenses, while in households with three and more children it was only 2.1% [<http://analizy-rynku.inse.pl/>].

Zalega [2011] when investigating coffee consumption in households including un-employed family members classified coffee (next to milk, sugar, bread, flour, groats, pasta, rice, vegetables, meat, vegetable oils, eggs and tea) to normal commodities, for which indexes of income elasticity of demand are non-elastic, i.e. changes in demand are slower than changes in income.

As it was reported by Lenart and Sikora [2001], consumer behaviours on the coffee market are dependent on psychological criteria (needs, motivations), behavioural criteria (frequency, amount and type of used coffee, brewing method and place where it is consumed), descriptive criteria (age, sex, profession, education, income, family size and residence), as well as marketing criteria (price and advertising).

According to the data of the Institute of Social and Economic Research (INSE Research) of 2012 the highest coffee consumption per person is recorded in the Lubuskie, Dolnośląskie, Pomorskie and Kujawsko-pomorskie voivodeships. In turn, the provinces with consumption levels below the national average of 2.85 kg per person are the Pod-

laskie, Mazowieckie, Świętokrzyskie and Podkarpackie voivodeships [<http://analizy-ryнку.inse.pl>].

The greatest amount of coffee per capita is consumed in towns of 100-199 thousand inhabitants, while it is lowest in cities with a population of over 500 thousand inhabitants [<http://analizy-ryнку.inse.pl>].

Preferences of respondents (a subjective reaction of a consumer in the situation of choice between at least two similar products and the selection of the most desirable sample) in relation to coffee according to Grębowiec [2010] result from the influence of 4 main factors: price, brand, habit and quality. The most significant reasons to purchase a given coffee brand are taste and habit. A study by Przybysz et al. [2013] additionally showed that respondents choose coffee mainly for its taste attributes (74%) and for its stimulating effect (54%).

The following coffee additives are available on the market: sweeteners, spices, liqueurs, whiteners such as milk (from 0 to 3.8% fat content), cream, condensed milk, whipping (heavy) cream, whipped cream and powder whiteners. Literature on the subject lacks studies concerning consumer preferences of coffee whiteners.

The aim of this study was to investigate habits concerning coffee drinking, focusing on the most commonly used dairy coffee additives.

## **MATERIAL AND METHODS**

Analyses concerned consumer preferences related with coffee consumption. Primary sources of information were used in this study. Investigations were conducted at the end of 2013 applying the survey method with the use of a questionnaire comprising open, semi-open and closed questions [Groves et al. 2009]. The questionnaire contained 17 questions (including two to specify sex and age), concerning e.g. frequency of consumption, method of preparation and strength of coffee as well as the type of used additives. The study was conducted in all provinces of Poland. Sample size ( $n = 600$ ) was calculated using a calculator [<http://www.surveysystem.com>], the significance level was 95%, estimation error was 4%, while the percentage share of the phenomenon in the general population was 50%. Population size (the number of adult inhabitants of Poland) was  $N = 31\,494\,000$  [<http://www.stat.gov.pl/>]. Additionally, a pilot survey ( $n = 20$ ) was conducted to verify whether the questions are comprehensible. The survey included 630 respondents, of which 600 declared coffee consumption and their numerical data from the questionnaire were classified to further analysis.

In the second part of the study the respondents were asked to specify their preferences for coffee colour. For this purpose 5 coffees of 250 ml were prepared using Nescafé Espresso and 5 coffees were made from Nescafé Classic (2 teaspoons of coffee – 3 g with 0%, 5%, 25% 45% and 65% addition of milk with 3.2% fat content). Next 100 respondents were asked to choose coffee colour (both Espresso and Classic), which best suited their expectations. Respondents selected a sample from among 5 brews, answering the question: “Which sample do you like best?”. The criterion for differentiation was preference of a sensory attribute (colour) of one sample in relation to the others [Barylko-Pikielna and Matuszewska 2009]. For comparison of beverage colour additionally 250 ml of 2 in 1 coffee and 3 in 1 coffee were prepared using for this purpose 1 mix packet each.

In order to provide physical determination of colour for 10 coffees (5 made from Nescafé Espresso and 5 from Nescafé Classic) 5 colour attributes were measured: L\* (lightness), a\* (colour from green to red), b\* (colour from blue to yellow), c (depth/clarity of colour), h (hue). Analyses were conducted using a SP60 x-rite spectrophotometer (Grandville, USA). The apparatus was calibrated using the SP62-162 ideal black and white reference model (Grandville, USA). Samples in a glass cuvette with liquid width of 1 cm were placed in an x-rite P/N DRS-810 attachment. Measurements were recorded using the D65 illuminant, at the slit of 8 mm, spherics d/8, spin setting and sample temperature of 20°C. Collected results are means of 3 measurements [Instrukcja obsługi spektrofotometru SP60].

## RESULTS AND DISCUSSION

The respondents in the survey were 62.2% female and 37.8% male. Their age ranged from 18 to 71.

As it results from preliminary analyses 95.2% Poles drink coffee. Every third coffee consumer participating in the survey (34.8%) drinks it once a day, 40% drink coffee two or three times a day (20% each), 25.2% drink coffee occasionally several times a week or less often. Very similar results were reported by Krelowska-Kułas [2002] and Grębowiec [2010].

Poles are drinking increasing amounts of coffee, as it is manifested e.g. in its growing imports. As it results from the data of the International Coffee Organization (ICO), coffee import to Poland in 2000 amounted to 2576 thousand bags, while in 2012 it was 3539 thousand bags. Germany is the biggest importer and re-exporter of coffee in Europe, while worldwide it is the United States. World coffee consumption increases by approx. 1.2% annually (since 1980), although there were years with an increase of over 2% [<http://www.ico.org/historical/>]. Still in 2007 according to a study by Jaworska and Czarniecka-Skubina only 32.5% respondents declared that they drank coffee once or several times a day.

Most consumers drink instant coffee (55.2%), followed by coffee brewed by pouring boiling water onto ground coffee (16.7%), from a pressurized coffee maker (14.8%), brewed in a French press coffee maker (6.7%), in an Italian style coffee maker (5%) and from the coffee machine using capsules (1.6%). None of the respondents prepared coffee in a drip coffee maker. The new trend, i.e. capsules, is only beginning to gain in popularity. Capsule sales increase on average by approx. 75% annually. At the same time, the sectors of ground and instant coffee are relatively stable and saturated [<http://analizy-ryнку.inse.pl/>]. As it results from a study by Przybysz et al. [2103], although many Poles like instant coffee very much, 48% respondents consider coffee from pressurized coffee makers to be the best.

In 1996 a total of 84% respondents bought ground coffee [Odorzyńska-Kondek 1997]. Most coffee beans imported at that time came from south-east Asia and were of poor quality. Beans were frequently with impurities, broken, damaged by pests and even in modern coffee roasting plants it was difficult to obtain a quality product with good taste. As a result consumers switched to instant coffee. Today again Poles appreciate ground coffee and its quality motivates them to search for such coffee brewing methods which would provide the best possible taste and aroma.

Poles more often prefer large amounts of this beverage, as reflected in their answers to the question: "What do you drink coffee in?". Mugs are used by 80%, while the other respondents prefer cups. The traditional glass, popular as recently as the 1980's, is no longer in use.

An average Pole most frequently uses two teaspoons of coffee to prepare the beverage. The number of individuals preferring weak coffee (1/2 teaspoon) and strong coffee (2.5 teaspoons and more) is much lower (Fig. 1).

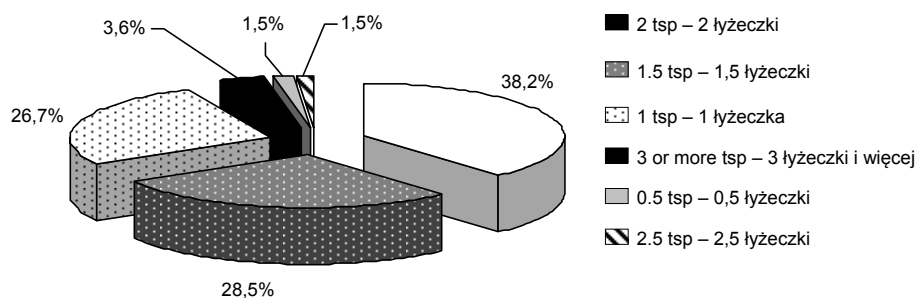


Fig. 1. Amount of coffee used by respondents to prepare the brew

Source: the author's study.

Rys. 1. Ilość kawy zużywana przez respondentów do sporządzania naparu

Źródło: badania własne.

Poles prefer sweet and white coffee. Sugar is used by 58.3% respondents, of which 60% add 1 teaspoon of sugar, while the other 40% – two teaspoons. One person among the respondents used a mint syrup as a sweetener. Nobody declared using honey or artificial sweeteners.

White coffee was drunk by 91.7% respondents. A strong association of coffee and milk may also be evidenced by a study by Dmowski and Platt [2012], in which selected non-fermented dairy coffee beverages received high scores for taste and aroma during organoleptic analyses.

Table 1 presents the products used by consumers to prepare white coffee, as well as those which they would like and have tried to use. The results show that the greatest number, i.e. 30% all respondents, use milk with 3.2% fat content. However, it needs to be stressed that a large group of respondents would replace 3.2% milk e.g. with coffee cream and whipped cream. This may suggest that milk with such a fat content is bought most frequently and used for other purposes, e.g. such as breakfast cereals or porridge. As it results from studies conducted in 2009 by the National Association of Dairy Cooperatives, 40.7% Poles buy UHT milk with 3.2% fat content, 35.3% – milk with 2% fat, 14.9% – 1.5% fat and 7.9% – 0.5% fat, while 0.4% each buy 0% fat milk, 1% fat and 3.6% fat milk, respectively [<http://mleczarstwpolskie.kzsm.pl/>]. None of the respondents adds powder whitener to coffee or would like to do so, although almost 30% have tried such a product.

Almost every second respondent (45%) when asked to describe in their own words the colour of their favourite coffee, wrote: light brown, 10% – creamy, 8.5% – white-creamy, 8.3% – dark brown, 8.3% – black or brown (individuals using no whitener),

Table 1. Answers of respondents concerning the type of whiteners added to coffee (n = 600)  
 Tabela 1. Odpowiedzi respondentów na temat środka zabielającego dodawanego do kawy (n = 600)

Product Produkt	What do you use to whiten your coffee? Czym zabiela Pani/Pan kawę?	What would you add to your coffee if you had the choice? Co dodałaby Pani/Pan do kawy mając do wyboru?	Have you ever tasted coffee with... Czy próbowała Pani kawy z...	
			YES TAK	NO NIE
Milk 0% Mleko 0%	1.6	3.3	28.8	71.2
Milk 0.5% fat Mleko 0,5%	8.4	8.3	40.2	59.8
Milk 1.5% fat Mleko 1,5%	15.1	16.8	53.3	46.7
Milk 2% fat Mleko 2%	24.9	26.2	80.0	20.0
Milk 3.2% fat Mleko 3,2%	30.0	16.7↓	83.2	16.8
Coffee dairy cream Śmietanka do kawy	6.7	14.2↑	58.3	41.7
Condensed milk Mleko zagęszczone	5.0	4.7	90.0	10.0
30% fat cream Śmietanka 30%	0	1.2	27.8	72.2
Whipped cream Bita śmietana	0	6.7	62.0	38.0
Creamer powder Zabielacz w proszku	0	0	53.3	46.7
Nothing Nic	8.3	1.9	–	–

↓ – greatest decrease, ↑ – greatest increase.

Source: the author's study.

↓ – największy spadek, ↑ – największy wzrost.

Źródło: badania własne.

6.7% – creamy-brown, 5.2% – dark cappuccino, caramel, dark beige, 4.8% – colour of caffè latte, 1.7% – very light beige and 1.5% – creamy-milky. It needs to be added here that the most recent study by Niseteo et al. [2012] showed that an addition of milk to coffee reduces its positive antioxidant effects (reducing the amount of beneficial polyphenols, most probably due to their reactions with milk proteins).

In a study by Adamczyk et al. [2009] almost 80% respondents declared they used milk to prepare white coffee. For this reason the questionnaire included questions concerning white coffee: 2 in 1 coffee and 3 in 1 coffee. Results show that 93.5% tried 2 in 1 coffee and 88.7% 3 in 1 coffee. The number of people buying these coffees is small, 15.0% and 13.3%, respectively.

The number of places where one can buy coffee to take away is increasing (chains of coffeehouses, grocery stores with coffee machines, petrol stations). Drinking coffee while being on the move was declared by 71.6% respondents.

Coffees prepared for visual analysis are presented in Photos 1 and 2. Table 2 presents percentages of respondents most frequently choosing a given coffee colour and colour attributes of prepared coffees. It results from these analyses that approx. 100 ml



Photo 1. Nescafé Espresso coffee. Upper row, from the left: black coffee, coffee with 5% and 25% of milk, bottom row, from the left coffee with 45% and 65% of milk

Source: the author's study

Foto 1. Kawa Nescafé Espresso. Rząd górny, od lewej: kawa bez dodatku mleka, kawa z 5- i 25-procentowym dodatkiem mleka; rząd dolny: kawa z 45- i 65-procentowym dodatkiem mleka

Źródło: badania własne.

Table 2. Colour desirability of Nescafé Espresso and Nescafé Classic and coffee colour parameters (n = 100)

Tabela 2. Pożądalność barwy kawy Nescafé Espresso i Nescafé Classic oraz parametry barwy kawy (n= 100)

Desirability of coffee colour Pożądalność barwy kawy	Black coffee Kawa bez dodatku mleka	Coffee with milk (5% addition) Kawa z 5-procentowym dodatkiem mleka	Coffee with milk (25% addition) Kawa z 25-procentowym dodatkiem mleka	Coffee with milk (45% addition) Kawa z 45-procentowym dodatkiem mleka	Coffee with milk (65% addition) Kawa z 65-procentowym dodatkiem mleka
1	2	3	4	5	6
% respondents who selected a given coffee colour % ankietowanych, którzy wybrali daną barwę kawy	9/9	7/7	30/27	42/45	12/12



Table 2 – cont. / Tabela 2 – cd.

1	2	3	4	5	6
Nescafé Espresso and Nescafé Classic coffee colour parameters Parametry barwy kawy Nescafé Espresso i Nescafé Classic					
L*	27.17/26.9	34.33/35.60	48.64/50.45	53.51/55.19	56.52/56.33
a*	2.70/3.95	3.97/4.40	5.53/5.06	5.08/4.52	4.61/4.13
b*	1.30/1.71	8.67/10.66	16.97/17.64	17.38/17.40	16.51/16.60
c	3.00/4.3	9.53/11.53	17.85/18.35	18.10/17.90	17.63/17.11
h	25.78/23.49	65.4/67.58	71.95/73.95	73.71/75.42	74.82/76.27

Source: the author's study.  
Źródło: badania własne.



Photo 2. Nescafé Classic coffee. Upper row, from the left: black coffee, coffee with 5% and 25% of milk, bottom row, from the left coffee with 45% and 65% of milk

Source: the author's study

Foto 2. Kawa Nescafé Classic. Rząd górny, od lewej: kawa bez dodatku mleka, kawa z 5- i 25-procentowym dodatkiem mleka, rząd dolny: kawa z 45- i 65-procentowym dodatkiem mleka

Źródło: badania własne.

milk need to be used for the preparation of a cup/mug (250 ml) of both instant Espresso and Classic with the most desirable colour.

The colour of 2 in 1 coffee and 3 in 1 coffee differed most from that of the most desirable coffees with added milk, i.e. coffees nos. 4 and 3 (Photo 3). Thus it may be stated that the limited popularity of coffee mixes may result e.g. from their inappropriate colour.

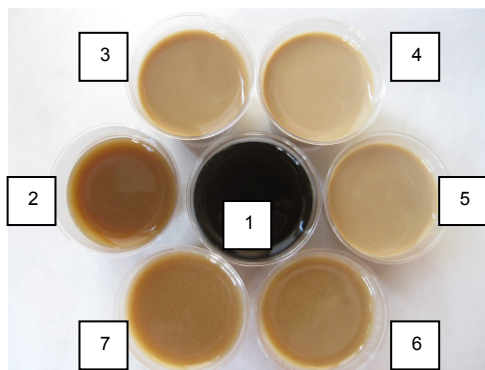


Photo 3. Comparison of coffee colour between Nescafé Classic (black coffee – no. 1, 5% milk addition – no. 2, 25% milk addition – no. 3, 45% milk addition – no. 4, 65% milk addition – no. 5), Nescafé 2 in 1 (no. 6) and 3 in 1 (no. 7)

Source: the author's study.

Foto 3. Porównanie koloru kawy Nescafé Classic (0% mleka – nr 1, 5% dodanego mleka – nr 2, 25% – nr 3, 45% – nr 4, 65% – nr 5), kawy Nescafé 2w1 (nr 6) oraz 3w1 (nr 7)

Źródło: badania własne.

## CONCLUDING REMARKS

Summing up the results of these studies it was found that on average 95 out of 100 surveyed Poles drink coffee. Most (74.8%) consume coffee regularly, once or several times a day. Traditionally sugar is used as a sweetener in coffee. The highest percentage of respondents use milk with 3.2% fat content to prepare white coffee. When having different dairy products to choose from the respondents would replace this milk mainly with coffee cream and whipped cream. Light brown is the preferred coffee colour. The amount of milk added to coffee did not depend on the type of coffee and in order to obtain the most desirable colour it was 45%.

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## ROZWÓJ RYNKU KAWY I ZMIANY W JEJ KONSUMPCJI WŚRÓD POLAKÓW

**Streszczenie.** W pracy przedstawiono wyniki ankiety dotyczącej konsumpcji kawy oraz wyniki wizualnej i instrumentalnej oceny kaw. Głównym przedmiotem rozważań był rodzaj stosowanych dodatków podczas przygotowywania kawy. Na podstawie badań ankie-

towych stwierdzono, że 58,3% respondentów używa środki słodzące, a 92,7% środki zabielające kawę (głównie mleko o zawartości 3,2% tłuszczu).

**Słowa kluczowe:** kawa, konsument, środki zabielające, ankieta, barwa

*Accepted for print – Zaakceptowano do druku: 29.09.2014*

*For citation – Do cytowania: Chudy S., 2014. Development of coffee market and changes in coffee consumption among Poles. J. Agribus. Rural Dev. 4(34), 41-51.*