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THE RISING TREND OF FOOD PRICES - A FACTOR IN CHANGING CONSUMER BEHAVIOUR REGARDING FOOD WASTE

Abstract

This paper aims to determine the influence of food prices in changing behaviour regarding reducing food waste in households. The motive for this research primarily originates from the ongoing global economic tendency of increasing the prices of energy sources which is also a direct factor affecting the prices of food products. Survey data were collected via questionnaires in North Macedonia. A descriptive and empirical presentation interprets the attitudes of different categories of consumers. The research concludes that prices significantly impact awareness of the importance of food. Hence, respondents agree that the amount of food waste in the home is reduced in the last year.

Keywords: *sustainability, food price, household, food waste*

JEL classification: D12, Q11, Q56

ТРЕНД РАСТА ЦЕНА ХРАНЕ - ФАКТОР У ПРОМЕНИ ПОНАШАЊА КОНЗУМЕНАТА У ПОГЛЕДУ РУКОВАЊА ОТПАДНОМ ХРАНОМ

Сврха овог рада је да одреди утицај цена хране у промени понашања у вези смањивања бацања хране у домаћинствима. Мотиви за ово истраживање примарно потичу од тренутних светских економских тенденција повећања цена извора енергија који су такође директни фактори који се одражавају на цену хране. Подаци су прикупљени анкетним упитницима у Северној Македонији. Дескриптивна и емпиријска презентација у овом раду приказује ставове различитих категорија потрошача. Ово истраживање закључује да цене значајно утичу на свест о значају хране. Међутим, анкетирани потрошачи се слажу да се количине отпада тј. бачене хране у домаћинствима смањују у последњој години.

Кључне речи: *одрживост, цена хране, домаћинство, бацање хране*

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Introduction

The impact of food prices will be a significant factor in household food consumption. Reducing food waste has become one of the biggest global sustainability challenges. The increase in food prices will undoubtedly make consumers spend rationally. As a result of the price trend, it is reasonable to expect that the level of food waste will decrease in a certain period. Changes in food prices can be positive or negative. From the perspective of this research, we observe such changes as positive because reducing food waste is at the heart of sustainable development (Sala and Castellani, 2019). Within the Sustainable Development Goals (SDGs), target SDG 12.3 addresses food waste. It aims to "halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including postharvest losses" by 2030 (Flanagan et al., 2018, p. 6). Previous studies highlight the need for more research targeted in this area, specifically there is a need to increase consumers' awareness and comprehension of the problem with the objective of fostering enduring changes in behaviour (Wansink, 2018; Pearson & Perera, 2018; Ponis, et al., 2017).

This research aims to provide substantive evidence, within the existing scientific literature on food waste and survey data, of the relationship between food price and consumer-level food waste. In this research, we use the elaboration of descriptive data obtained from the conducted survey, as well as empirical testing of the correlation of variables.

Recent studies have revealed that in order to have a more environmentally sustainable food system, production must be improved, food waste must be decreased, and dietary preferences must change (Willett, et al., 2019). Consumer behaviour depends on a variety of external factors, and on personal characteristics including demographic factors (de Hooge et al., 2017). Differences in food waste behaviour associated with age have been shown in existing research studies (Bravi et al., 2019; Neff et al., 2015; Quested, et al., 2013). Quested et al. (2013) pointed out that older people tend to waste less, not because of environmental concerns, but rather because their attitudes toward food waste are that wasting food is 'wrong'. Moreover, the authors argue that younger generations are more likely to express an environmental concern while still wasting food. The amount of food waste produced at the home level is one of the largest contributors to food waste in countries with high incomes, accounting for nearly half of the overall economic value of food waste.

The literature review shows that previous research has extensively observed the methods of reducing food waste. However, the impact of market prices on consumer behaviour almost does not exist. The closest topics of this issue are the motives related to saving money, the role of retail in educating and encouraging consumers to change their behaviour, etc. Existing research has shown the 'Save money' appeal is one of the most effective ways to motivate people to reduce food waste (Graham-Rowe, Jessop, & Sparks, 2015; Neff et al., 2015; Pearson & Nefovski, 2019; Thyberg & Tonjes, 2016). Several studies point out that saving money may well be a stronger motivator of individuals' actions than environmental concerns (Bravi et al., 2019), suggesting that people are more motivated by short-term self-interest in relation to their food waste behaviour, rather than long-term external issues such as benefits to the natural environment (Stancu et al., 2016).

When observing the price as a factor, and in the context of this research, it is useful to mention that some authors highlight the role of retailers in supporting consumers who already wish to live more sustainably by providing and promoting products and giving consumers

information (Trewern et al., 2021). Food retailers can therefore play an important role in supporting citizens to adopt more sustainable food consumption behaviours (Trewern et al., 2022). "Another way to influence consumers in shops is to use information as a reminder of the consumer's values; that they are an environment-friendly consumer. The idea is therefore to influence the consumer by means of a subtle reminder of how the consumer intends to behave." (Röös et al., 2021).

1. Background and literature review

To contribute to the understanding of whether and how food prices motivate consumers to reduce food waste, two fields of literature are relevant to this study. The first focuses on food pricing trends in North Macedonia and globally. The second one is focused on post-purchase behaviours and consumer habits regarding food waste.

1.1. Food prices

Food prices refer to the average price of particular food commodities globally and across countries (Roser & Ritchie, 2021). Global food prices continue to rise after the spike caused by the Covid-19 pandemic. Countries that opted for stricter measures of lockdown and restriction of movement recorded, only in March 2020, inflation of food prices of about 1% (Akter, 2020). In situations where the shock resulted in food shortages or gluts, an increase in food prices usually occurs, with the highest hike being in the most demanded foods (Kansiime et al., 2021). The price of essential food products for the lockdown has risen sharply due to the market shock and demand growth for these products of over 100% (Akter, 2020).

Prices may change customers' purchasing behaviour (Shoemaker, Dawson & Johnson, 2005) and can potentially make a contribution to influencing social norms around food consumption in a more sustainable direction (Röös et al., 2021). Few studies pointed out that higher food prices can heighten the incentive for tighter home management, which may include less food waste, outcomes consistent with comparative statics from household production models of food waste (Katare et al., 2017; Hamilton & Richards, 2019; Ellison et al., 2020; Roe, Bender & Qi, 2021).

Table 1: FAO Food Price Index

Year	Food Price Index	Meat Price Index	Dairy Price Index	Cereals Price Index	Oils Price Index	Sugar Price Index
2020	98.1	95.5	101.8	103.1	99.4	79.5
2021	125.7	107.7	119.1	131.2	164.9	109.3
2022	145.8	120.0	143.4	155.9	195.3	114.2

Source: FAO Food Price Indices, November 2022, https://www.fao.org/worldfoodsituation/foodpricesindex/en/

World prices of the main agricultural products (mainly cereals, rice and oilseeds) practically doubled in the 2006−2008 period and increased again between 2011 and 2012,

and they have not returned to their pre-crisis level (Saman & Alexandri, 2018). This trend is also present from the beginning of 2021 and during the whole 2022. The effects of high food prices can be found in the population's welfare, such as food insecurity (Saman & Alexandri, 2018). The FAO Food Price Index (FFPI) experienced large fluctuations between 2020 and 2022 (Table 1).

According to the data from the most recent month between July and October 2022 for which food price inflation data are available, there was high inflation in almost all low- and middle-income countries. Inflation levels exceeded 5% in 83.3% of low-income countries, 90.7% of lower-middle-income countries, and 95.3% of upper-middle-income countries.

According to the International Monetary Fund, Haver Analytics, and Trading Economics, North Macedonia is among the top 10 countries for real food price inflation[4] (Table 2). Food inflation reached as much as 25 per cent in Bosnia and Herzegovina, Montenegro, and North Macedonia (World Bank, 2022).

Table 2: Food Price Inflation by Country

Country	Nominal Food inflation (% Year-over-Year)	Country	Real Food Inflation (% Year-over-Year)
Zimbabwe	321	Zimbabwe	52
Lebanon	208	Lebanon	46
Venezuela	158	Iran	32
Turkiye	99	Sri Lanka	20
Argentina	87	Rwanda	17
Sri Lanka	86	Hungary	15
Iran	84	Colombia	15
Rwanda	41	Uganda	15
Suriname	40	Turkiye	13
Lao PDR	39	North Macedonia	13

Source: FAO The World Bank, Food Security Update, November 2022, https://www.worldbank.org/en/topic/agriculture/brief/food-security-update

According to the State Statistical Office in North Macedonia (2022) data, the Consumer Price Index in October 2022, in comparison with the previous month was 101.4, while the Retail Price Index was 100.6. The Consumer Price Index in October 2022, in comparison with October 2021, increased by 19.8%, while Retail Price Index increased by 15.4%.

1.2. Consumers' behaviour

There is a rapidly growing population in the world, and the increasing consumption is causing a decrease in the world's resources (OECD, 2012). The exponential population growth (7.6 billion) translates into more need for ecosystem services such as food, water, shelter, and energy (Msengi et al., 2019). Chalak et al. (2016) noted that food waste figure as high as 35 per cent is attributed to consumers, whereas European Commission reveals that

[4] Real food inflation is defined as food inflation minus overall inflation.

60 per cent of food waste in industrialised countries occurs at the consumer level (European Commission, 2018).

The economic theory of consumer behaviour postulates a strong connection between price and consumption (Gourville & Soman, 2002). For example, there is a research that shows that consumers often only weigh in one or two factors, for example, taste and price, or price and health impact (Kalnikaité et al., 2013). Other study mentions that the overall low level of food prices in developed countries leads to an undervaluation of food by consumers and a disregard for the natural resources that have been used to produce it (Gjerris & Gaiani, 2013; Aschemann-Witzel et al., 2015). On the other hand, pricing mechanisms are also suggested as an instrument to tackle the problem of food waste, with the application of price reductions of suboptimal food allowing the sale of food that would otherwise be wasted at the retail level, such as imperfect food items (Tsalis et al., 2021; Aschemann-Witzel et al., 2020). Additional research shows that food waste was higher among price and convenience-oriented consumers, and lower for value-conscious consumers (Aschemann-Witzel, Giménez & Ares, 2018).

After gathering survey data to understand consumer behaviour regarding food waste, Singapore's National Environment Agency in 2017 launched the "Waste less - Save more" campaign to promote the adoption of rational food purchase, storage, and preparation practices that help consumers save money while reducing food waste (NEA & AVA, 2017). The outreach program includes educational resources for use in classrooms as well as resource materials for newspapers, television, and community-led initiatives, which featured an educational skit. The Oregon Department of Environmental Quality in the U.S. used the 'Wasted food – Wasted Money' slogan within public awareness campaign that encourages Oregon restaurants, grocery stores and commercial food service providers to make small changes to prevent and reduce wasted food (The Oregon Department of Environmental Quality, 2017).

Marketing theory argues that most of the daily consumer decisions to buy food are happening in the spur of the moment, without much thought. For self-initiated change to occur, people need to be convinced that their food waste-related behaviours are problematic (Stöckli, Niklaus, & Dorn, 2018).

2. Methodology

This study aims to test the correlation between consumer groups and features, motivation and attributes about food prices.

2.1. Sample and data collection

The development of the questionnaire was led by the authors of this paper. Nominal and ordinal scales were used in the questionnaire, including the Likert scale. The research was conducted in October 2022. The existing literature review shows that the most common method for collecting this type of data is through online questionnaires (Abd Razak et al., 2018; Neff et al., 2015; Young et al., 2017) and traditional paper-based questionnaires (Yu & Yu, 2007; Fanning, 2005).

In this study, a survey was distributed on paper and online through Google forms. The structured questionnaire was delivered to N=191 consumers. The total number of N=146 individuals participated in the survey, which represents a response rate of 76%. The majority of the respondents were females (53%) compared to males (47%). A demographic analysis of this sample is given to illustrate the characteristics of individuals who participated in the survey (Table 3).

Table 3: Sample description

Demography	Frequency	Percent (%)
Age		
18 to 25	15	10.3
26-30	9	6.2
31-35	38	26.0
36-40	11	7.5
41-45	18	12.3
46-50	4	2.7
51-55	38	26.0
56-60	4	2.7
61-65	3	2.1
66+	6	4.1
Gender		
Male	68	46.6
Female	78	53.4
Education		
High school	9	6.2
Bachelor degree	133	91.1
MSc / PhD	4	2.7
Household Composition		
Single person household	3	2.1
Adult couple	43	29.5
Family with children	59	40.4
Family, only adults (16+)	25	17.1
Shared household, non-related	1	0.7
Other (specify)	15	10.3
Total	146	100%

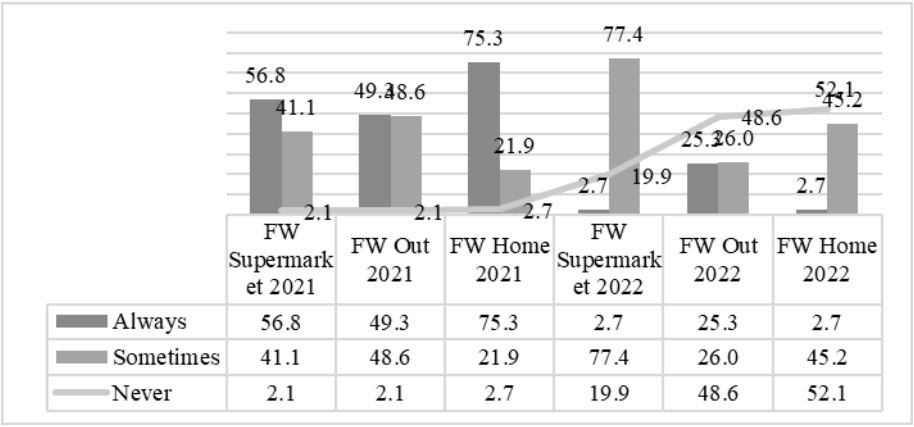
Source: Authors

2.2. Descriptive analysis

Descriptive analysis is used to determine the distribution, types, and outliers of data, as well as the similarities across variables. The primary goal of the research was to determine the trend of food waste during the period when global food prices increased. For this purpose, two of the questions in the questionnaire refer to the frequency of food waste that consumers estimate. The first refers to the period before 2021, and the second to current habits. The

results remarkably reflect the change in consumer behaviour during the observed period. The result shows the change in behaviour and transition from the "I always generate food waste" category to the "sometimes" or "never" category.

Figure 1: Food waste before 2021 versus 2022



Source: Authors

The percentage of respondents reporting that they never produce food waste at home grew remarkably from 2.7% in 2021 to a fantastic 52% in 2022. These extreme results coincide with the claim of a study that the achievement of a 10% change in the consumption of beef, for example, follows the price increase of up to 20 to 30% (Röös et al., 2001). The lowest change in the behaviour is notable when observing food consumption outside home.

Results do not confirm that the only motive for this behaviour is price. However, the results of the question that refers to the concern reported by consumers regarding the trend of increased food prices support this assumption (Table 4). Namely, 53% of the respondents reported that they strongly agree that they are very concerned about the rising trend of food prices. Most consumers (strongly) disagree that they do not worry about the cost of the food that finishes in the garbage.

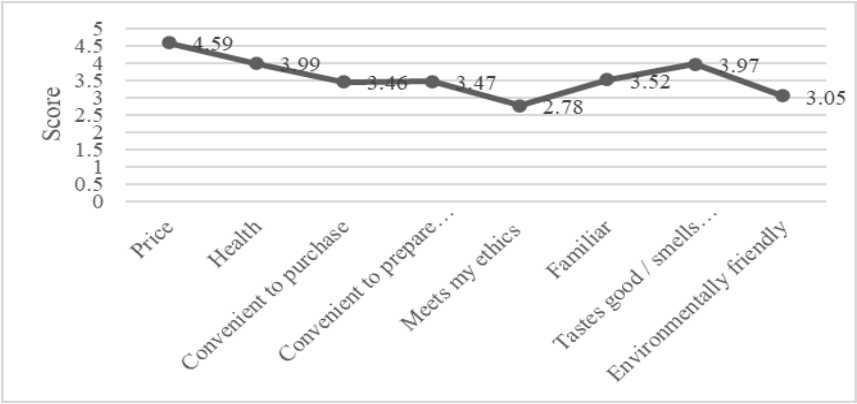
Table 4: Statements regarding food prices

	Significantly higher food prices in comparison to 2021 and before		Do not really worry about the cost of the food that I throw away		Buying food in markets with the most favourable offers/prices		I am concerned about the trend of rising food prices		A belief that the rising food prices will reduce the amount of FW	
	No.	%	No.	%	No.	%	No.	%	No.	%
Strongly disagree	0	0.0	58	39.7	0	0	0	0	0	0
Disagree	0	0.0	70	47.9	19	13.0	0	0.0	0	0.0
Average	16	11.0	18	12.3	14	9.6	62	42.5	16	11.0
Agree	8	5.5	0	0.0	49	33.6	7	4.8	55	37.7
Strongly agree	122	83.6	0	0.0	64	43.8	77	52.7	75	51.4

Source: Authors

The survey did not register results of agreement with this statement. Finally, the majority of respondents show a tendency to agree with the statement that the trend of increased food prices will have an impact on the reduction of food waste in households.

Figure 2: Food waste before 2021 versus 2022



Source: Authors

Finally, this study considers the average grade of the importance of different features in the consumer food purchasing process. (Figure 2). The "price" factor recorded the highest average score of 4.59 (from 5). Also, 88 respondents stated that price is an extremely important feature when buying food for a home. The survey notes that the feature related to ethical issues recorded the lowest average score of 2.78.

2.3. Statistical analysis

The Spearman coefficient was used to correlate between two quantitative variables and the significance of the obtained results was judged at the 5% level. Spearman correlation was performed using IBM SPSS 25 software.

Table 5: Concerns about the trend of rising food prices – test statistics

Spearman's rho	Concerned about the trend of rising food prices	Motivating factor - Save money	Concerned about the trend of rising food prices	Relevant features - Price
Corr. Coef.	1.000	.816**	1.000	.815**
Sig. (2-tailed)		0.000		0.000
N	146	146	146	146
Corr. Coef.	.816**	1.000	.815**	1.000
Sig. (2-tailed)	***0.000***		***0.000***	
N	146	146	146	146

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Authors

There is a significant positive correlation between participants' rating of the level of concern about the trend of rising food prices and the motivation for reducing FW to save money, $p<0.001$. There was also a significant positive correlation between participants' rating of the level of concern about the trend of rising food prices and the perception of the price as a relevant feature for making a decision when purchasing food with a 99% confidence interval.

A significant negative correlation is recorded between the participants' rating of education and the level of concern about rising food prices, $p<0.027$, with a 95% confidence interval. On the other hand, there is no correlation when testing the relationship between education versus the level of motivation and education versus consumer concerns about the price of wasted food ($p> 0.05$).

Table 6: Education versus food waste – test statistics

Spearman's rho	Education	Concerned about the the trend of rising food prices	Education	Level of motivation to reduce FW	Education	Do not worry about the cost of the wasted food
Corr. Coef.	1.000	-.184*	1.000	-0.079	1.000	0.056
Sig. (2-tailed)		0.027		0.344		0.503
N	146	146	146	146	146	146
Corr. Coef.	-.184*	1.000	-0.079	1.000	0.056	1.000
Sig. (2-tailed)	***0.027***		0.344		0.503	
N	146	146	146	146	146	146

*. Correlation is significant at the 0.05 level (2-tailed).

Source: Authors

Conclusion

As previously discussed in the literature, consumers are the highest generators of food waste (Albisu, 2015; Buzby & Hyman, 2012; Calvo-Porral et al., 2017; Stangherlin & de Barcellos, 2018). Prices have a strong influence on consumer purchase behaviour. This study concludes that food price pressures have positive implications in the case of pro-environmental behaviour. The dramatic percentage of the reduced amount of food waste generated by consumers in the last three years, both in the households and out, is clearly shown. In addition, the study registers a significant correlation between the level of concern about rising food prices and the motivation for reducing food waste to save money. As expected, compared with the other eight features, the price has the highest mean score for the importance of the food purchasing decision. The highest percentage of respondents (more than a half) strongly agree that increasing food prices will affect consumer behaviour by reducing household food waste.

Limitations

One of the limitations of the study is the moderate sample size of 146. However, the indicators from this study could be applied in further research since this is an ongoing project, which will lead to the generalisation of future results about the impact of food prices on the behaviour change among consumers regarding food waste. The other limitation is geographical. The survey was distributed only among respondents from North Macedonia and reflected their perception of this issue which could differ from the global trends.

Finally, this study relies on the results of self-reported measures that can cause biased estimates of actual behaviour (Armitage & Conner, 2001). Hence, the data gathered may be a better reflection of what the participant thinks, or would like to do, than what is actually done (Pearson & Amarakoon, 2019). For this reason, additional qualitative research in the form of focus groups may uncover more specific details on the research topic.

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