Analysis of Hungarian consumers' food consumption and wastage patterns in times of the crisis

Tímea Juhász[1], Péter Huszka[2], Péter Karácsony[3]

1 – Budapest Business University, Budapest, Hungary
2 – Széchenyi István University, Győr, Hungary
3 – University of Óbuda, Budapest, Hungary

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Corresponding author:

Tímea Juhász
E-mail: juhasz.timea@uni-bge.hu

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Abstract

Introduction. The present research studies the extent to which recent crises have affected the food purchasing habits of Hungarian consumers and whether the financial difficulties caused by the crisis have changed their food wastage patterns.

Materials and methods. The research method was a questionnaire survey, and the authors evaluated the data based on the opinions of a total of 798 respondents. The evaluation was carried out using SPSS version 28 and Smart PLS software.

Results and discussion. The results showed that the current economic crises have a significant impact on the purchasing habits of the Hungarian consumers surveyed and the amount of food they buy. During a crisis, Hungarian consumers are more conscious and buy less. Consumers are less optimistic about the future (mean: 3.00 standard deviation: 1.248). The study shows that optimism has no effect on whether they waste food. Anxiety has a strong effect on perceptions of crisis and wastage. The study also shows that Hungarian consumers are not satisfied with the way the economic crisis is being handled (mean: 2.29, standard deviation: 1.185). The responses also show that consumers surveyed are typically careful about how much they buy (mean: 3.70, standard deviation: 1.113), what they put away and what they throw away. More conscious thinking about waste and consumption is well outlined (mean 3.62, standard deviation 1.205). Less food is thrown away, with 18.7% of respondents never throwing away food waste and one in five respondents buying only as much food as they can afford to take away. When food is left over, around 18% of survey respondents compost the leftovers.

However, there was no difference in the extent to which those affected by economic impacts abandoned their previous consumption habits or stuck to their previous lifestyle.

Conclusion. Wastage is affected by the experience of the crisis and a sense of uncertainty about the future. Similarly, the experience of the crisis is influenced by our knowledge of eating habits and our environmental awareness.

Introduction

Since the second half of the 20th century, the world has experienced relative economic, social and financial stability. However, this period of socio-political equilibrium and economic prosperity was shattered by the attacks on the Twin Towers and the bankruptcy of Lehman Brothers – the largest bank failure in US history – both of which played major roles in the financial crisis of 2007–2008 (Fernandez and Wigger, 2016; Lukács and Völgyi, 2018). Following the bankruptcy, global markets immediately plummeted, national currencies worldwide depreciated and inflation and unemployment soared. Before a full recovery from this global crisis, the world was already facing a new challenge: the coronavirus. Infectious diseases, which have been a part of people's lives throughout history, have taken on a new level of significance, profoundly affecting the world economy. The coronavirus crisis, declared a global pandemic by the World Health Organization on 11 March 2020, inflicted severe economic damage worldwide (Kumar Jaiswal, 2021), affecting not only national economies but also people's daily lives (Grueso-Hinestroza et al., 2022). Several economic sectors, including trade, tourism, hospitality and retail, have been more severely affected by the crisis (Kohus et al., 2022; Tóth et al., 2023; Yang et al., 2024). We had barely emerged from the Covid crisis when another crisis erupted across Europe as a result of the Russian conflict (Sandoval Velasco et al., 2022). This conflict caused a significant decline in consumer and business confidence in the European Union and also carried serious inflationary consequences (Sohag et al., 2022). According to the Central Statistical Office, in 2022, the average annual domestic inflation rate was 14.5%, more than double the EU average. However, it can also be noted that Hungarian inflation has not yet reached its peak at this point, despite the Central Statistical Office reporting an even higher inflation rate of 25.7% in January 2023. The high inflation in Hungary is largely due to the substantial increase in food prices. The most expensive items were eggs (79.2%), dairy products (76.2%), butter and buttercream (75.1%), cheese (72.1%), bread (71.1%), confectionery (68.6%), dry pasta (57.3%), milk (53.7%), and pastry products (51.9%) (KSH, 2023).

The present research explores the context of Hungarian consumers' food purchasing and wasting decisions in the current crisis period, taking into account the opinions of 799 respondents.

The primary objective of the study was to evaluate how Hungarian consumers perceive their financial security and their attitudes towards food consumption and potential food waste in the current economic context.

Literature review

In consumer society, both wealth and poverty, thrift and waste, obesity and starvation, the need for awareness and the predominance of emotional choices coexist. Within this complex system of consumer behaviour, a series of rational and irrational decisions can be observed (Rybaczewska et al., 2023; Sułkowski et al., 2022; Trandafilovic et al., 2015). When consumers exchange money for a service or product they aim to secure the best possible deal and satisfy a need. However, the role of emotional motivations in the realm of purchasing decisions is also crucial (Ngo et al., 2023). Throughout the process of purchasing and utilizing a product, the buyer is surrounded by pleasant feelings, and emotions can become so significant that the 'pleasure-giving function' of the product transforms into a goal during the purchase (Kotler and Keller, 2013).

During times of economic crisis, consumer awareness increases, leading individuals to be more aware of what they buy, how much they buy and at what cost. Consumer awareness

refers to the fact that consumers make decisions based on certain criteria when making purchases (Alimi and Workneh, 2015; Bednarz et al., 2023). Changes in consumer behaviour were also observed during the coronavirus epidemic, as the fear of the virus pushed consumers towards online shopping, thereby increasing the frequency of online grocery purchases (Dias et al., 2023; Nguyen et al., 2024; Oláh et al., 2023; Rybaczewska et al., 2021; Susanti et al., 2022; Semenenko et al., 2022). In this respect, Semerádová and Weinlich distinguished eight factors that emerged as consumers' risk-reduction expectations during the coronavirus crisis. These factors encompassed, among others, the reduction of shopping occasions or the emphasis on food safety factors (Semerádová and Weinlich, 2022).

The concept of consumer awareness, similar to various aspects within marketing, is not uniform, as different authors approach the concept from various perspectives, such as the awareness and enforcement of consumer rights or thorough information-seeking behaviour. In the literature, an informed consumer is generally identified as a well-informed individual who knows, asserts and uses their consumer rights (Febriandika et al., 2023; Mnerie et al., 2015; Kotler and Keller, 2013). Among today's consumers, the concept of informed consumption can be interpreted more broadly. According to the approach of the informed consumer, awareness not only implies being aware of one's rights and the ability to assert them but also emphasises the importance of being a consumer who is not only aware of oneself but also others, displaying moral and environmental consciousness.

Since the Second World War, there has been a significant increase in mass consumption, primarily driven by the easier availability of material goods and the rise in living standards. Mass consumption has been accompanied by other consequences besides wastefulness, including overconsumption, which is increasingly threatening resources (Mian and Ramana, 2011). The result of overconsumption is the rapid depletion of natural resources, their swift conversion into waste and the disruption of ecological balances (Bublyk et al., 2023; Håkansson, 2014; Hudayah et al., 2023). It is widely known that food wastage remains an unresolved problem across all points in the food chain, from production, harvesting and processing to trade and final consumption (Okobo et al., 2022; Schneider, 2008).

Over the past decade, more and more countries around the world have recognised the problem of food waste and realised the need to take decisive action to tackle it. The prevention of food waste, the management of food surpluses and the reduction of food waste have, therefore, become global challenges. Today, the problem has reached unprecedented proportions, and tackling it is a major challenge (Corrado and Sala, 2018). While developed countries are experiencing significant overproduction, overconsumption, 'unhealthy consumption patterns' and wastage, other parts of the world are facing food crises and even contiguous hunger zones. According to Fanelli and Di Florio (2016), the causes of food waste vary depending on attitudes, eating habits, culture and the level of development in countries. In rich and developed countries such as Italy, food is most wasted at the consumption stage, partly due to the availability of cheap and abundant food in developed countries. In Italy, an individual spends 20% of their income on food, while an Egyptian spends 43% of their money on food. Therefore, consumers in developed countries have a lower appreciation of the true value of food and buy more than they need without much thought (Flanagan et al., 2019; Mnerie et al., 2016). Thus, the more developed the economy and the standard of living in a country, the more food is wasted at the end of the supply chain at the consumer level (Corrado and Sala, 2018). However, the less developed the economy, the more food waste is shifted towards agriculture. This is due to the use of inadequately developed technology for cultivation in such areas, inadequate harvesting methods and an inability to store and transport crops properly, resulting in a large amount of wasted produce right from the beginning (Kumar and Kalita, 2017).

Alongside government interventions and legislation, NGOs, programmes and even individual households are increasingly determined to curb food overproduction and reduce waste. Consumer awareness can also be related to when, where and how much a conscious consumer buys. According to FAO (2011) studies, one-third of food produced for human consumption worldwide will be wasted, equivalent to approximately 1.6 billion tonnes of food and 8% of global greenhouse gas emissions. The production of unconsumed food contributes to more than 20% of global pressures on biodiversity. However, this waste also represents a significant resource in terms of land, water, energy and labour, for example (FAO, 2011). Parfitt et al., (2010) distinguish three types of household wastage: avoidable losses, refers to food that is thrown away but otherwise consumable (e.g. leftovers, untimely use); it refers to food or parts of food that some people consume but others do not (e.g. bread crusts, potato peelings, etc.); and inedible losses, which are those parts of food that are inedible (unfit for human consumption) (e.g. bones, eggshells, coffee grounds, vegetable peelings, apple cores, etc.).

The total amount of food waste in the European Union in 2020 was almost 57 million tonnes, of which more than 31 million tonnes were food discarded in households. According to Eurostat, households, therefore, produced nearly 55% of food waste, amounting to approximately 70 kilograms per inhabitant, while supply chain operators generated approximately 60 kilograms of food waste. Among supply chain actors, around 14 kilograms of food waste per inhabitant was generated in production, 23 kilograms in manufacturing, 12 kilograms in catering and 9 kilograms in food distribution (Eurostat, 2022).

The European Commission attaches the utmost importance to tackling food waste, as reducing waste has huge potential to decrease the resources used in producing the food we consume (e.g. 1 kilogram of beef requires around 15,000 liters of water to produce, and if we throw it away, not only is the food itself wasted but all the resources needed to produce it are wasted as well). More efficient use conserves food for human consumption, saves money and reduces the environmental impact of food production and consumption. Food loss and waste increase the risks associated with food insecurity, malnutrition and excessive water usage, while global hunger continues to rise. EU Member States have committed to the UN Sustainable Development Goal of halving per capita food waste at retail and consumer levels by 2030 and reducing food losses in the production and distribution chain (European Commission, 2022).

On the other side of the food waste coin, food insecurity has become a global problem, with many parts of the world experiencing it to a greater or lesser extent (Ortega Ibarra, 2021). Food insecurity and hunger are not only found in underdeveloped and remote countries but are present all over the world (Aiyedogbon et al., 2022; Dubanych et al., 2023; Nyambayo, 2015; Zegar, 2009). In Hungary, many people do not have access to three meals a day. Qualitative hunger is the most common form of hunger in our country, but quantitative hunger can also occur in families on the table living in extreme poverty. Qualitative hunger means that there is enough food, and they eat regularly, but the quality and nutritional content of this food are inadequate. Quantitative hunger is the reverse, with little food per person, but mostly of adequate energy and nutritional value (Pollard and Booth, 2019). Hunger is a complex problem with many causes, including low agricultural productivity, population growth and poverty.

Materials and methods

Questionnaire

This study is not a random sampling study, but the authors have endeavoured to make the method as close as possible to random sampling. To this end, 798 respondents were included in the sample. The authors published the questionnaire on social media platforms; as a result, it was not possible to measure the willingness to respond. The research was conducted over a period of six months and the questionnaire was anonymous, voluntary and specifically designed for research purposes. The researchers respected the personal data of the respondents, i.e., they interviewed the sample in compliance with GDPR regulations. The questionnaire comprised closed questions and was mainly based on nominal and metric variables.

The questions in the questionnaire were divided into three groups.

In Table 1, the authors present the questionnaire questions grouped accordingly:

Table 1

Structure of the questionnaire

Specific questions	Features of the domestic economic and energy crisis	Food consumption and wastage in the current economic situation
No Age School education Residence Average monthly income per person	The impact of the situation on everyday life Assessment of crisis-induced micro- and macroeconomic measures Characterisation of the financial situation of respondents	How has the food consumption of the respondents changed in the last six months? Wasteful practices of given foods Income expenditure according to the concerned foodstuffs Changes in the financial situation of the concerned families

Before the final questionnaires were completed, the authors carried out a test survey. This meant that around 10 respondents had pre-completed the questionnaire, and as they encountered no problems with interpretability, the authors used the questions in their unchanged from throughout the research. The questions were closed in nature, based on metric and categorical variables. On one hand, the questions were the authors' own, and on the other hand, they were based on a lavish evaluation of the authors' questions. Since the questionnaire was the authors' own, its reliability was tested by the researchers through a small group re-survey. The results were similar to those of the original questionnaire, and the authors of the study rated the questionnaire as reliable.

Questions and the hypothesis

The following questions were raised during the research:

1. How do respondents perceive what foods are typically not used and thrown away?
2. What factors influence whether respondents might throw out food?
3. How do respondents see their financial situation and how does this affect their consumption?

In line with the above objectives, the study focused on proving the following hypotheses:

Hypothesis 1.
For this particular study sample, food waste is strongly influenced by the current economic situation, and respondents are concerned about their present and future living situation.

Hypothesis 2.
The sense of crisis is strongly influenced by respondents' concerns about the economic situation and their future.

Hypothesis 3.
In the Hungarian sample, the feeling of optimism is strongly influenced by the economic situation created by the crisis and the respondents' concern about their future.

Results and discussion

Sample

A total of 798 people answered the questions. The Hungarian population was around 9.711 million in 2022. To calculate the minimum sample size, the authors used Yamane's formula (Yamane, 1965), which, at the 95% confidence level, is: p=0.05

$$N = N/(1+N\times(e^2))$$

N = 9.711 million inhabitants, 9 711 000/ (1+ 9 711 000·0.05·0.05) = 400. As the number of respondents was more than this, the authors accepted the sample number.

For the analysis, the authors used SPSS version 28 and SMART PLS 4 for SEM modelling.

The study sample could be described by the following characteristics:

Table 2

Some characteristics of the sample

Features	N	%
No	Men: 396 pers. Women: 402 pers.	Men: 49.6%% Women: 50.4%
School education	Primary: 44 pers. No secondary school leaving certificate: 124 pers. Graduates: 274 people Tertiary level: 356 pers.	Primary level: 5.5% No secondary school leaving certificate: 15.5 % Graduates: 34.3% Tertiary level: 44.6%
Residence	Village 284 pers. City: 315 pers. County town: 199 pers.	Village 35.6% City: 39.5% County town: 24.9%

Cross tabulation analyses showed that 5.3% of men had primary education, 18.9% had secondary education without a high school diploma, 33.8% had a high school diploma or less and 41.9% also had tertiary education.

For women, it was found that 5.7% had only completed primary school, 12.2% had attended secondary school but did not have a school leaving certificate, while 34.8% had a school leaving certificate as their highest level of education; furthermore, 47.3% held a diploma. The Chi-square test showed that there was no correlation between gender and the highest educational attainment in the sample (Chi-square: 7.247, df:3 sig.: 0.063 $p>0.05$).

It was found that 42.4% of men lived in villages, 33.8% in towns and 23.7% in cities. The proportions for women were as follows: 28.9% lived in a village, 45% lived in a town and 26.1% lived in a city with county status. Based on the place of residence and gender, the Chi-square test showed a significant correlation for this sample (Chi-square: 17.098, df: 2 sig.: 0.001, $p<0.05$).

In terms of educational attainment, the majority of those with primary education lived in rural areas (63.6%), which is similar to those with secondary education lacking a school leaving certificate, who also mostly lived in rural areas (41.9%). Those with a high school diploma were mostly urban residents (42.7%), and the same applied to those with a diploma (41.9%). The Chi-square test confirmed the association between educational attainment and the place of residence (Chi-square: 25.402, df: 6 sig.: 0.001, $p<0.05$).

Model and the results

In the research, the authors created a model to investigate the factors that influence potential food waste and savings. To analyse this, they employed the structural equation model (SEM), including the variance-based method. In the SEM model, the latent variables constructed from indicators and the relationship between them can be presented.

The SEM models consist of two parts: the measurement model and the structural model. The measurement model depicts the relationship between the latent variables and the indicators, while the structural model depicts the relationship between the latent variables. The direction of the relationship between the indicators and the latent variable showed a reflective relationship in the authors' model.

The latent variables in a model can be endogenous, dependent and exogenous, as well as independent (Sajtos-Fache, 2005). In PLS SEM path analysis, the metric measurement-level variables, known as items, are not required to be normally distributed (Kazár, 2014). This was tested by the authors using the Kolmogorov-Smirnov and Shapiro-Wilk tests. For all variables, the p-value was less than 0.01, indicating that the measurement variables under study are not normally distributed.

During the research, the authors made several claims about the current economic situation, food consumption and possible wastage. On a five-point Likert scale, respondents were asked to rate their level of agreement with the statements, where one indicated strongly disagree and five meant strong agreement. The mean and standard deviation of the items used and the variables constructed are summarised in Table 3.

Table 3

Constructs and items

Construct	Item	N		M	SD
		Valid	Missing		
DI Disposal	DI1 We should pay more attention to our environment.	798	0	4.36	0.991
	DI2 I spend a significant proportion of my income on food, so I always try to waste less.	798	0	3.70	1.113
	DI3 I was brought up as a child to throw food away only when I had to.	798	0	4.26	1.090
OP Optimism	OP1A Addressing the economic crisis, the energy crisis is good.	798	0	2.29	1.185
	OP2 I am optimistic about the future.	798	0	3.00	1.248
	OP3 It is good to live in Hungary.	798	0	2.74	1.266
	OP4 By 2030, my standard of living at home will rise significantly.	798	0	2.39	1.241
CR Crisis	CR1 I am buying less because of the economic crisis and the energy crisis.	798	0	3.30	1.247
	CR2 I buy cheaper products because of the economic and energy crisis.	798	0	3.38	1.219
	CR3 I am in a bad financial situation because of the energy crisis.	798	0	2.86	1.292
KN Knowledge	KN1 We live in an environmentally responsible way, so we don't throw food away.	798	0	3.66	1.078
	KN2 I watch my eating habits, throwing out less food than before.	798	0	3.62	1.205
	KN3 I am aware of the concept of functional food.	798	0	2.93	1.380
AN Anxiety	AN1They are often worried about the future.	798	0	3.41	1.251
	AN2 Poverty is a serious problem in Hungary today.	798	0	4.14	1.041
	AN3 There are significant income disparities in today's Hungarian society.	798	0	4.24	1.061

The mean and standard deviation data in the table indicate that respondents are typically careful about how much they buy, what goes into surplus and what they throw away. Regarding this question, the respondents were relatively homogeneous in their opinions based on the standard deviation values. Survey respondents were not optimistic and satisfied with their present circumstances and they were not particularly optimistic about their future. They were worried about the years ahead and perceived poverty and income inequality as an existing problem. The responses suggest that the economic crisis is affecting both the financial situation of the sample and, consequently, their purchasing habits and the amount of food they buy. The majority are aware of their eating habits and environmental awareness.

Based on the given items and constructs, the authors have created the following model. The following five latent variables were incorporated into the model by the researchers: disposal, optimism, crisis, knowledge and anxiety. All latent variables are low-level constructs, which means that they cannot be further subdivided into sub-dimensions. There are exogenous and endogenous variables in the model. Exogenous variables include anxiety and knowledge, while endogenous variables include disposal, optimism, crisis, etc. The model includes mediator variables, which act as mediators between constructs.

The authors employed the model to explore two main aspects. Firstly, the model delved into the factors shaping food accumulation and wastage within the ongoing economic crisis. Secondly, it investigated respondents' optimism regarding the current state and their future outlook. Furthermore, the analysis aimed to ascertain how individuals evaluate crisis management and identify the factors that amplify or diminish its impact.

Figure two illustrates the model created by the authors:

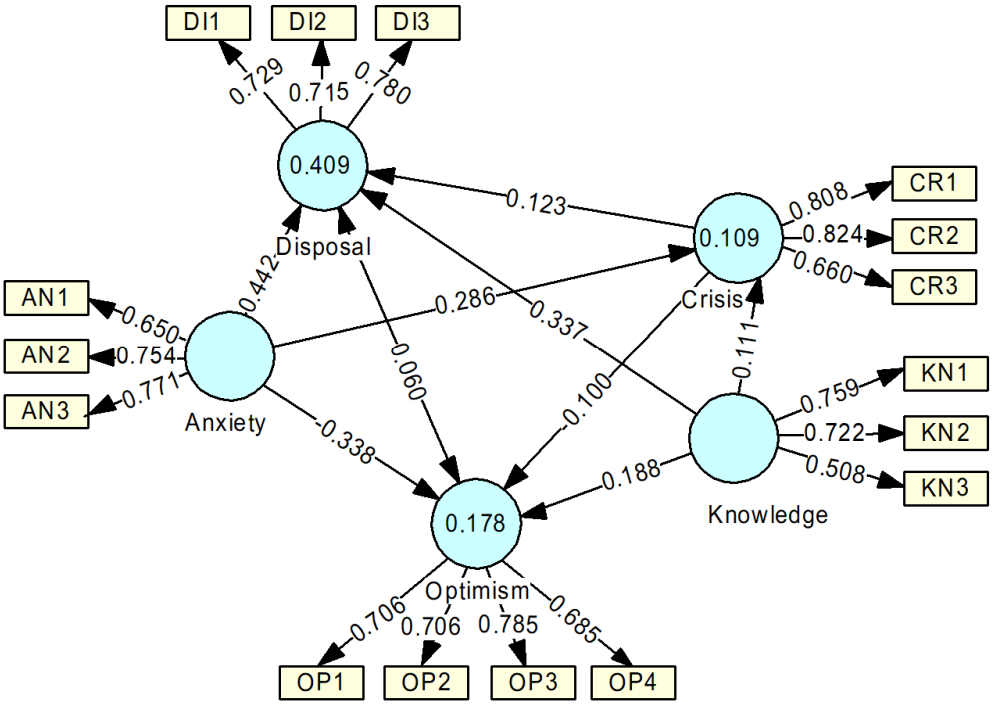

Figure 2. Food waste during the crisis

Proceeding, the authors analyse the model, which they begin by presenting the measurement model.

The figure clearly shows that the standardized factor weights for all items were above 0.5 (Haier et al., 2016).

To analyse the multicollinearity of the indicators, they used the VIF value, which should be below 5 (Hair et al., 2016). The variables met this requirement. The authors also analysed the composite reliability (CR) value, which should be above 0.7 (Werts et al., 1974). All constructs met this criterion. To measure convergent validity, the authors checked the average variance extracted (AVE), which is considered acceptable above 0.5 (Fornell-Larcker, 1981).

One construct had a lower value, but this latent variable was deemed important by the authors and was not excluded from the model. The above results are presented in Table 4. In this, items and constructs are now labelled by the authors using only the alphabetic characters in Table 4.

Table 4

Standardised factor weight, VIF, CR and AVE

Construct	Changing	Standardised factor weight	VIF	CR	AVE
DI	DI1	0.729	1.194	0.786	0.550
	DI2	0.715	1.180		
	DI3	0.780	1.202	0.813	0.521
OP	OP1	0.706	1.370		
	OP2	0.706	1.200		
	OP3	0.785	1.421		
	OP4	0.685	1.341		
CR	CR1	0.808	1.306	0.810	0.589
	CR2	0.824	1.361		
	CR3	0.660	1.213		
KN	CN1	0.759	1.080	0.706	0.452
	CN2	0.722	1.077		
	KN3	0.508	1.033		
AN	AN1	0.650	1.039	0.770	0.528
	AN2	0.754	1.404		
	AN3	0.771	1.402		

It was employed several methods to test the validity of discriminant validity. One of the most popular techniques is the Fornell-Larcker criterion (Fornell-Larcker, 1981). According to this criterion, the square root of the mean variance extracted by a construct should be greater than the correlation between the construct and any other construct. This criterion was met for the model. Another possibility is cross-loading, where items can express content more strongly in their own construct than in another latent variable. This condition was also fulfilled.

Table 5

Fornell-Larcker criterion

	AN	CR	DI	KN	OP
AN	**0.727**				
CR	0.313	**0.768**			
DI	0.521	0.304	**0.742**		
KN	0.244	0.180	0.467	**0.672**	
OP	-0.374	-0.188	-0.096	0.075	**0.722**

Table 6

Cross loading

	AN	CR	DI	KN	OP
AN1	0.650	0.370	0.292	0.085	-0.341
AN2	0.754	0.117	0.374	0.209	-0.278
AN3	0.771	0.170	0.469	0.245	-0.187
CR1	0.238	0.808	0.331	0.199	-0.060
CR2	0.278	0.824	0.253	0.129	-0.166
CR3	0.198	0.660	0.067	0.068	-0.249
DI1	0.402	0.125	0.729	0.318	-0.079
DI2	0.310	0.349	0.715	0.332	-0.054
DI3	0.439	0.210	0.780	0.385	-0.078
CN1	0.142	0.078	0.375	0.759	0.139
CN2	0.250	0.177	0.332	0.722	-0.035
KN3	0.084	0.118	0.210	0.508	0.038
OP1	-0.273	-0.054	-0.127	-0.010	0.706
OP2	-0.273	-0.268	-0.038	0.092	0.706
OP3	-0.282	-0.137	-0.066	0.110	0.785
OP4	-0.250	-0.037	-0.054	-0.005	0.685

The authors found the measurement model to be appropriate. To analyse the structured model, the authors used bootstrap sampling. The sub-sample size was 5000, and the p-value had a significance level of 0.05. The authors checked whether the independent variables had a significant effect on the dependent variables. Another test was for the beta coefficient, which indicates how much one variable influences the other. The R-squared values indicate the extent to which the magnitude of the change in the endogenous variable is explained by the exogenous variables. In the authors' model, the numbers in the blue circles represent the R-squared values, which behave as endogenous variables. The number in the arrows represents the β value. The significance values are summarised in Table 7. The authors have also included mediator variables in the model. Through these, we can discuss the indirect effect between latent variables. If there is no mediating variable, we talk about a direct effect. The direct and indirect effects together represent the total effect in the model. These relationships are summarised in Tables 7 and 8, encompassing beta values and T-statistics, with values exceeding 1.96 deemed acceptable (Fawad, 2022).

Table 7

Direct contacts (p:0.05)

	β value	T statistics	P value
Anxiety -> Crisis	0.286	7.791	0.000
Anxiety -> Disposal	0.422	11.231	0.000
Anxiety -> Optimism	-0.388	12.432	0.000
Crisis -> Disposal	0.123	4.125	0.000
Crisis -> Optimism	-0.100	2.325	0.020
Knowledge -> Crisis	0.111	2.759	0.006
Knowledge -> Disposal	0.337	11.449	0.000
Knowledge -> Optimism	0.188	4.913	0.000
Optimism -> Disposal	0.060	1.868	0.062

The data in the table show that optimism does not affect whether we waste food. However, there is a strong effect of worry on the perception of crisis (β: 0.286, t: 7.791, p: 0.000), wastage (β: 0.422, t: 11.231, p: 0.00), as well as a negative effect on optimism (β: -0.388, t: 12.432, p: 0.000) and negatively affects optimism (β: -0.100, t: 2.325, p: 0.020). Knowledge and knowledge of relevant information affect the crisis (β: 0.111, t: 2.759, p: 0.006), significantly impact wastage (β: 0.337, t: 11.449, p: 0.000) and optimism (β: 0.188, t: 4.913, p: 0.000).

Table 8

Indirect links (p: 0.05)

	β value	T statistics	P values
Anxiety -> Crisis -> Disposal	0.035	3.601	0.000
Knowledge -> Crisis -> Disposal	0.014	2.179	0.029
Anxiety -> Crisis -> Optimism -> Disposal	-0.002	1.295	0.195
Anxiety -> Crisis -> Optimism	-0.029	2.165	0.030
Knowledge -> Crisis -> Optimism	-0.011	1.754	0.079
Crisis -> Optimism -> Disposal	-0.006	1.350	0.177
Anxiety -> Optimism -> Disposal	-0.023	1.836	0.066
Knowledge -> Crisis -> Optimism -> Disposal	-0.001	1.143	0.253
Knowledge -> Optimism -> Disposal	0.011	1.679	0.093

Table 8 shows that anxiety has an impact on disposal through the crisis, both indirectly (indirect link) and directly. In this case, the total effect is the sum of the direct effect (β: 0.422) and the indirect effect (0.286*0.123): (β: 0.458). Since the indirect relationship is positive and significant for these three variables, the total effect is also positive and significant, and is therefore considered a complementary partial mediation.

In another example, there is a similar mediation process between knowledge, crisis and disposal. The direct relationship between knowledge and disposal is significant and positive (β: 0.337), and crisis also serves as a significant mediator between the latent variables (indirect effect: 0.111*0.123). In this case, as well, we can speak of an additional partial mediation, where the total effect is (β: 0.351).

The authors also examined what can be concluded about R squares with respect to endogenous variables. The 40.9% change in wastage is explained by the crisis and concern about the future. The 17.8% difference in optimism is explained by knowledge, worry and crisis, while 10.9% of changes in the crisis can be attributed to knowledge and worry.

Finally, the authors looked at which foods are least likely to be thrown away by respondents. They examined several staple foods. The table shows the proportion of foods that are never thrown away.

It can be seen that even for less durable foods, such as bread, fresh vegetables and fresh meat, the proportion of respondents who never throw them away is very high, while for durable goods the proportion is even higher. True, Hungarian food waste is still very high. In 2020, 905067 tonnes of food waste (about 92 kilograms per capita) will be generated in Hungary, of which 16 587 tonnes in the processing industry, 187 391 tonnes in the manufacturing industry, 41 952 tonnes in food distribution and 19 331 tonnes in catering. In addition, households disposed of 639,806 tonnes of food waste (about 65 kg/person). Prepared meals, bakery products, fresh vegetables, fruits and dairy products continue to account for a significant share (83.5%) of total food waste (Szabó-Bódi et al., 2018).

Table 9

I never throw away the food I have

Food	%
Bread parties	22
Chocolates	66
Canned food	71
Frozen meat, vegetables	65
Dairy products	26
Fats (butter and margarine)	59
Jam	66
Fresh meat	67
Fresh fruit and vegetables	43
Clippings	38
Eggs	66

However, it can be said that, in parallel with global economic events, we are also witnessing a continuous change in human nutrition and eating habits (Kolte et al, 2022; Marinković and Lazarević, 2021). Dietary culture and habits are among the earliest evolved behaviours, influenced not only by personal motives and family dynamics, but also by external forces that surround us, such as the Covid epidemic (Yamamoto and Uenishi, 2021) and the food price hike of 2022 (Elhajjar, 2023). Consumer behaviour is undergoing a major transformation as carefully planned marketing activities prove ineffective when an unexpected food price explosion caused by a crisis impacts on all aspects of our lives. These unforeseen factors have underlined the growing importance of studying the factors that influence consumer behaviour in both domestic and international research.

Conclusion

1. The consumer behaviour is undergoing a significant transformation, as exemplified by the coronavirus epidemic and the aftermath of the Russian-Ukrainian war in 2022. These events caused panic buying, and the freedom of choice was replaced by consumer vulnerability (lack of goods), similar to the prevailing situation during the years of regime change.
2. In the first half of 2023, Hungary will experience a decrease in solvent demand, primarily due to high inflation (retail sales volume down by 9.5% year-on-year). Therefore, companies need to be aware of changes in consumer demand, such as emphasizing higher value for money or offering smaller pack sizes, to avoid food waste.
3. The research looked at the factors that influence potential food wastage and saving, and how optimistic Hungarian consumers are about their future in the current economic downturn.
4. The responses suggest that the economic crisis is having an impact on both the financial situation of the sample and, consequently, on their purchasing habits and the amount of food they buy.
5. Based on the above results, the acceptance and rejection of the research hypotheses are summarized in the following table:

Table 10

Hypothesis table

Hypothesis	Acceptance-Decline	Reasons
Hip.1.	Adoption	The effect of Anxiety is significant-indirect, and significant-indirect through the crisis. The overall effect: β: 0.458. The effect of the crisis is direct and significant on wastage (β: 0.123).
Hip.2.	Adoption	The direct effect of Anxiety on Crisis is significant (β: 0.286).
Hip.3.	Adoption	The effect of Anxiety is significant-directly, and significant-indirectly through the crisis. The overall effect: β: -0.417. The effect of the crisis is direct and significant on optimism (β: -0.100).

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