DETERMINATING FACTORS IN ROMANIAN CONSUMERS' PREFERENCES FOR WHOLE GRAINS PRODUCTS IN CLIMATE CHANGE CONTEXT

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Abstract
Among other factors specific to the macro environment of the product market, which influence consumption behaviour, climate changes can be mentioned. Climate changes related factors (rainfall, temperature, drought) directly influence the level of production (supply) of cereals regardless of their type. At the same time, climate changes indirectly influence the diet of the population and the demand on the grain market. The grains sector is perhaps the most important agri-food sector in Romania and component of the Romanian agri-food system and not only. Among others factors, this is due to the pedo-climatic characteristics favourable for cereal crops and the cultivation tradition. This market is characterized by a high demand, due to the multiple ways of use and consumption, cereal products being essential food for a healthy diet. This paper aims to analyse consumers preference on the whole grains market, a category encouraged by high productions level but also recommended by specialists for improving health, both for population and environment. In this context, it is important to identify the main socio-demographic characteristics of the Romanian respondents that influence their consumption decision on this market. In order to achieve the purpose of this work, a questionnaire was applied among 126 respondents and the interpretation of the results was carried out with the help of the SPSS program. Thus, reference statistical parameters such as the chi-square test and contingency coefficient were calculated, in order to validate or not the research hypotheses.
Key words: climate changes, consumers behavior, marketing approaches, whole grains market,, sustainable consumption

INTRODUCTION
Whole Grains market characteristics. World and European trends
At the global level, whole grains demand is growing is characterized by an increasing trend, thus demonstrating the consumers awareness around the world regarding the importance of whole grain consumption (*Ardent Mills Report, 2022*). Also, according to the latest Report published by Market Data Forecast in 2023, the whole grains market is expected to grow up to 5 USD billion by 2028, with a compound annual growth rate of 3.8% (*Market Data Forecast Report, 2023*). This growth is estimated due to the increase in consumer awareness of the health benefits in following the consumption of whole grains. The population is increasingly interested in replacing conventional foods with healthier foods, thus protecting their health and the environment. These changes were even more evident during the Covid-19 pandemic, when the extreme situations and challenges that the population had to face were increasingly diverse.

The main difference between refined (conventional) and unrefined (whole) cereals lies in the way they are processed. Refined cereals are cereals that have been processed, from which some of the components have been removed (both the

outer shell and the germs), in order to have a finer texture and to extend their shelf life. At the same time, in the refining process, a series of nutrients and fibers are eliminated *(Mann, J.,2007)*.

According to FAO reference statistical data analysis for food balance, it can be observed that, for each whole grain analysed category, there are certain particularities of consumption, depending on the analysed region. At global level, it can be state that rice and the derived products from this category reach the highest average annual consumption/inhabitant, (78.91 kg/inhabitant/year in 2020). This value, higher than other categories, is primarily explicated due to registered consumption in Asia, where rice consumption is very high (over 110 kg/inhabitant/year). According to the same source, sorghum production reaches the highest level in the African area (over 42% of the world production level), due to this crop's characteristics: for instance, farmers from South Dakota to Texas appreciate that sorghum thrives where other crops would wither and die (*Global Whole Grains Council, 2022*).

Why is increasing whole grains consumption important, both for population and environment?

The importance of whole grains and consumption increasing among the population is not overlooked also by official forums. For instance, one of the main objectives of the European Commission strategy *From Farm to Fork (2020), is 2.4 Promoting sustainable food consumption and facilitating the shift to healthy, sustainable diets.* Focusing on this, the European's consumers behaviour is describe being "unsustainable from both health and environmental points of view" and the "*consumption of whole-grain cereals, fruit and vegetables, legumes and nuts is insufficient*" *(Farm to Fork, 2020).* Also, in the document Sustainable healthy diet- guiding principles, published by FAO (Food and Agriculture Organization) and WHO (World Health Organization) in 2019,

whole grains category is recommended to be more often included in the population alimentation, among with nuts, fruits and vegetables.

Others research findings shows that whole grains are advisable both for the health of planet and for humans. Therefore, Mekonnen M. et. all states in his paper that for producing one calorie of whole grain 0.51l of water is needed, comparative with the water necessary for producing one calorie of beef (10.19 l). Others research in the sustainable food field consider whole grains category being a "eco-friendly choice", mentioning the fact that by increasing whole grains consumption, important environmentally parameters, such as carbon footprint are reduce, due to the capacity to the absorb carbon dioxide.

Whole grains - Romanian market characteristics

According to FAO statistical data (2021), in terms of grains productions volume, Romania registers important levels at several category such as *maize (corn)* – 14820690 tonnes (10.45% of EU production level, 2nd place in Europe), *wheat* – 10433750 tonnes (3.88% of EU production level, 4th place in Europe), *barley* – 1981030 tonnes (2.22% of EU production level, 6th place in Europe), *oats* – 209850 tonnes (1.54% of EU production level, 10th place in Europe), *rye* – 35100 tonnes (0.38% of EU production level, 15th place in Europe), *sorghum* – 33750 tonnes (2.94% of EU production level, 5th place in Europe), *rice* -14980 tonnes (0.40% of EU production level, 8th place in Europe). According to the same source, the most consumed grains types in Romania, in 2020, are wheat (130 kg/capita/year), maize (32 kg/capita/year), rice (5 kg/capita/year), rye, barley, others cereals (1.2 kg/capita/year). Thus, it can be observed that Romanians still prefers to consume conventional grains, like maize and wheat.

Regarding whole grains consumption in Romania, according to a recently Nestle study, is it showed that, although Romanians know the benefits of whole

grains, they only consume them 2-3 times a month. Even if 84% of Romanians know that whole grains are rich in fiber and 69% are also recognizing the role of these foods in reducing the risk of certain chronic diseases, only 36% of consumers consider taste as a factor in avoiding whole grain products. However, the consumption of whole grains in Romania remains low. Only 16% of Romanians consume whole grains more than 5 times a week. Among children, the average cereal consumption is 3 times a week, 28% consuming 2-3 times a week, 21% 4-5 times a week and 18% more than 5 times a week *(Nestle Study Report ,2017)* Considering the findings according to which whole gran consumption in Romania remains at a low level, comparative to the European trends, investigating the determinant factors of grains consumption is important.

MATERIALS AND METHODS

To realize the present work, a various scientific methos has been used, including quantitative research, analysis and synthesis, simulations, system structural analysis, and more. The main method is represented by the development of a quantitative research, a marketing research field derived technique (Catoiu, et.al., 2009). The main instrument applied is represented by a questionnaire, with 26 specific several types questions (filter questions, open questions, single/multiple response choice questions, mixed questions). The questionnaire was applied within 126 respondents, during February-March 2023. The collection of answers from the interviewed consumers answers centralization was made online, through Google Forms platform.

Regarding the interpretation collected data process, SPSS program was used, for coding questions and answers, to centralize the respondents' answers and also to calculate specific statistical parameters, such as chi-square test or the contingency coefficient values *(Voineagu, V., 2007)*. These parameters were used in order to validate or not the research

hypotheses, based on the independent variables (socio-demographic consumers characteristics) and the dependent variables (respondents answers). Thus, a chi square test (hi2) 0.05 smaller value shows that between analysed variables is a connection. Only in this case it can be continued with contingency coefficient calculations, in order to observe the intensity of the independent-dependent variables link *(Adamson K.A., 2013)*. Also, in order to reach the research objectives, several parameters were calculated to measure the central tendency (mode, median, mean, median), depending of the scale type (nominal, ordinal, interval) *(Fávero, L.P.,2023)*.

Sampling structure

For this study, *random sampling method* was used and the sample structure is given by the respondents' answers to the socio-demographic questions (gender, age, education level, income, marital status) as following:

• *gender:* 93 females (74%) and 33 males (26%);

• *age:* between 18 and 35 years (38.1%), between 35 and 49 years (42.9%), between 50-65 years (19%);

• *income:* over 4500 lei (66.7%), between 3001 lei and 4500 lei (28.6%), between 1500 lei and 3000 lei (4.7%);

• *education level:* more than 90% of respondents has a university degree;

• *professional status*: employee (78.6%), entrepreneur (19%), retired (2.4%).

Thus, the target audience for this research is predominantly female, which is a positive aspect, taking in considerations that women go shopping more often, for food supply (Jeljeli, R.,2022) mature, both from the age and education perspective, with a good financial situation.

RESULTS AND DISCUSSIONS
Research purpose and key objectives

The aim of this research is to identify consumer preferences and requirements regarding the qualities and properties of

whole grains and products derived from this category. As any purpose assume a set of objectives, before starting the present quantitative research results, the research objectives are exposed, without resuming at the following aspects:

• O1. Defining the socio-demographic profile of respondents participating in the present research;

• O2. Defining the degree to which consumers are knowing the meaning of the whole grains concept, the differences between whole grains and conventional ones, the main types of whole grains usually know, the knowledge of the benefits brought by the whole grain's consumption;

• O3. Determining the frequent consumption habits existing on the whole grains products markets and refined grain products consumption habits;

• O.4 Determining the perception of the Romanian consumer on the whole grains products market;

• O5. Determining the most important product characteristics in consumer's purchase decision: product type, price, packaging, quality, method of preparation, provenance, supply location and others;

• O6. Designing the consumption of whole grains

Main findings of the research

To resume the main findings of this research, the respondents' answers interpretation shows that the Romanian consumer are informed about the concept of whole grains, the types of whole grains (37%) and the main differences between conventional and whole grains (20%) and correctly identifies the health benefits of their consumption. Whole grains are consumed by the studied community occasionally (54.8%), only 11.9% of respondents choosing to consume these types of products daily. According to the

respondents, whole grains differ from refined grains in terms of: high content of fibers, minerals, vitamins (25.20%), taste (19.4%), price (16.50%) but also the degree of satiety obtained (14.60%).

Regarding the conventional grains, it is observed that bakery products are preferred by the respondents (20%), while the whole grains market pasta (19.5%) and rice (16%) are mostly chosen by the respondents. As for the bread category preferred by the respondents, whole wheat or rye sliced bread (26.2%), ready-packaged white sliced bread (21.4%) are preferred and black bread (4,8%). Therefore, there is a trend towards products that comply with hygiene standards, ready-packaged, consumption behavior that has intensified with the Covid-19 pandemic. Most respondents choose whole grain products for breakfast (26%) or snacks (8.3%). When they are using cereals in dishing prepare, they don't care whether the raw material is based on whole or refined grains (25%). Most respondents choose whole grain products to diversify their diet when fasting or dieting (9%). For a small percentage of the respondents, the differences in taste felt at the level of consumption of whole grains made them give them up (5%). Paradoxically, although the respondents do not use smart applications for food lifestyle modelling, the Internet, including social networks, online media is still the main source of information (40%). This shows the undeniable usefulness of campaigns or short articles on the ways of using and the benefits of mentioned profile applications, possibly on communication channels such as Facebook or Instagram or other social networks. This online communication channels are more accessible to consumers, regardless of

their age or education level. An important share of respondents declares that the source of information is represented by health experts (27%), something positively appreciated. Thus, against the backdrop of the diversification of the type of information found on the Internet, viral marketing ("word of mouth") loses its effectiveness, a small percentage of the sample mentioned as information source family members or friends. It was observed that the majority of respondents are willing to pay to purchase wholemeal bread between 2 and 10 lei for the purchase of wholemeal bread (52.4%), wholemeal flour (66.7%), wholemeal pasta (50%), with other words respondents chose the first price range. There are also categories for which they are willing to pay a higher price, respectively, between 11 and 30 lei, for quinoa (47.6%) and whole grains (45.2%), for products they do not buy so often.

Research hypothesis validation

As it was mentioned in the "Materials and Methods" section, the main purpose of this paper is to validate or not the research hypotheses using specific statistical methods and parameters. The research hypotheses are:

Hypothesis 1 (H1): The respondents age, income and professional status influence the use of online applications in order to shape the food lifestyle, supply the home or the decision to buy agro-food products online;

Hypothesis 2 (H2): The respondent's income and level of education influence the degree of consumption of processed products based on whole grains;

Hypothesis 3 (H3): Respondents' gender influences their perception

regarding the differences between whole and refined grains.

Previous findings to sustain the hypothesis of present research

All the three above hypotheses are starting from the premise that social, demographic and cultural factors are influencing the consumer's behavior and their purchase decision process. To support this statement, there are numerous specialized publications, in the agri-food marketing field and not only. For example, Philip Kotler, the "father of the modern marketing", defines in his work the main determining factors in consumer behavior: cultural, social, personal (age, occupation etc.), psychological *(Kotler, 1999).* Dominici A. et al (2022) mentioned in his paper several studies that have as a main theme the influence of socio-demographic variables on agrifood products purchase in different countries: "Finotto et al., 2020; Hamad and Schmitz, 2019; Hood et al., 2020; Hui and Wan, 2009; Naseri and Elliott, 2011; Van Droogenbroeck and Van Hove, 2017; Wang and Somogyi, 2019". Also, others study's findings shows that the socio-demographic characteristics of the population are influencing the motivations in choosing dietary customs or emotional food products (Massaglia, S., 2023). Cetina et. all. (2012), describes in her work how demographical factors and economic factors influence the consumer behavior, in a direct way [16].

Regarding the first research hypotheses (H1), in table 1 it is presented the SPSS model results for the test correlations between the independent research variables (age, income and professional status) and the option to use online tools to model dietary lifestyle or housing supply

(respondent's answers to Q14, Q23 and Q24).

Table 1. Estimated SPSS model results for H1. Contingency Coefficient values

Independent variables	Dependent variables		
	Q14. The option of using intelligent applications for modeling the food lifestyle	Q23. The option of using super/hyper market profile sites for online agri-food purchases	Q24. The option of using smart applications for agri-food purchases for home supply
Q2. age	0.38	*	*
Q3. Professional status	*	0.472**	0.472**
Q5. income	*	*	*

Source: The results show the values of the hi² test. If the hi² test values are less than .05, then we can calculate the contingency coefficient values. If otherwise (hi² test values are greater than .05), the contingency coefficient value is not significant (*); the symbol ** shows a high intensity of correlation between the analyzed variables

Thus, following the carried-out analysis, the respondents ages influence the option of the respondents to use intelligent applications for modeling their food lifestyle, in a medium intensity (contingency coefficient value 0.38), but not the option to use the store websites profile or online applications for supplying the home with agro-food products. Thus, younger people use the applications mentioned in the first category more often than mature respondents (1). The professional status of the respondents influences their choice of using super/hyper market profile sites and intelligent applications for home agri-food supply purchases to a high extent (contingency coefficient value 0.472 in both situations) However, this socio-demographic characteristic does not influence the intelligent applications for modelling the food lifestyle use degree. Thus, people registered in the employees and entrepreneur's category use the online environment (websites and mobile applications) to a much higher extent than pensioners (2). No significant correlations were found between respondents' income and the dependent variables analysed under hypothesis 1 (3).

From (1), (2) and (3) it is shown that Hypothesis 1 is partially validated, observing a greater inclination of young people to use online food lifestyle modelling applications and a more intensive use of employees /entrepreneurs of the online environment for purchases intended to supply the home with food.

Regarding the second research hypotheses (H2), in table 2 it is presented the SPSS model results for the test correlations between the independent research variables (education level and income) and their preferences regarding the frequently purchased whole grain products types (respondent's answers to Q11).

Table 2. Estimated SPSS model results for H2. Contingency Coefficient values

Dependent variables	Independent variables	
Q.11 Frequency of consumption of whole cereals products	Q4.education level	Q5. income
Q11_1 flour	*	0.368
Q11_2 hominy	0.254	*
Q11_3 breadcrumbs	*	0.339
Q11_4 semolina	*	*
Q11_5 rice	*	0.497**
Q11_6 pasta	0.269	0.511**
Q11_7 barley / rye bran	0.205	*
Q11_8 quinoa	0.169	0.423**
Q11_9 snacks	*	0.384

Source: The results show the values of the hi² test. If the hi² test values are less than .05, then we can calculate the contingency coefficient values. If otherwise (hi² test values are greater than .05), the contingency coefficient value is not significant (*); the symbol ** shows a high intensity of correlation between the analyzed variables

Thus, following the carried-out analysis, the respondents' level of education influences the respondents' choice to consume foods

such as corn, pasta, barley/rye bran and quinoa, in a medium to weak intensity (contingency coefficient values between 0.169 and 0.269), but not their option to consume flour, breadcrumbs, semolina, rice or whole grain snacks. Thus, graduates of a bachelor's or master's program consume the mentioned products more often than high school graduates, but this hypothesis is not confirmed for all products from the list included in the questionnaire, from the type of integral ones (1). Respondents' income influences their choice to consume whole grain products, such as whole grain rice, whole grain pasta and quinoa to a high extent (contingency coefficient values between 0.423 and 0.511) and to a lesser extent the consumption of whole grain flour, whole wheat bread and integral snacks. However, this socio-demographic characteristic does not influence the consumption of meal and semolina, as well as that of snacks. Thus, people who declared a higher income consume more of food categories such as flour, breadcrumbs and rice, pasta and quinoa (2). From (1) and (2) it is shown that Hypothesis 2 is partially validated, however, more or less significant correlations are recorded between the level of education and the respondents' income, on the one hand and the types of products consumed on the whole grains market, on the other hand. Thus, the consumption of meal, pasta and quinoa is influenced equally by the financial and educational situation of the respondents. A higher level of education usually implies a higher level of respondents' interest in accumulating information about a healthy lifestyle, and a higher income allows consumers to allocate a higher budget for the grocery basic shopping basket. Regarding the frequency of consumption for the other

foods in the list of products included in the questionnaire, we note that their consumption is influenced by the income level or the level of education of the respondents. In general, we observe that the products that register a greater price difference, referring to the same type of product but based on conventional cereals, are influenced by the income level of the respondents. Products that have a similar price (rye and barley, whole wheat bran) or that are not used so often in the own household, are used occasionally (e.g. quinoa or whole wheat), are those whose frequency of consumption is influenced by the respondent's education level.

Regarding the third research hypotheses (H3), in table 3 it is presented the SPSS model results for the test correlations between the independent research variables (gender) and how they perceive the differences between whole and refined grains, according to several product characteristics (respondent's answers to Q9).

Table 3. Estimated SPSS model results for H3. Contingency Coefficient values

Dependent variables Q9. Main differences between whole grains and refined grains	Independent variables
	Q4. education level Q5. income
Q11_1 Taste	0.236
Q11_2 Aspec	*
Q11_3 Price	0.261
Q11_4 s Satiety degree	*
Q11_5 Fibers, minerals, vtamins content	*
Q11_6 All the mentioned above	*

Source: The results show the values of the hi^2 test. If the hi^2 test values are less than .05, then we can calculate the contingency coefficient values. If otherwise (hi^2 test values are greater than .05), the contingency coefficient value is not significant (*); the symbol ** shows a high intensity of correlation between the analyzed variables

Thus, it is showed that the respondents gender influences their perception

regarding the main differences between wholegrain and refined cereals with a reduced intensity, if we refer to criteria such as taste and price (contingency coefficient values between 0.236 and 0.261). However, gender doesn't change the respondents' perception related to the appearance, degree of satiety obtained after consumption and the content of fibers, minerals, vitamins. Ladies believe that whole grains differ from conventional ones in terms of taste (55% of women) and price (49%) more than men do (27% and 18%, respectively). This can be explained by the fact that women, natively speaking, are more attentive to details when it comes to food and others product, generally speaking. They are also the ones who more often than males go shopping in order to supply their home with agro-food products.

Thus, the gender of the respondents influences their perception of the differences in taste and price between whole and conventional cereals, but not those related to the appearance, degree of satiety obtained from the consumption of cereals or the content of fibres, minerals, vitamins. Hypothesis 3 is partially confirmed.

CONCLUSIONS

The increasing of whole grain consumption level is an important challenge, among with others recommended products, in order to fulfil the main objective of several European directives, such as Farm to Fork Strategy (component of Green Deal, 2020). One of the arguments that sustain previous affirmation is that encourage whole grain consumption is recommended both for population health and also for the environment, contributing at a sustainable development. Others previous findings presented in this paper shows that although in the last decade the consumers diet has positively evolved, the consumption of whole grains does not reach the value recommended by specialists, in most European countries. Low-profile consumption is also registered in Romania, even if Romanian consumer's are aware of the whole grain consumption benefits. This is the main reason for which the formulation of several hypotheses regarding the relationship between consumers' attitude towards the consumption of whole grains and their socio-demographic characteristics is welcome.

The research results interpretation shows that consumers started diversifying their diet by introducing whole grains, but they still do not give up processed products, from conventional grains. Thus, eating habits rooted since childhood speak for themselves, especially in the case of mature audiences.

Concluding, the present research, *Determinant factors in Romanian consumer's preference for whole grains products in climate changes context* has achieved its goal, demonstrating the correlations between the chosen variables, independent variables (socio demographic characteristics) and the dependent variables (the whole grains products consumers preference and perception, as well as their buying customs regarding the buying methods for agro-food products).

As a mention, the presented results are preliminary conclusions of the quantitative research held within the whole grain market, and these results can be efficiently improved through testing new hypotheses or by explaining analysed correlations with others statistical parameters and graphic methods (such as Scatter Plot, for

example). These mentioned methods will be applied as future development of this present research.

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