

Radzymińska, Monika / Rosak, Mirosław / Jakubowska, Dominika

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Monika Radzymińska*
Miroslaw Rosak**
Dominika Jakubowska***

FACTORS INFLUENCING UNIVERSITY STUDENTS BEHAVIOR IN THE MOMENT OF INFORMATION ABOUT MEAT-SAFETY HAZARD

CZYNNIKI WPŁYWAJĄCE NA ZACHOWANIA STUDENTÓW W MOMENCIE INFORMACJI O ZAGROŻENIU BEZPIECZEŃSTWA MIĘSA

Introduction

The international literature shows that socio-demographic and cultural factors, as well as consumers' personal values, attitudes and perceptions are considered to be important determinants of behavior and can be used as predictors of consumer choices of meat with increased reliability, compared to time series data analyses¹. Some of investigations show, that consumer behavior towards food safety in general differs according to demographic and socio-economic factors such as gender, age, educational level and economic status^{2,3,4,5,6,7}. Wilcock et al.⁸ point out that consumers' attitudes towards

* dr, inż. Uniwersytet Warmińsko-Mazurski w Olsztynie

** dr, inż. Wyższa Szkoła Agrobiznesu w Łomży

*** dr, Uniwersytet Warmińsko-Mazurski w Olsztynie

¹ A. Krystallis, I.S. Arvanitoyannis, *Investigating the concept of meat quality from the consumers perspective: The case of Greece*, "Meat Sci." 2006, nr 72, s. 164–176.

² N. Unklesbay, J. Sneed, R. Toma, *College students' attitudes, practices, and knowledge of food safety*, "J. Food Protect" 1998, nr 61, s. 1175–1180.

³ S.F. Altekruise, S. Yang, B.B. Timbo, F.J. Angulo, *A multi-state survey of consumer food-handling and food consumption practices*, "Am. J. Prev Med." 1999, nr 16, s. 216–221.

⁴ W. Verbeke, J. Viaene, *Beliefs, attitude and behavior towards fresh meat consumption in Belgium: empirical evidence from a consumer survey*, "Food Qual Prefer." 1999, nr 10, s. 437–445.

⁵ S. Laloo, F.S. Rampersad, A. La Borde, K. Maharaj, L. Sookhai, J.D. Teelucksingh, S. Reid, L. McDougall, A.A. Adesiyun, *Bacteriological quality of raw oysters in Trinidad and the attitudes, knowledge and perceptions of the public about its consumption*, "Int. J. Food Microbiol." 2000, nr 54, s. 99–107.

⁶ D.M. Dosman, W.L. Adamowicz, S.E. Hruday, *Socioeconomic determinants of health- and food safety-related risk perceptions*, "Risk Anal." 2001, nr 21, s. 307–317.

food safety are not an independent issue. They are also linked to culture, personal preferences and experience.

A series of food scares, such as contamination with dioxins, and antibiotics residues, Bovine spongiform encephalopathy (BSE) or Foot and Mouth Disease, increased public concern about safety of meat and related products. Many cases of meat contamination have negatively influenced consumer reactions and have resulted in a major loss of confidence in meat products. For example, since the BSE, and foot and mouth outbreak, the number of vegetarians, meat reducers and vegans in the Europe, and specially and UK, has risen significantly⁹. In UK the value of the vegetarian foods market has increased by 56% between the years 1995 and 2000. In Portugal, consumption of beef declined sharply by 21% in 1996, as well in all European Union countries where beef meat reducers around 30% in 1996.

Wansik¹⁰ points out, that not all crises are created equal, some have received a great deal of press (BSE and Foot in Mouth disease) while others were more isolated, like brand-based and commodity-based incidents. Food safety crises show¹¹ the need to understand how consumers react in the way they do.

As noticed by Mazzocchi et al.¹² the complexity of factors influencing consumer behavior in food safety crisis situation makes it difficult to develop adequate risk communication strategies. This is a priority for current policy and for the actors in the food chain. Consumer reactions may play an important role in the effectiveness of any attempt to communicate risks^{13,14}. Understanding consumer-perceived risk can help to improve the communication between the food industry and consumers.

Researches on young consumers' knowledge and perception of food safety are very important in context of improvement of education programs. This study explored relation between risk perception, risk reduction and likelihood to purchase meat in the response to meat-safety hazards among University Students.

⁷ O.B. Kennedy, B.J. Stewart-Knox, P.C. Mitchell, D.I. Thurnham, *Consumer perceptions of poultry meat: a qualitative analysis*, "Nutr. Food Sci." 2004, nr 34, s. 122–129.

⁸ A Wilcock, M.M. Pun, J. Khanona. M. Aung, *Consumer attitudes, knowledge and behaviour: a review of food safety issues*, "Trends Food Sci. Tech." 2004, nr 15, s. 56–66.

⁹ M.R. Ventura-Lucas, *Consumer Perceptions and Attitudes towards Food Safety in Portugal*. Paper prepared for presentation at the 84th EAAE Seminar 'Food Safety in a Dynamic World' Zeist, The Netherlands, February 8-11, 2004.

¹⁰ B. Wansink, *Consumer Reactions to Food Safety Crises*, "Adv. Food Nutr Res." 2004, nr 48, s. 103–150.

¹¹ A. Abbott, *BSE fallout sends shock waves through Germany*, "Nature" 2001, nr 409, s. 275.

¹² M. Mazzocchi., A.E. Lobb W.B. Traill, *Food scares and consumer behaviour: a European perspective*. Paper prepared for the International Association of Agricultural Economists Conference, Australia, August 12–18. 2006.

¹³ S. Rosati, A. Saba, *The perception of risks associated with food-related hazards and the perceived reliability of sources of information*, "International J. Food Sci. Technol." 2004, nr 39, s. 491–500.

¹⁴ B. Knox, *Consumer perception and understanding of risk from food*, "Brit. Med. Bull." 2000, nr 56, s. 97–109.

Methods

Design

Baseline risk perception, risk reduction methods and purchase likelihood were assessed in the questionnaire administrated in class. The research was conducted in years 2008 and 2009. No Institutional Review Board approval was necessary for this research.

Subjects

The research sample comprised representative sample 1568 of University Students. Faculty and year of study were criteria for selection of sample. All students were responsible for meat purchasing. The *characteristics* of the *respondents* are *shown in Table 1*.

Table 1. Sample profiles

Variable	Number
<i>Faculty</i>	
Food Sciences	213
Veterinary Medicine	124
Geodesy and Land Management	169
Law and Administration	192
Economic Sciences	196
Humanities	126
Biology	72
Animal Bioengineering	101
Environmental Management and Agriculture	125
Environmental Sciences and Fisheries	60
Year of study	
I	283
II	301
III	321
IV	263
V	173
VI	37

Source: own work.

Questionnaire Constructs

In this study multi-factors model was applied. The survey instrument consisted of three parts of questions assessing: risk perception – 8 items adopted from Yeung and

Morris¹⁵, risk reducing strategies – 11 items¹⁶ and likelihood to purchase meat – 2 items. The perceived risk scale consisted of two-dimension model: probability of loss (P) and importance of loss (I). Risk perception and risk reducing strategies items were measured with reference to a seven-point Likert –type scale (7 – extremely important, 1 – not important at all). The binary dependent variables were created by classifying students above meat buyers and below non meat buyers in the response to food-safety hazards.

Statistical Analyses

The constructs structures (risk perception and risk reduction scale) were confirmed by confirmatory factor analysis and Cronbach’s alpha coefficients. Finally, a structural equation model was estimated to explore the relation between personal values, risk perception, risk reduction and purchase likelihood. The logistic regression was employed considering the ordinal format of the dependent variable. Data were analyzed with the computer software program STATISTICA model 8.0, Poland 2009.

Results

Risk perception

Table 2 presents the factor loading scores after Varimax rotation with Kaiser normalization. The Principal Components Analysis extracted three factor solutions from eight statements of risk perception. Factor 1 contains three items: “Sick due to consuming contaminated food“, “Adverse effect on personal health” and “Adverse effect on health for long term”. This factor has been labeled “Health risk”.

Table 2. Results of principal component analysis for perceived risk factors

Type of risk	Items	Mean P x I			
		Range 1–49	Factor loadings		
Health risk	Sick due to consuming contaminated food	33.396	0.842	0.065	0.002
	Adverse effect on personal health	34.848	0.881	0.074	0.002
	Adverse effect on health or long term	32.582	0.842	0.083	0.060
Financial risk	Money wasted	24.321	0.348	0.277	0.710
	Lose income/job	23.791	0.563	0.364	0.705

¹⁵ R.M.W. Yeung, J. Morris, *An empirical study of the impact of consumer perceived risk on purchase likelihood: a modelling approach*, “Int. J. Consum. Stud.” 2006, nr 30, s. 294–305.

¹⁶ R.M.W. Yeung, W.M.S. Yee, *Risk reduction: an insight from the UK poultry industry*, “Nutr. Food Sci.” 2003, nr 33, s. 219–229.

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Psychology risk	Let down or embarrassed among friends/family	28.772	0.006	0.766	0.070
	Let down or embarrassed among friends/family	29.342	0.068	0.765	0.073
	Adverse effect on lifestyle	27.641	0.205	0.733	0.001
Factor statistics					
	Eigenvalue		3.342	2.424	1.419
	Cronbach α		0.850	0.823	0.792

Source: the author' own resarch.

Factor 2 was correlated with variables defining “Financial risk”: “Money wasted” and “Lose income/job”. Factor 3 has been labeled “Psychology risk” and contains three items: “Let down or embarrassed among friends/family”, “Let down or embarrassed among friends/family” and “Adverse effect on lifestyle”. The Cronbach’s alpha coefficients were all higher than 0.7, varying between 0.792 and 0.850. All factors had an eigenvalue greater than one.

Risk reduction

The principal component analysis extracted four factor solutions from eleven risk reducing strategies items (Table 3).

Table 3. Results of principal component analysis for risk reducing strategies factors

Risk reducing strategies	Items				
		Factor loadings			
Brand loyalty	Purchasing the same brand/store that I purchased before	0.141	-0,022	0.177	0.827
	Choosing a well-known or popular brand	0.069	0.112	0.094	0.849
Quality assurances	Choosing those with quality assurance	0.757	-0,103	0.166	0.129
	Purchasing meat that has been tested by government laboratory	0.802	-0,026	0.153	0.130
	Purchasing meat that has been tested by private laboratory	0.794	0.138	0.078	-0,035
	Ensuring the meat has been traced to the original produce	0.726	0.005	0.206	0.285
Price	Ensuring they have some form of money back guarantee	0.297	0.723	-0,073	0.104
	Purchasing the product with higher price	-0.053	0.815	-0,051	-0,109
	Shopping around to compare what is on offer	0.057	0.772	0.290	0.163
Product information	Reading in store leaflet for product information	0.031	0.149	0.681	0.170
	Taking the advice of family and friends	0.201	0.022	0.770	0.030
Factor statistics					
	Eigenvalue	2.15	2.01	1.67	1.91
	Cronbach α	0.834	0.790	0.721	0.892

Source: the author's own research.

Factors 1 contains two items, including “Purchasing the same brand/store that I purchased before”, and “Choosing a well-known or popular brand”. This factor has been labeled “Brand loyalty”. Factors 2 contains four statements “Choosing those with quality assurance”, “Purchasing meat that has been tested by government laboratory”, “Purchasing meat that has been tested by private laboratory” and “Ensuring the meat has been traced to the original produce”, and thus these factor has been labeled “Quality assurances”. Factor 3 was correlated with variables defining “Price”: “Ensuring they have some form of money back guarantee”, “Purchasing the product with higher price” and “Shopping around to compare what is on offer”. Factor 4 was focused around variables characterizing “Product information”; “Reading in store leaflet for product information” and “Taking the advice of family and friends”. Loaded on these factors show high loadings and acceptable factors Cronbach’s alphas of 0.834, 0.790, 0.721 and 0.892. The factors had an eigenvalue greater than one.

Likelihood to purchase meat was measured as an intention to buy meat in the response to meat-safety hazards. The proportion of buyers and non-buyers of meat is presented in Table 4.

Table 4. Proportion of buyers and non-buyers of meat in the response to meat-safety hazards

	likely		unlikely	
	number	percentage	number	percentage
Continuation of purchase	532	34	1036	66

Source: the author' own research.

Predictors of behavior in the response to meat-safety hazards

By using logistic regression models, one can predict the probability that a variable or set of the independent variables such as risk perception, risk reduction, and personal values will affect the likelihood to purchase meat. Logistic regression analyses were performed using the factors: "Health risk", "Financial risk", "Psychology risk", "Brand loyalty", "Quality assurances", "Price", "Product information" and two demographic variables: "Year of study", "Direction of the education" (Figure 1). Table 5 shows the relation between personal values, risk perception, risk reduction and purchase likelihood. The Chi-square for the model was significant (chi-square = 49.702, $p < 0.01$).

Table 5. Results of logistic regression analysis for as a function of factor scores

Variable	Parameter estimates	Probability	Odds. Ratio
	(β_i)	(Chi-square)	(e^{β_i})
Health risk	-0.481	0.002	0.638
Psychology risk	-0.210	0.001	0.416
Quality assurances	0.311	0.001	1.325
Price	0.214	0.009	1.189
Constant	-0.092	0.124	0.324
Chi-square/sign.	49.702	0.001	

Notes: Correctly classified 70.8 percent 2 log likelihood 134.112.

Source: the author' own research.

Results indicated that four out of the nine factors were significant predictors of meat purchase likely among the students. Students with higher "Quality assurance" and "Price" factors scores were more likely to be meat buyers. Respondents who displayed less perception of "Health risk" and "Psychology risk" were also more likely to be meat buyers. Results revealed that the year and direction of study were not significant predictors of continuation of meat purchase.

Discussion

The literature on public perceptions of meat-related hazards and understanding of risk from food is relatively recent. Thus, understanding of consumer meat-related hazards perception can lead to more effective food policies aimed at maintaining consumer

confidence in meat safety crisis situation. Alexon and Brinberg¹⁷ and Conento and Murphy¹⁸ argue that people make a rational decisions about their behavior when they are aware of associated problems, have some knowledge concerning these problems and have some judgment as to the level of risk involving in not changing their behavior. Therefore it can be concluded that the willingness to change behavior is determined by perceptions and beliefs. Other studies suggest that perceptions and beliefs are formed by knowledge derived from exposure to information sources and personal effort in obtaining information¹⁹. Böcker and Hanf²⁰ report that the impact of information on purchasing behavior is the relevant issue. Frewer et al.²¹ find that the level of trust in different information sources influences individual risk perception. Consumers risk perception plays an important role during periods of meat safety concern because it greatly influences the purchase and consumption behavior of consumers²². Mazzocchi et al.¹² show that risk perception is unlikely to affect consumer choices when there is no related food scare, but when there is a scare the intention to purchase is affected by differing levels of risk perception. Wansik¹⁰ observes that risk perception reflects a consumer's interpretation of the likelihood they will be exposed to the illness or disease. Studies undertaken by Pennings et al.²³ show that the relative influence of risk perception and risk attitude on consumers' reactions depends on the accuracy of knowing the probability of being exposed to the risk. These results suggest that clear, forthright, and consistent communication on research results is a powerful tool in changing behavior.

The results of this study reveal that health and psychology motives, quality assurance and price have the strongest impact on decision of the purchase of meat in the response to meat-safety hazards. This study confirm that "Brand loyalty", "Product information" and "Financial risk" are not significant in students decisions to continue buying meat. Further research is required to assess which principal factors could strongly affect perception of trust in sources of information about food-related hazards.

¹⁷ M.L. Axleson, D. Brinberg, *A Social-Psychological Perspective on Food-Related Behaviour*, New York: Springer-Verlag 1989.

¹⁸ I.R. Conento, B.M.W. Murphy, *Psycho-social factors differentiation: people who reported making desirable changes in their diets from those who did not*, "J. Nutr. Educ." 1990, nr 22, s. 6–14.

¹⁹ W.A. McIntosh, L.B. Christensen, G.R. Acuff, *Perceptions of risks of eating undercooked meat and willingness to change cooking practices*, "Appetite" 1994, nr 22, s. 83–96.

²⁰ A. Böcker, C.H. Hanf, *Confidence lost and – partially – regained: consumer response to food scares*, "J. Econ. Behav. Organ." 2000, nr 43, s. 471–485.

²¹ L.J. Frewer, C. Howard, D. Hedderley, R. Shepherd, *What determines trust in information about food-related risks? Underlying psychological constructs*, "Risk Anal." 1996, nr 16, s. 473–486.

²² M. McCarthy, M. Brennan, A.L. Kelly, C. Ritson, M. Boer, N. Thompson, *Who is at risk and what do they know? Segmenting a population on their food safety knowledge*, "Food Qual Prefer" 2007, nr 18, s. 205–217.

²³ J.M.E. Pennings, B. Wansink, M.M.E. Meulenberg, *A Note on Modeling Consumer Reactions to a Crisis: The Case of the Madcow Disease*, "Int. J. Res. Mark." 2002, nr 19, s. 91–100.

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STRESZCZENIE

Celem badań było zbadanie relacji między percepcją ryzyka, redukcją ryzyka oraz prawdopodobieństwem nabycia mięsa w momencie informacji o zagrożeniu bezpieczeństwa mięsa wśród studentów.

Stwierdzono, że zdrowie i motywy psychologiczne, gwarantowana jakość oraz cena mają najsilniejszy wpływ na decyzję zakupu mięsa w momencie informacji o zagrożeniu.

SŁOWA KLUCZOWE: zachowanie, studenci, zagrożenia bezpieczeństwa mięsa

SUMMARY

The aim of the study was to explore relation between risk perception, risk reduction and likelihood to purchase meat in the moment of information about meat-safety hazard among University Students. The results of this study reveal that health and psychology motives, quality assurance and price have the strongest impact on decision of the purchase of meat in the response to meat-safety hazards.

KEYWORDS: behavior, students, meat safety hazards