

SOCIO-ECONOMIC CONDITIONS OF INNOVATIVE FORMS OF APPLE PROCESSING

Wioletta Knapik, Jacek Puchała

University of Agriculture in Krakow

Paweł Malicki

AGH University of Science and Technology

Abstract. The aim of this paper is to examine the lacto-fermentation as a method of apple preservation. The output is a pickled apple, which is an alternative way for manufacturing apples and utilizing the fruit supply. The key issue for winning at the innovative product in the food market is whether consumers will accept it. The survey has been carried out for the purpose of evaluating the product: pickled apple. The results of the research show that the respondents accept the new product and a its high chance of being introduced to the food market in Poland.

Key words: food innovation, consumer acceptance, apple processing, lacto-fermentation, lacto-fermenting of apples, ecological agriculture

INTRODUCTION

Embargo imposed in 2014 by Russia on some food products, mainly apples, resulted in the fact that Polish fruiters, as leaders among the apple producers in the European Union, were especially severely affected by withholding of export of this product to the strategic recipient. In this situation other management of apples in the future years should be considered, which would not be almost entirely dependent on export to Russia. It is necessary to undertake actions ensuring disposal of these fruits – by diversifying target markets, which will allow to prevent possible liquidation of apple orchards. One way to maintain the production of apples at the previous level is their processing, which is more

Corresponding author: Wioletta Knapik, University of Agriculture in Krakow, Mickiewicza 21, 31-120 Kraków, Poland, e-mail: w.knapik@ur.krakow.pl

© Copyright by Warsaw University of Life Sciences Press, Warsaw 2015

beneficial than sale of fresh fruits, since, among others, period of suitability for consumption is prolonged and the economic production profitability is increased and will remain permanently high.

INNOVATIVE DETERMINANTS OF PROCESSING – LITERATURE OVERVIEW

Agri-food processing is the second largest segment of agribusiness, which contains primary processing and industrial processing. This is the main part and an element of micro environmental factors [Mrówczyńska-Kamińska 2010].

Primary processing is a set of basic operations run on small scale within agricultural firms or within a buyer's company in order to prepare their produce for trading. On the other hand, industrial processing is usually run on much larger scale focused on transforming a physical form of fruits during a technological process.

The main elements of industrial processing include so-called core processing, which focuses on delivering various preparations. A different kind of processing is so-called trade processing, which is run in retail chains that trade fruits on large scale, usually in logistics centers. As a result of growing interest in consuming even more processed goods, the significance of fruit processing industry is getting stronger day by day. An agricultural segment has taken over the role of delivering resources for the entire fruit and vegetables industry [Knecht et al. 2009].

The fruit and vegetables pickles place on the fourth position after dairy products, meat and tobacco due to comparative advantages in the branches of food industry. So far, the Poland's greatest success in the fruit and vegetables processing has been the frozen food, juices and fruit drinks [Wiśniewska 2011]. Highly specialized agri-food processing is considered a stimulus to agriculture. It accelerates agricultural modernization and thus causes affecting of both segments on each other. Agri-food industry is strongly influencing the effectiveness of the entire food economy. It is seen as an enhancer of integration processes in the agri-food sector [Mrówczyńska-Kamińska 2010].

Poland's food economy can be characterized as missing tight and direct links between fruit producers and processing plants, which results in the necessity of continuous negotiations between these segments of agribusiness. It is vital to consider that fruit growers influence the processing plants as far as pricing policy is concerned. The current position of processing plants is becoming more complicated as there is a risk of falling below the break even point which is the result of international competition. It is crucial to consider an implementation of new and innovative forms of apple processing, which would give greater chance of utilizing an entire produce volume and help rise the added value.

Innovations make a foundation for cooperation between different companies, which are parts of the entire innovation system. The innovation system comprises four elements: all participants focused on innovation; interactions between these firms; micro- and macroenvironment; readiness of society to accept innovation [Rosenfeld 2002].

„A product is becoming a good for a particular market segment only (...) if market demand for each of a product or its effectiveness parameters will be fully met by more than one available product” [Christensen 2010].

Manufacturing of innovative products is only the beginning of changes, which come from an innovative idea in a form of material good or service. A particular product success on the market depends on its commoditization [Lewandowska 2014]. Practitioners, who have achieved market success highlight that this isn't just a product, which cause the change. An act of using a product makes the world change [Lachowski 2010].

Agribusiness, being a vast segment of Poland's economy, creates multiple opportunities for manufacturing, followed by delivering new products to the market. Product innovations, beside completely new ideas, technologies, may also regard goods which used to be manufactured but have already been forgotten. These can get their form unchanged or modified slightly so that they re-enter the market niche. Innovativeness also refers to new means of product distribution, which have not yet been used in a given micro- or macroregion. As far as agriculture is concerned – innovations may regard new resources or new ways of their utilization [Musiał and Wojewodziec 2014].

Clayton M. Christensen i Michael E. Raynor [2008] cite *The Innovator's Dilemma* by C.M. Christensen propose two categories referring to circumstances of innovating. These categories result in innovations being conservative or critical. In the case of conservative innovations there is a competitive advantage on the side of experienced firms which usually offer enhanced products that are prized highly. A critical role of innovations is about introducing simpler and more functional products, for a lower prize, which attract less fussy customers among previous ones or there are new customers on the way. A groundbreaking strategy is basically referring to new firms, that are not yet recognizable. There are authors who highlight that this type of strategy depends on an industry, which means that a groundbreaking concept in industry A will be a conservative one and in industry B vice versa. Assuming that a rule is the relation: conservative innovation – experienced companies and breakthrough innovation – new, inexperienced companies, then in the case of introducing a new product on the market, a situation will happen that for some of experienced companies this product will turn out to be breakthrough and for others only preservative improvement – it is necessary to come back to the starting point. In such a case it is necessary to redefine opportunities so as to make innovation became breakthrough in the eyes of significant market players. If innovation is seen by leading companies as conservative, chance for this innovation to succeed is minor. To assess whether the idea is breakthrough – Clayton M. Christensen and Michael E. Raynor suggest a conduct of three tests based on two questions regarding first two tests and one question in third test; test will be assessed positively, if in the case of: (i) first test – at least one answer is positive (questions: “Is there a group of people, which so far had to do without a particular product due to lack of possibility to purchase it or manufacture it on their own?”, “Does the place where the customers can purchase the product is convenient and attractive for them?”); (ii) the second test – both answers are positive (questions: “Are the customers in less profitable market sectors ready to purchase the product at lower price at the cost of reduced parameters but on optimal and acceptable level?”, “Are we able to create a business model assuming achievement of satisfactory profits at lower prices?”); (iii) third test – summarising, evaluating chances of innovations (question: “Is the given innovation ground-breaking for all interested entities in a given industry?”).

Scientific research shows that at the level of single companies there is a positive correlation between level of innovation and export as an important index of international competition [Soete 1981, Malerba and Montobbio 2003]. It takes place also in the case of food processing plants [Zalewski 2012]. We may thus conclude that embargo imposed on Polish apples has to induce companies processing these fruits to bigger expenses on research-development actions.

Based on Bleaney and Wakelin research [2002] it can be concluded that not innovative companies are more willing to export, if they have a competitive advantage. On the other hand, innovative companies are more willing to export, provided that they run more innovation works. Other research indicates that likelihood of export and its intensity remain in strict connection with research-development works and implemented innovation projects [Gourlay and Seaton 2004].

From this comes a recommendation for Polish apple producers – greater innovation in particular processing companies should lead to achieving new sales markets for apples and their products. Such actions are particularly important when selling of Polish apples to Russia is frozen – in conditions of lack of the main recipient so far.

Considering impact of innovation processes on export of companies it is emphasised that the companies embedded in mature economic systems fare best with the same issues. According to indications of some of the researchers, companies able to demonstrate large commitment in innovations and in use of advanced technologies, significantly more often declare presence of various barriers. Baldwin and Lin [2002] refer to a group of specialist companies from Canada, where obstacles for innovations occur much more often than in the case of companies that do not implement innovations.

Companies in Poland, as well as in other countries of the former socialist camp, to a large extent, are still subject to the mechanisms of cost and pricing competition. Level of possibilities of Polish processing plants with regard to differentiation of products are still too low; problem is also to guarantee their optimal quality [Kowalska 2011]. However, recent years bring changes in food processing, which can give rise to optimism [Wziątek-Kubiak 2009].

MATERIAL AND METHODS

The subject of survey research was to estimate the consumer acceptance of a new product, which is pickled apple produced by means of natural lactic acid fermentation method. A comeback to revitalised tradition and introduction on a large scale of innovation methods requires to consider various factors, but eventually it is consumer who determines success of product on the food market.

As part of research, pickled apples were served for tasting, prepared in accordance with the recipe developed by food production technologists from the University of Agriculture in Kraków. After that the surveys have been done to estimate the taste of the new product and its market potential. The surveys were conducted in March 2015 by the authors of this article and the students among the participants of scientific conference (representatives of business and agricultural organisations, farmers).

RESULTS

In the research 265 people took part. Men comprised insignificant majority – 136 people (51.3%); number of women was 129 (48.7%).

Most of the surveyed, positively evaluated flavour qualities of apples (total of 68%; on question “Did you like pickled apples?” 47.2% of the surveyed answered “definitely yes” and 20.8% answered “rather yes”). This product gained higher recognition among men (77.2%) than among women (58.1%).

From among all of the respondents – more than 1/3 (97 persons, i.e. 36.6% of all) prefer only one taste, and 55 of the surveyed (20.7%) – mixed taste. Remaining respondents (113 persons, i.e. 42.6%) indicated specifically on two or more flavours that suits them mostly. Pickled apples enjoyed the greatest recognition among persons who prefer only bitter taste (four persons only). This product was appreciated also by most of the respondents (65.4%) who opted for mixed taste. The second largest group of the surveyed which preferred only one taste comprise persons who chose sweet taste (49 out of 152 persons, i.e. 32.2%). A slightly surprising fact is that the vast majority of this group (81.6%) liked pickled apples which, after all, have sour-salty flavour (Table 1).

Table 1. Evaluation of taste preferences for lacto-fermented apples (responses according to preferred taste; $N = 152$)

The kind of preferred taste	Yes (%)	Rather yes (%)	Rather no (%)	No (%)	In total (%)
Only salty	50.0	25.0	0.0	25.0	5.3
Only sweet	57.1	24.5	6.1	12.2	32.2
Only bitter	75.0	0.0	0.0	25.0	2.6
Only savory	44.4	33.3	5.6	16.7	11.8
Only sour	44.4	16.7	16.7	22.2	11.8
Mixed	52.7	12.7	10.9	23.6	36.3
In total	47.2	20.8	12.8	19.2	100.0

Source: Own research.

In the opinion of most of the respondents (64.5%) the new product, which is pickled apple, is likely to mark its presence into Polish market. In these forecasts men demonstrated greater optimism (69.1%). The same percentage among answers of women and men constitutes category “I don’t know” (about 16%).

The respondents were strongly in favour of the need to support Polish apple market (91.3%). Slightly more women (93%) than men (89.7%) expressed such opinion. Only 4.2% of the respondents were not in favour of this issue. It can be assumed that such standpoint of the surveyed is, above all, a consequence of media interest of difficult situation of Polish fruiters.

The respondents foresee rather average interest of the consumers in pickled apples (68.3%). In this case, similarly as in reference to evaluation of the opportunity of this product to enter Polish market, men were more optimistic (72.8%). In total 20.8% of the surveyed referred to these chances as marginal or not present (Table 2).

Table 2. Forecasting of consumer interest in lacto-fermented apples on the Polish market (N = 265)

Consumer interest	Women (%)	Men (%)	In total (%)
High	10.1	11.8	10.9
Medium	63.6	72.8	68.3
Low	21.7	14.0	17.7
Lack of interest	4.6	1.4	3.1
In total	100.0	100.0	100.0

Source: Own research.

In order to determine the impact of independent variable – gender impact on answers of the respondents with regard to their opinions concerning potential interest of the consumers in the new product, verification by test of independence was applied (χ^2). Calculations combined the following categories concerning interest in pickled apple: “marginal” and “none”. Eventually, no dependences between gender and interest in pickled apples were identified ($\chi^2 = 4.978 > \chi^2_{\alpha=0.05} = 5.991$).

According to the research, women prefer wider range of flavours more than men do, which, in the case of pickled apples may also mean awaiting for different flavour, not only sour-salty. As many as 90.7% of the respondents believe that pickled apples would meet with greater approval of the consumers if taste of fruits was more diverse (Table 3).

Table 3. Forecasting of consumer interest in lacto-fermented apples with varied flavours (N = 265)

Consumer interest	Women (%)	Men (%)	In total (%)
Yes	61.2	48.5	54.7
Rather yes	29.5	39.0	34.3
Rather no	2.3	5.1	3.8
No	5.4	5.2	5.3
Undecided	1.6	2.2	1.9
In total	100.0	100.0	100.0

Source: Own research.

Test of independence, regarding impact of a “gender” variable on assessment of possible interest in pickled apples of various flavours, demonstrated that there is no dependences between gender and opinion of consumers ($\chi^2 = 4.168 > \chi^2_{\alpha=0.05} = 5.991$) following categories were combined in test: “not” and “rather not” while “lack of opinion” was rejected.

Both the surveyed women and men believe that introduction of innovative forms of apple processing requires commitment of scientists. Opposite opinion expressed 16.6% of the surveyed consumers (Table 4).

Table 4. Survey responses in regards to scientists' efforts to advance apple processing technology ($N = 265$)

The need for scientists engagement	Women (%)	Men (%)	In total (%)
Yes	61.2	61.0	61.2
Rather yes	17.8	21.4	19.6
Rather no	9.3	8.8	9.1
No	9.3	5.9	7.5
Undecided	2.4	2.9	2.6
In total	100.0	100.0	100.0

Source: Own research.

Verification by test of independence indicates on lack of dependences between gender and opinion of consumers in this respect ($\chi^2 = 1.452 > \chi^2_{\alpha=0.05} = 7.815$); test did not include the category: "lack of opinion".

By analogy, to the question on the need of supporting Polish fruiters by scientists in introducing of new products and implementation of new technologies, the vast majority of the respondents opted for the need for such assistance (95.1%). Such support, in opinion of 47.7% of the surveyed, should be granted in every respect. Less than 1/3 of the surveyed opted for technological and marketing support (accordingly: 28.2 and 16.4%). Only 7.7% indicated social area, regarding assistance granted to fruiters. The respondents probably did not understand what is meant by the notion of "social support".

Another question concerning the assessment of flavour qualities of pickled apples was a question to the first question of the survey. This time, these qualities were positively assessed by 81.9% of the surveyed. The opposite opinion expressed 18.1% of the surveyed consumers. In the case of prior question concerning assessment of the flavour of pickled apples, there were fewer positive answers (by 13.9%). This can be explained by the fact that approval of the new product increased with commitment of the respondents in research and occurrence of questions about the need to support Polish fruiters.

The majority of the respondents appreciated the qualities of pickled apples, though samples intended for tasting were not the final product, ready to introduce on the market. Such product requires refinement of recipe and performing many tests in order to improve technology of apple pickling. In practice, with regard to apples subject to organoleptic assessment, this means assessment of the product which still requires improvements and thus raising its flavour qualities. Considering that the respondents prefer mainly sweet or mixed flavour (which has been reflected in opinions of the respondents that pickled apples of various flavours would might enjoy greater interest among consumers), positive evaluation of pickled apple with clear sour-salty note may give rise to optimism concerning chances of this product to mark its presence on the market. Such opportunities, though moderate, are observed also by the respondents who collectively expressed the need to support Polish market of apples. Certainly, such opinion is fostered by clearly observable in the last months, increasing tendency of apple

consumption on the domestic market and growth in solidarity of Poles against Russian embargo. However, in such an adverse situation fruiterers are not able to manage on their own. Support can be provided also by scientists, e.g. through preparation and popularisation of new ways of processing apples with which most of the respondents agreed.

The impact of situation accompanying researches should be considered, which may have (although does not have to) connection with their results. Participants of the conferences, though representing different environments, were people aware of importance of science and modern technologies supporting work of farmers. In addition, place of research – conference centre and social premises accompanying research issues (they have been presented to the participants of the conference and thus to the respondents) might have affected the answers of the surveyed.

The respondents' opinions constitute initial outline of assessment of possibility to accept by the consumers the new product on the food market, based on natural lactic acid fermentation technology. The received image of consumer reactions is the basis for further tests in order to determine more precisely potential market opportunities of the product, which is pickled apple.

DISCUSSION

Polish society is aware of importance of apples in our daily diet. They are rich source of many vitamins; they contain flavonoid compounds and polyphenols [Paszkiwicz et al. 2012]. Worth highlighting is strong antioxidant effect of apples consuming of which impedes, most effectively from all of fruits, development of cancers, and some fruit preparations may contain more antioxidants in comparison with fresh fruit [Ścibisz et al. 2004]. On the basis of experiment aiming at, among others, examination of content of polyphenols in apple products such as: not clarified juice and apple creamogen (purée with a very fine texture), conducted in the period 2003–2004 by scientific employees of Warsaw University of Life Sciences it can be concluded that “Despite decrease in total content of polyphenols in apple creamogen in the process of its receiving and storage, their content in product is still higher than in apple juice” [Rembiałkowska et al. 2006]. However, not all forms of processing favour preservation of the most valuable nutritional values of apples. In Poland clear juices and concentrates are very popular, with production consuming about 1 million tons of apples per year. However, these products are almost completely deprived of the compounds most valuable for health – polyphenols, flavonoid compounds, vitamins and fibre (only about 5% of components contained in fresh fruit remains). The inhabitants of Western Europe, USA and Japan appreciate health-promoting properties apple and more and more often consume products in the form of naturally unclarified juices (in Germany 25%, and in Japan 80% of all preparations comprise cloudy juices, pressed in hydraulic presses, without enzymatic treatment, clarification and filtration). Biological value of such juice may be increased by subjecting it to lactic acid fermentation (so-called biojuice). In some countries of Western Europe, but also in Poland, biojuices are used in hospitals as an agent supporting treatment. Pickling of apples and their consumption in various forms was a common practice in pre-WWII Poland [Chabłowska et al. 2013].

Therefore, the new product – pickled apple used all the vitamins and nutritious value of the apple. Pickled apples offer a number of benefits for consumers and the whole fruit and vegetable industry (Table 5).

Table 5. Profits generated across the lacto-fermented apples

Economic benefits	Technological-nutritional benefits	Socio-cultural benefits
<ul style="list-style-type: none"> • Shortening of supply chain from fruiters to consumer • Offer of niche products from apples preserved using natural method • Extension of apples' suitability for consumption • Additional direction of processing apples as a supplement for pickles and sauerkraut cabbage recognized in Polish culture • Possibility of diversification of incomes of farmers running small orchards • Possibility of fixation of large volumes of fruits at relatively low costs of energy and own funds • Reduction in costs of warehousing of apple surpluses by resigning from using of some of cooling devices or by managing them in different way 	<ul style="list-style-type: none"> • Stabilized content of vitamin C, provitamin A, which do not break down • Vitamins B2 and PP generated as a result of fermentation • Acetylcholine generated as a result of fermentation, perform important role in processes of food digestion, reducing blood pressure and improve transfer of nerve signals • Increase in assimilability of the fermented product by organism • Supplying of organism with lactic acid bacteria and regulation of intestinal microflora composition • Development of safe and "green" production on the basis of the natural lactic acid fermentation process 	<ul style="list-style-type: none"> • Supporting of folklore and rural tradition • Possibility of social stimulation of unemployed people from rural areas in the processes of preparation of apples to pickling • Input for agritourism and rural tourism • Promotion of healthy food, full of vitamins and nutrients

Source: Own study.

Changes in interest of production of pickled apples can to a large extent contribute to nationwide increase in internal consumption of fruits. The whole fruit and vegetable industry is facing a number of possibilities competent use of which will allow to improve difficult situation of fruiters.

CONCLUSIONS

Economic recommendations with regard to preserving apples with pickling method are based on complete freeing of crop processing market for farmers running small agricultural farms. Allowing freedom in conducting independent operations in this respect fully corresponds to demands of a socially responsible agriculture. Survey results constitute some premises for preparation of recommendations for public institutions with

regard to remove existing legal barriers imposed on small producers of fruit processing by the State Sanitary Inspection. There is a need for further tests and social consultations in economic units having appropriate production capacities allowing produce pickled apples in short time and direct them for fast-moving distribution (FMCG). It is also possible to use available capacities through existing fruit processing plants, where, by relocation of technological lines for production of pickles, pickled apples can be produced in the periods of apple harvest for the purposes of FMCG trade. The results of survey show that there is interest on the new product, which could be a chance for development of processing apples market.

REFERENCES

- Baldwin, J., Lin, Z. (2002). Impediments to Advanced Technology Adoption for Canadian Manufacturers. *Research Policy*, 31, 1–28.
- Bleaney, M., Wakelin, K. (2002). Efficiency, Innovation and Exports. *Oxford Bulletin of Economics and Statistics*, 64, 1, 3–15.
- Chabłowska, B., Piasecka-Józwiak, K., Rozmierska, J., Szkudzińska-Rzeszowiak, E., Kliszcz, M. (2013). Fermentacja mlekowa jabłek z upraw ekologicznych sposobem na otrzymanie nowego asortymentu produktów – biosoków. *Journal Research and Applications in Agricultural Engineering*, 58 (3), 72.
- Christensen, C.M. (2010). *Przełomowe innowacje*. Wydawnictwo Naukowe PWN, Warszawa.
- Christensen, C.M., Raynor, M.E. (2008). *Innowacje. Napęd wzrostu*. Studiu EMKA, Warszawa.
- Gourlay, A.R., Seaton, J.S. (2004). UK Export Behavior at The Firm Level. *Economic Issues*, 9 (2), 3–20.
- Knecht, D., Jankowska, A., Popiołek, M. (2009). Rolnictwo istotnym subsystemem agrobiznesu. *Zeszyty Naukowe Uniwersytetu Przyrodniczego we Wrocławiu, Biologia i Hodowla Zwierząt*, 58, 572, 91–103.
- Kowalska, A. (2011). Food Quality and Its Conditionings. *Acta Sci. Pol., Oeconomia*, 10 (4), 43–54.
- Lachowski, S. (2010). *Droga innowacji*. Wydawnictwo Studio EMKA, Warszawa.
- Lewandowska, M.S. (2014). Innovation Barriers and International Competitiveness of Enterprises From Polish Food Processing Industry. *Research Results. Acta Sci. Pol., Oeconomia*, 13 (4), 103–113.
- Malerba, F., Montobbio, F. (2003). Exploring Factors Affecting International Technological Specialization: The Role of Knowledge Flows and The Structure of Innovative Activity. *Journal of Evolutionary Economics*, 13 (4), 411–434.
- Mrówczyńska-Kamińska, A. (2010). Tworzenie i rozdysponowanie produkcji rolnej na tle związków z gospodarką narodową (sektorowa analiza porównawcza rolnictwa w Polsce i Niemczech). *Zagadnienia Ekonomiki Rolnej, IERiGŻ-PIB*, 1, 9–25.
- Musiał, W., Wojewodzic, T. (2014). Innowacyjność w zakresie gospodarowania ziemią rolniczą w regionach rozdrobnionych agrarnie. *Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu*, 361, 164.
- Paszkiewicz, M., Budzyńska, A., Różalska, B., Sadowska, B. (2012). Immunomodulacyjna rola polifenoli roślinnych. *Postepy Hig. Med. Dosw. (online)*, 66, 637–646.

- Rembiałkowska, E., Hallmann, E., Adamczyk, M., Lipowski, J., Jasińska, U., Owczarek, L. (2006). Wpływ procesów technologicznych na zawartość polifenoli ogółem oraz na potencjał przeciwutleniający przetworów (soku i kremogenu) uzyskanych z jablek pochodzących z produkcji ekologicznej i konwencjonalnej. *Żywność. Nauka. Technologia. Jakość*, 1 (46), Supl., 123.
- Rosenfeld, S.A. (2002). Just Clusters. Economic Development Strategies That Reach More People and Places. A Synthesis of Experiences. Regional Technology Strategies, Inc. Carrboro.
- Soete, L. (1981). A General Test of Technological Gap Trade Theory. *Weltwirtschaftliches Archiv*, 117 (4), 638–660.
- Ścibisz, I., Mitek, M., Serwinowska, K. (2004). Aktywność przeciwutleniająca soków i półkoncentratów otrzymanych z owoców borówki wysokiej (*Vaccinium corymbosum* L.). *Żywność. Nauka. Technologia. Jakość*, 3 (40) Supl., 196–203.
- Wiśniewska, J. (2011). Konkurencyjność przedsiębiorstw przemysłu owocowo-warzywnego. *Zagadnienia Ekonomiki Rolnej*, 2, 78–97.
- Wziętek-Kubiak, A. (2009). Od awersji do innowacji do upowszechnienia się innowacji wśród polskich przedsiębiorstw. In: E. Adamowicz (Ed.). *Polska transformacja po latach*. Wydawnictwo C.H. Beck, Warszawa.
- Zalewski, R.I. (2012). Platforma INNOPENA dla wzrostu innowacyjności przetwórstwa żywności w Wielkopolsce. *Przemysł Spożywczy*, 66, 16–19.

EKONOMICZNO-SPOŁECZNE UWARUNKOWANIA INNOWACYJNYCH FORM PRZETWÓRSTWA JABLEK

Streszczenie. Artykuł podejmuje problematykę przetwarzania jablek za pomocą metody naturalnej fermentacji mlekowej. Wytwarzany w ten sposób produkt, jakim jest jabłko kiszzone, stanowi jedną z alternatyw w zakresie zagospodarowania nadwyżki jablek na rynku poprzez ich przetwórstwo. Kwestią kluczową dla sukcesu innowacyjnego produktu na rynku jest jego akceptacja przez konsumentów. W tym celu przeprowadzone zostały badania ankietowe dotyczące oceny jabłka kiszzonego. Wyniki badań wskazują, że respondenci akceptują nowy produkt i jego szanse na zaistnienie na polskim rynku spożywczym.

Słowa kluczowe: innowacje spożywcze, akceptacja konsumentka, przetwórstwo jablek, fermentacja mlekowa, kiszenie jablek, rolnictwo ekologiczne

Accepted for print: 02.10.2015

For citation: Knapik W., Puchała J., Malicki P. (2015). Socio-economic conditions of innovative forms of apple processing. *Acta Sci. Pol., Oeconomia*, 14 (4), 49–59.