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Role of Consumers' Input into the Development of Innovations. Innovative Trends in the Textile and Clothing Industry and the Needs of Polish Consumers

Abstract

Until recently the textile and clothing industry has been developed based on technological and cost factors. As a result, manufacturers have generally implemented research/technology-driven and price-driven innovations rather than user/consumer-driven innovations. The aim of this article is to start a discussion about the ways to increase the role of consumers' inputs into textile and clothing innovations, including so-called 'sustainable innovations'. The article presents the results of research that the author carried out using a representative random sample of 981 Polish adults. The research aimed: to establish the degree of consistency between types of innovations currently prioritized by the textile and clothing industry and the present needs of Polish consumers; to create a hierarchy of innovations that R&D centres may offer with respect to those needs; to analyse the survey respondents in terms of their socio-demographic characteristics in order to describe consumers interested in particular types of innovations according to the accepted criteria.

Key words: sustainable innovations, user-driven innovations, consumer needs, textiles and clothing.

Introduction

Innovation has been for long a key element of discussions dealing with enterprise competitiveness, or more broadly with the development of countries and regions. One of the priorities set in the EU's long-term program of socio-economic development 'Europe 2020', a successor of the Lisbon Strategy, is sustainable development based on knowledge and innovation. This article intends to direct the attention of innovators active in the textile and clothing industry (i.e. working for R&D centres and the industry) to the fact that greater involvement of users and consumers in the creation of product innovations is a necessity. The discussion of innovations presented below concentrates on product and technological innovations, as well as on those contributing to sustainable development that ensures the well-being of human needs and institutions while respecting worlds' natural resources and regenerative capacity. Literature on the subject calls these innovations "sustainable" [1, 2].

The basic research conducted by the author gives a snapshot of how Polish consumers of textiles and clothing view product and technological innovations that the industry and R&D institutions offer to them, while allowing the assessment of the degree to which trends prevailing in innovative research meet the needs of Polish buyers of textiles and clothing.

A process of innovation assuming close cooperation between producers and consumers can be divided into several stages. In the first stage, an organization needs to collect as many ideas as possible. The big challenge is that they must be collected from the right customers. In other words, customer segmentation is crucial for the success and effectiveness of the actions to follow. Therefore in the next part of this article consumers interested in particular types of innovations will be analysed in order to create their profiles according to the socio-demographic criteria assumed. Considering that the subject area analysed herein is a special group of innovations called 'sustainable', the relationship between consumers' environmental and ethical sensitivity and the degree to which particular types of innovations are useful / interesting for them will also be examined.

The consumer as one of the socio-cultural determinants of innovation in the textile and clothing sector

There is no doubt that science remains a fundamental source of innovation, but in order to transform the knowledge produced by R&D into commercial results firms need to engage in interactive learning with customers and markets, as well as manage feedback from the broader social and institutional environment [3]. Regarding the socio-cultural determinants of innovation concerning the textile

and clothing sector, we can identify four socio-cultural characteristics of communities which are relevant to innovation: cultural capital and consumer behaviour, human capital, social and organisational capital, and entrepreneurship see [4]. From the perspective of this article, two of them seem particularly important: cultural capital and consumer behaviour and social capital. The first of them refers to the cultural background and basic value system that is shared by individuals in a community, manifesting itself through their attitudes and habits, including consumption. It encompasses certain basic values and the resulting attitudes held by societies that may influence innovation activity: consumers' responsiveness to new technologies, attitude to the future, attitude to the environment, attitude to other cultures, and the wish to be part of the product designing / creating process.

On the other hand, social capital concerns the nature and intensity of relationships. The impact of social capital on innovation can be measured for its different aspects, such as the extent of collaboration with clients or customers, the main sources of information for innovation or the level of trust in other people. Analysis of the socio-cultural determinants of innovation in the textile and clothing sector indicates that cultural capital and consumer behaviour in the Netherlands is by far the most favourable for innovation across the EU-25 Member States, whereas in other European countries, especially Greece, Italy and Poland they seem to obstruct innovation. Regarding social capital, the most favourable environment seems to exist in Finland, Denmark, the Netherlands and Sweden, where cooperation between companies and academics is well developed and customers are considered a particularly important source of information for innovation. Poland is one of the countries that generally have a low level of trust and high level of corruption, and where cooperation with academia or consumers is also very limited [4].

The role of the consumer in the development of textile and clothing innovations

During the last several decades innovation models and concepts have been evolving. The major and most discernible trend in this area has been the replacement of a linear approach to innovation

with thinking outside the technological box [5, p. 20]. Countries have understood over time that international competitiveness cannot solely rely on large numbers of technically-skilled human resources and global prominence in high-tech sectors. Consequently the role of consumers treated as one of the main forces driving the development of innovations has started to be accentuated more and more strongly. Today the most prominent method for implementing innovations that draws on consumers' knowledge, in which new ideas and solutions need to be created, is called User-Driven Innovation (UDI). Despite different theoretical perspectives on user-driven innovation and various methods being employed within user-driven innovation, this concept has several features that make it distinct from other approaches and traditional methods of product development. These are [6, 7, pp. 42-43]:

- a strategic focus on consumer pull (vs. technology push) – producing what sells, rather than selling what is produced
- revenue-enhancing activities (vs. cost-cutting activities) involving the development of solutions that better meet consumer needs
- use of multiple skills and perspectives in the innovation process (e.g. inviting ethnologists, anthropologists and designers to join scientists, engineers and business specialists)
- more direct involvement of the user/consumer in the innovation process – either through observation processes, toolkits, user panels, or letting the users do it themselves
- requirements for an open and collaborative business environment. (The theoretical basis and assumptions underlying the UDI concept and its practical applications can be found in [5 - 10]).

European consumers' inputs into the development of innovative textile and clothing products are specific to regions and countries [4]. Although the industry boasts leaders in the effective implementation of UDI (e.g. 3M or Adidas), it seems that manufacturers mostly involve customers to find out about their needs rather than giving them the role of innovators. Market research is more about testing than about discovering new solutions.

Polish innovation policy focuses on research-driven innovation (its instruments are R&D grants, incubator and university

spin-off programs, investments in technical education, public-private partnership, networking programmes and projects, including clusters, cooperation between scientists and entrepreneurs, technological parks, etc.). Yet it has become evident over time that high R&D investment and hosts of scientists, engineers and other knowledge-intensive professionals do not directly translate into high innovation performance. Other aspects must be considered as well. One of the major weaknesses of the above instruments is the very limited involvement, or even non-involvement, of consumers; the insufficient participation from SMEs should also be mentioned.

An important barrier to innovation as encountered by Polish manufacturers of textiles and clothing is the scarcity of funds (e.g. resources that could be used to finance in-house R&D departments are in a short supply). To cope with the problem, manufacturers should enter into cooperation with R&D centres that have many globally unique laboratories and trained staff. The relatively limited cooperation between manufacturers and R&D centres, resulting in a low level of commercialisation of innovative solutions developed by the latter, is largely attributable to final users of technologies or products being excluded from the process of innovation. The user-driven approach to innovation might partly reduce commercialisation risks that every new solution entails, because of better knowledge of what consumers need and expect.

Based on pertinent literature, the following model showing relations between a textile and clothing producer whose business strategy takes account of a new, consumer-driven approach to innovation and demanding consumers is proposed.

Its central part is an innovative textile and clothing product whose value added – environmentally-friendly status and ethicality of the production process make it differentiable in the market (see *Figure 1* on page 10). In the context of sustainable innovations, various scholars have highlighted the role of user involvement in product development [11 - 14]. As sustainable innovations often require changes in user behaviour, it is important to identify key factors either facilitating or obstructing their adoption. Cooperation with consumers allows a company to shape sustainable innovations according to market demands, thus increasing

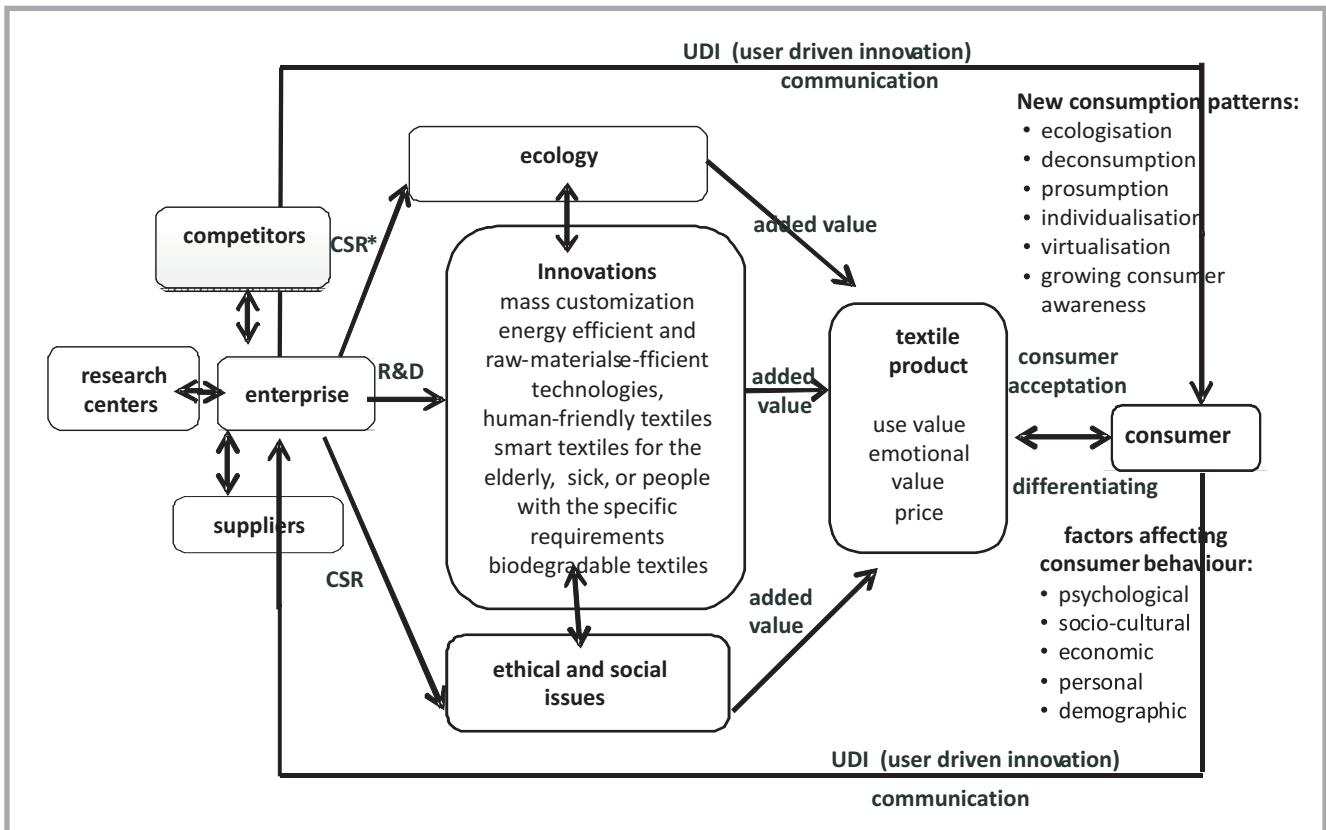


Figure 1. Role of the consumer in the development of sustainable innovations in the textile and clothing industry; *CSR-Corporate Social Responsibility. **Source:** developed by the author.

their chances on the market [14]. The contextual everyday knowledge of product users combined with the technical knowledge of companies may lead to mutual learning, technical innovations and positive changes in production and consumption patterns. Consumers have crucial knowledge about the environmental aspects of products during the decisive life-cycle stage of usage that are normally concealed from producers. Users and producers also have different languages, values and coding schemes. In order to enable efficient transfer of knowledge between these groups, joint knowledge interpretation processes are indispensable [14].

Polish customers' attitude to textile and clothing innovations – conclusions for Polish R&D centres and manufacturers

New trends in the development of innovations, the priorities of the EU's new strategy 'Europe 2020', new trends in global consumption patterns [15] and new directions in research into innovative textiles undertaken by domestic

R&D units became an incentive for carrying out a survey of Polish consumers.

Aims and methodology of author's own research

The aims of the research were the following:

- to establish the degree of consistency between types of innovations currently prioritised by the textile and clothing industry and the present needs of Polish consumers;
- to establish the hierarchy of innovations that R&D centres may offer with respect to those needs;
- to analyse the survey respondents in terms of their socio-demographic characteristics with a view to describing consumers interested in particular types of innovations according to the accepted criteria.

An omnibus survey of a representative sample of 981 adults living in Poland was conducted from 30 November to 8 December 2010. The sample was drawn from the PESEL system¹. This construction of the sample provides grounds for treating the results as representative of all Polish consumers.

The questionnaire included 15 questions about product innovations concerning human ecology, environmental protection, as well as social and ethical aspects. Ten questions investigated respondents' interest in particular types of innovations. Another five asked them what motivated them to make their purchasing decisions. The questionnaire also had 9 questions dealing with respondents' attitudes to environmental and ethical issues. The answers were used to build the typology of Polish consumers based on their sensitivity to these issues (a full description of the typology and methods employed can be found in [15]). Other questions that the questionnaire asked were intended to build profiles of the respondents according to their selected socio-demographic characteristics.

To learn about the structure of respondents' attitudes to innovations and to establish how the attitudes differed, the responses were analysed qualitatively and quantitatively by means of descriptive statistics. Respondents' interest in particular types of innovations was analysed in terms of their socio-demographic characteristics using cross tabulations. Their sensitivity to environmental and ethical

Table 1. Types of innovations ranked by their usefulness for respondents / their interest. Source: developed by the author based on research results.

Scope of innovation	What type of textile innovations would you need or consider the most useful?	% of responses	Rankings
Human ecology	Textiles with components improving comfort and safety of use , e.g. antibacterial, antiallergic, etc.	37.3	1
	Textiles ensuring thermal comfort , i.e. optimal body temperature, despite changes in ambient temperature – warming the user when it's cold and cooling when it's hot	32.2	2
	Textiles free of heavy metals, toxic substances, chemicals, etc., safe for human health	28.6	3
	Drug-releasing textiles facilitating medical treatment of children and the elderly	16.9	7
	Fire-protective textiles that will not ignite, protecting children's clothes and curtains, etc., from burning	10.8	8
	Textiles with built-in health monitoring devices (for instance monitoring the vital parameters of elderly or sick persons) and ensuring permanent contact with the patient.	6.6	10
Ecology of the environment	Textiles produced from renewable and biodegradable raw materials	24.1	4
	Textiles produced using environmentally-safe processes , without pesticides, excessive consumption of water and electrical energy, etc.	21.2	6
Ethics	Ethically-produced textiles, i.e. by producers respecting fundamental human rights, not using child labour, and providing their workers with decent and safe working conditions	22.2	5
Mass customization	Availability of clothes being fitted to consumer's body and taste in chain stores (such as Reserved, H&M etc.), with the waiting time and cost of the service being much below those imposed by traditional dressmakers.	8.7	9
I don't know		15.0%	
Refused to answer		1.0%	

issues was evaluated with exploratory factor analysis see [15]. All statistical analyses were carried out with SPSS statistical software package.

■ Results and discussion

The first stage of the research set out to examine the usefulness of particular types of sustainable innovations as viewed by Polish consumers of textiles and clothing. The analysis concentrated on the innovations' environmental, social and ethical dimensions. The environmental impacts of textile and clothing products can be considered according to two major areas: impacts on users (human ecology) and impacts on the environment. In the second case, the manufacturing process (ecology of production) and the post-use stage of a product (ecology of waste management) should be additionally examined. The innovations analysed, arranged according to the categories, are presented in *Table 1*.

The first three innovations in the general ranking belong to the field of human ecology, as they minimise the negative impacts of textiles on human health and improve the comfort and safety of use. Within this category, the most useful

innovations for Polish consumers were **textiles preventing bacteria growth** (37.3% of responses), then textiles **ensuring thermal comfort** (32.2%) and those made using processes safe for human health (i.e. without harmful substances – 28.6%). Innovative textiles enabling automatic and gradual administration of drugs (16.9%) as well as fire-protective textiles increasing user safety and decreasing the risk of burns (10.8%) aroused much less interest.

Textiles with health-monitoring devices meant for elderly and sick persons were found useful by the smallest percentage of respondents (6.6%). This innovation was also ranked the lowest in the general ranking.

In determining the usefulness of innovations falling under the category 'human ecology', one must remember that the first three innovations of choice actually meet the personal needs of every user of textiles and clothing (comfort, safety), felt in almost all circumstances. The lower-ranked innovations obviously address more unique needs arising from very special requirements, felt by a definitely smaller group of users. The bottom line is that while the first three innovations

are meant for mass consumers, the last three are developed to fill certain market niches.

Within the category of textile and clothing innovations aimed to **protect the natural environment**, the most useful for consumers were products made of **renewable and biodegradable raw materials (24.1%)**. These innovations were ranked high (fourth) in the general ranking too. Much of the reason for biodegradable products developed by Polish R&D centres encountering commercialisation problems is that Polish producers label them as unpopular with consumers. The survey findings seem to challenge such pessimistic evaluation of the potential of this market segment in Poland.

Innovations categorised as '**ecology of production**' were rated somewhat lower. Textile and clothing products manufactured through environmentally-safe processes (no pesticides, limited consumption of water and electrical energy) were liked by slightly more than 20% of the consumers surveyed.

Innovations stressing the ethical production of textiles (respect for human rights, no child labour involved, etc.) were ranked relatively high (fifth) in the general ranking. Over 22.2% of the respondents found them interesting.

It was surprising to find that innovations involving **mass customisation of products** were ranked almost at the bottom of the scale (last but one). Only 8.7% of the respondents were interested in purchasing clothes fitted to their personal needs (taste, measurements, etc.). The Polish market is apparently not ready for these solutions yet. However, to confirm the truthfulness of the statement, the special character of these innovations should be examined in more detail using also methods other than quantitative and qualitative.

In the next stage of the research, the socio-demographic structure of respondents interested in particular types of innovations was examined to create consumer profiles. The following conclusions were reached through the analysis.

Textiles containing **components increasing comfort and safety of use** were found to be useful more often for women than for men, for people aged 35 - 44 years, residents of medium-sized

towns (20,000 - 100,000), and educated people. Among the socio-occupational groups, service sector workers were the most interested in them.

As regards the demand for **innovations offering thermal comfort**, these were chosen by approximately similar numbers of men and women. The age structure of these respondents is quite irregular, with people aged 35 - 44 years pointing to innovations the most frequently and those in the 65 age group and older being definitely the least interested in them. The demand for this category of innovations noticeably increases with the size of the locality and the level of education (it is the highest in cities with populations exceeding 500,000 and among people with tertiary education, and the lowest in rural areas and among people with elementary education).

As far as the socio-occupational groups are concerned, specialists with tertiary education and managerial staff, medium-level personnel, technicians and on-account workers found this type of innovation the most useful; among the economically inactive these were adult students and housewives. In terms of respondents' financial situation, the innovations were liked the most by persons who viewed their situation as good or very good.

More women than men stated that they liked **textiles facilitating medical treatment**, for instance textiles gradually releasing drugs. Although the product might seem more appropriate for the elderly who suffer from various ailments more often, very young people, to 24 years of age, more frequently chose such textiles. The reason may be that young people are more open to innovative solutions and appreciate comfort.

Respondents living in large towns, people with secondary education, those estimating their financial situation as very good, adult students and service sector workers also chose innovations more often.

The structure of the respondents opting for **fire-protective/slow-burning textiles** is quite irregular with respect to most socio-demographic characteristics (age, gender, place of residence, education or financial situation, etc.). However, such textiles were found to be more interesting to very young (to 24 years) and elderly respondents (50 - 60 years), in particular those living in cities with

populations exceeding 500,000. When the socio-occupational criteria were applied, the textiles turned out to be more frequently chosen by service sector workers, administrative and office personnel, and farmers, and in the economically inactive group by adult students and disabled pensioners.

The socio-economic structure of the respondents who were interested in innovations offering **mass customisation of textile products** is very clear-cut. These are usually very young and young people (to 35 years), people with secondary and tertiary education, people doing office and administrative jobs, managerial staff, people with tertiary education, adult students, and those who view their financial situation as good or very good. Notwithstanding the popular opinion that women more frequently have problems with finding good-fitting clothes, slightly more men than women wanted to buy individually fitted clothes.

Textiles free of heavy metals, toxic substances and chemicals (safe for human health) were more frequently chosen by young people to 35 years of age, educated people, people living in large cities, quite a large group of adult students, and by people whose financial situation was moderate or good.

Health-monitoring textiles are mainly dedicated to sick persons who need to be constantly monitored, or to their carers. However, it was interesting to find that the demand for this type of innovation was the highest among very young people still going to school or studying, own-account workers and farmers, and those who viewed their financial situation as good or very good.

Environmentally-safe textiles were more interesting for women than for men. Not only were they favoured by respondents aged 45 - 65 years but also by young people to 24 years, those living in cities with populations exceeding 500,000, and by people with secondary and tertiary education. Regarding the socio-occupational groups, such innovations first met the needs of own-account workers, but were also liked by medium-level personnel, technicians, farmers and high-level managerial staff.

As far as **innovations falling under the category 'social and ethical'** are concerned, these were usually picked by peo-

ple aged 25 - 44 years, those well-educated and well-off, managers, own-account workers and service sector workers.

Innovative textiles made of **natural/biodegradable raw materials** were more frequently chosen by women than by men, people aged 25 - 44 years, rural residents, those living in medium and large towns, manual workers (both skilled and unskilled), managerial staff, service sector workers and farmers. The group of respondents who liked the textiles had larger shares of people estimating their financial situation as either very bad or very good than the total sample.

Very interesting conclusions have been derived from the examination of consumers' ethical and environmental sensitivity and its effect on the strength of their interest in particular categories of innovations. (See: *Table 2*).

As shown by the analysis, consumers falling under the category 'everyday practice' and those named 'ethical prosumers' are completely different regarding their preferred innovations (a full description of the methods and the scope of the typology can be found in [15]). The two typological groups seem to favour things that are poles apart and the hierarchy of innovations preferred by one group is the reverse of what the other group likes.

The environmental sensitivity of the first type of consumer is manifested through basic environmental practices, such as waste sorting and buying from the local store, which do not necessarily stem from consumers' ethical or environmental awareness. The most useful for these consumers are innovations that directly concern them, i.e. their health, comfort and safety (respectively a, b, c, and d in the table above).

'Ethical prosumers' (i.e. consumers who purchase things consciously based on their knowledge of the producer and the brand do not buy from unethical producers, feel remorseful if they happened to buy from them, discuss ethical issues with friends and family members, recommend buying products made by ethical producers, campaign for responsible consumption or fair trade, and follow basic environmental practices, such as waste sorting) prefer 'niche' innovations (view them as more useful) requiring higher environmental awareness and sensitivity to be appreciated. *People with heightened*

Table 2. Demand for sustainable innovations among Polish consumers in relation to their ethical and environmental sensitivity. **Source:** developed by the author based on research results.

Type of innovation	Everyday practice	Ethical pros/sums
it's difficult to say	83.0	17.0
a. fire-protective textiles	69.5	30.5
b. textiles ensuring thermal comfort, i.e. optimal body temperature, despite changes in ambient temperature	62.0	38.0
c. textiles with components improving comfort and safety of use	60.9	39.1
d. textiles free of heavy metals, toxic substances, chemicals, etc.	58.7	41.3
e. availability of clothes individually fitted with a body scanner in network stores	57.6	42.4
f. drug-releasing textiles	56.0	44.0
g. textiles made of renewable and biodegradable raw materials	54.9	45.1
h. ethically-made textiles	54.1	45.9
i. textiles made through environmentally-safe processes	53.8	46.2
j. textiles with built-in health monitoring devices	52.3	47.7

Table 3. Type of an innovation and its effect on respondents' purchasing decisions. **Source:** developed by the author based on research results.

Scope of innovation	What is the main property of human and environmentally-safe textile products (clothes, bed linen, towels, curtains, etc.) made respecting workers' rights which will make you purchase them despite their higher prices?	% of answers	Rankings
Human ecology	Certified as safe for humans, i.e. made without substances likely to induce allergies, hyperhidrosis, etc.	49.1	1
Ecology of the environment	Certified as produced using environmentally-safe methods, i.e. without toxic chemicals, with low consumption of energy and water, etc.	40.0	2
	Certified as produced using recyclable materials	20.6	5
Ethics (social aspects)	Certified as made without child labour	38.7	3
	Certified as not being produced with infringement of human rights, i.e. made by well-paid workers in a safe working environment	24.3	4
It's difficult to say		3.3	

environmental sensitivity are concerned not only for things that affect them personally but also for those having effect on other people and the environment. To appreciate this category of innovations (j, i, h, and g in the table), an individual must be aware of both current and future impacts of actions that are environmentally and ethically risky.

In the next part of the survey respondents were asked to state what the main reason would be for them to buy textiles made using processes safe for humans and the environment and respecting workers' rights despite their higher prices. The answers are summarised in **Table 3**.

The survey findings presented in **Table 3** confirm that consumers give priority to innovations that belong to the field of human ecology, i.e. ensuring that the textile products will be safe for their users. The respondents recognised these innova-

tions as the most attractive (part 1 of the survey), as well as generating the strongest incentive to buy innovative products (49.1%).

Innovations addressing 'ecology of production' were ranked second (40.0% of responses). In the first part of the survey exploring consumers' interest in innovations this category was ranked lower. Socially-oriented innovations, i.e. products made without child labour (38.7%) and by a well-treated workforce (24.3%) were ranked third and fourth, respectively. These rankings are consistent with the respondents' answers given in the first part of the survey; thus interest in social innovations has an effect on customers' decisions. Innovations falling under the category 'ecology of waste management' were ranked last (fifth). These innovations were the least attractive for respondents considering which products to buy (20.6% of answers).

Conclusion

Textile and clothing manufacturers can no longer rely solely on operational efficiency or technological superiority in order to create a competitive advantage. Companies must place stronger emphasis on consumers' involvement in the search for and creation of innovations today. This process is neither easy nor short, and calls for a well-designed action plan, determination and favourable conditions both inside and outside the organisation. Poland is among those European countries where the level of cooperation between textile and clothing manufacturers, on one hand, and consumers and R&D centres, on the other, is particularly low. This justifies assuming that consumers and users have relatively rarely supported organisations seeking and developing innovative solutions so far.

The basic research conducted under this study aimed to juxtapose innovations prioritised by R&D centres and producers with the needs of the adult population in Poland. The following conclusions have been drawn:

- innovations that Polish consumers liked the most concerned human ecology and comfort of use. Additionally, although priced higher than traditional products, they were also the most interesting for Polish buyers - this choice was indicated by almost half of the respondents.
- the second most interesting products were those meeting certain ecological and/or ethical criteria, i.e. textiles made using processes that are the least risky to the environment or made respecting ethical principles (human rights, non-use of child labour).
- textiles facilitating medical treatment by gradually releasing drugs also attracted relatively strong interest from the respondents.
- innovations that were ranked the highest usually address more 'common', everyday needs of most users of textiles. Those ranked lower are meant for the 'niche' customers and meet needs that can be described as more personal.
- the socio-demographic factors (e.g. gender, age, financial situation, place of residence, education, etc.) and the degree of an individual's overall environmental and social sensitivity are important for the type of innovation he or she will choose.

The findings may be useful For Polish R&D institutions and manufacturers in choosing the most promising lines of research and in extending the proposed approach to segmentation with additional criteria. In the next stage, the organisations should start cooperating with the selected group of consumers to deliver innovative products that will meet true consumer needs, thus increasing the probability of market success. Whether entrepreneurs and R&D institutions will take their chance, or not, will depend on their determination and openness to cooperation, and on Polish consumers' willingness to become their partners in the process.



Editor note

1 To ensure that the survey is reliable and representative, the Public Opinion Research Centre (CBOS) was asked to compile the sample and conduct the interviews.

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