

INNOVATION

MARKETING AND MARKET FACING PRODUCT AND TECHNOLOGICAL INNOVATIONS

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Marketing and market facing product and technological innovations

Monograph

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INTRODUCTION

P. F. Drucker indicated that an enterprise has only two basic functions: marketing and innovations (DRUCKER P.F. (1992)).

The monograph relates to innovations viewed from the standpoint of marketing and customer. The problems of asymmetry of information concerning the quality of potential products and its effect on marketing strategies and promotion within the marketing mix were also analysed. In this regard, the observation of the authors who performed examinations of consumer behaviours connected with perception of energy labels placed on household electrical appliances are also very interesting. The previously discussed ecological problems are continued in the chapter devoted to the development perspectives of transport. Three last chapters highlight the challenges that agriculture and food industry have to face. These challenges, which can be generally defined as technological and market innovations, concern the capability of creation and implementation of new products in the market and the skilful use of promotional potential of national (regional) products.

The monograph represents the outcome of the scientific research performed within international collaboration of scientists from Poland and Slovakia coordinated by Sz. Dziuba, PhD, and editors: A. Bodak, PhD, Prof. A. Cierniak-Emerych, PhD, and A. Pietroń – Pyszczek, PhD.

Being aware of the fact of the multitude of problems in this field, the authors believe that the monograph contributes to exploration of new areas of research concerning innovativeness and represents the topic for the discussion of the scope or limits of the concept of innovation.

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QUALITY OF PRODUCTS AND ITS USE IN MARKETING IN ERA OF INFORMATION SOCIETY

Abstract: Product quality is considered as principal requirement of entrepreneurship sustainability and competitiveness. On the other hand we are looking at increasing number of quality related scandals and increasing mistrust of customer concerning the marketing activities. In time of market and product complexity information asymmetry on the market is rising. Signaling as process of asymmetry overcoming is developed and analyzed in economic theory, but only minimal is developed in marketing. Chapter develops theoretical view at information asymmetry and its forms and combines it with different forms of conformity assessment used in practice. Using criteria of conformity assessment and credibility of information contribution creates classification of signaling instruments for marketing communication and shows examples of their use.

Key words: Times Quality, information asymmetry, signaling, conformity assessment, certification, promotion

1.1. Introduction

Newspaper, journals, TV and internet is full of recommendation for high and/or best quality products. In fact, we will not meet at the market any product about which its producer or seller would say it has bad quality. In the worst case would seller recommend such product as good value purchase where poor characteristics of the product are balanced by its low price. Of course, common sense tells that we can't successfully sell product which is worse than other available alternatives and that speak about product poor quality would mean economic suicide.

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Problem is, that recommendation of all experts and professionals is to prefer by purchase decision higher quality product instead of poor quality products. Although in sounds reasonable, in reality is for huge majority of consumer by huge number of purchased products have difficulties to evaluate and compare quality of available products.

At least there are two reasons why it happens. One reason is lack of capacities by consumer to go through such process of evaluation. Consumers have no knowledge to select quality attributes important by purchased category of product, to compare them and analyse condition of purchase and use. Even if they would have capacity to do that, it would take too long time to really make it. Maybe by purchase of product with big value, i.e. cars, real estate, holiday, higher amount of customer go through such process.

Second reason why consumers make decision about product purchase in situation of imperfect information is rational. Even if they have competencies to value attributes and characteristics of the product they normally don't have information needed for such process. They are several parameters and attributes which are not visible and which can't be evaluated immediately or at all and where they can't get all necessary information. In our contribution we will discuss such situation and its impact on marketing strategy and promotion as part of marketing mix.

1.2. Different meaning of quality

Although we have quality defined in several documents of obligatoriness and voluntary characters achieve overall accepted meaning of quality is rather difficult. In technical society is quality definition given by ISO 9000 standards perceived as axiomatic declaration of quality, but looking at economics and management, sociology and social sciences, or philosophy we will find different perception of the term quality.

It is to be added, that even within the ISO 9000 standard itself, there has been a shift. While the ability to meet the requirements and needs of customers that mentioned the first version of the norms we can

understand very subjective (STRHAN R. 2007), the latest version of standards ISO 9000:2015 defines quality as degree to which a set of **inherent** characteristics of an object fulfils requirements, where inherent means, as opposed to “assigned”, existing in the object (ISO 9000:2015). Use of inherent characteristics as criteria for quality perception avoid subjective customer influence as their existence in the object must be given by formal documents such as product specification.

It is therefore not surprising that the authors have also begun to address the differences in understanding and the definition of quality in the past. As Garvin and Hunt (GARVIN D.A. 1984; HUNT D. 1992) have shown, in practice, different authors in different disciplines understand the quality in a different way. Garvin has identified 5 basic types of quality definition (GARVIN D.A. 1984):

1. **The Transcendent approach.** According to the transcendent view, quality is synonymous with „innate excellence“. It is both absolute and universally recognizable, a mark of uncompromising standards and high achievement, *Nevertheless, proponents of this view claim that quality cannot be defined precisely; rather, it is a simple, unanalysable property that we learn to recognize only through experience. This definition borrows heavily from Plato’s discussion of beauty
2. **The Product-based Approach.** Product-based definitions are quite different; they view quality as a precise and measurable variable. According to this view, differences in quality reflect differences in the quantity of some ingredient or attribute possessed by a product. For example, high - quality ice cream has a high butterfat content, just as fine rugs have a large number of know per square inch. This approach lends a vertical or hierarchical dimension to quality, for goods can be ranked according to the amount of the desired attribute that they possess. However, an unambiguous ranking is possible only if the attributes in question are considered preferable by virtually all buyers.
3. **The User-based Approach.** User-based definitions start from the opposite premise that quality „lies in the eyes of the beholder“.

Individual consumers are assumed to have different wants or needs, and those goods that best satisfy their preferences are those that they regard as having the highest quality. This is an idiosyncratic and personal view of quality, and one that is highly subjective. In the marketing literature, it has led to the notion of “ideal points”: precise combinations of product attributes that provide the greatest satisfaction to a specified consumer. ... Each of these concepts, however, faces two problems. The first is practical - how to aggregate widely varying individual preferences so that they lead to meaningful definitions of quality at the market level. The second is more fundamental – how to distinguish those product attributes that connote quality from those that simply maximize consumer satisfaction.

4. **The Manufacturing-based Approach.** User-based definitions of quality incorporate subjective elements, for they are rooted in consumer preferences – the determinants of demand. In contrast, manufacturing-based definitions focus on the supply side of the equation, and are primarily concerned with engineering and manufacturing practice.

Virtually all manufacturing-based definitions identify quality as “conformance to requirements. Once a design or a specification has been established, any deviation implies a reduction in quality. Excellence is equated with meeting specifications, and with “making it right the first time.” In these terms, a well-made Mercedes is a high-quality automobile, as is a well-made Chevrolet.

5. **The value-based Approach.** Value-based definitions take this idea one step further. They actually define quality in terms of costs and prices. According to this view, a quality product is one that provides performance at an acceptable price or conformance at an acceptable cost. Under this approach, a 500 USD running shoe, no matter how well constructed, could not be a quality product, for it would find few buyers.

A recent survey of consumer perceptions of quality in twenty-eight product categories suggests that the value-based view is becoming more

prevalent. While ingredients and materials were seen as the key quality indicators in such categories as food, clothing, personal care, and beauty products – reflecting a product-based approach to the subject- the study's overall conclusion was that “quality is increasingly apt to be discussed and perceived in relationship to price.”

Consumers hear very often suggestion from experts and politician, that they should in their purchase decision prefer quality to simple price. But if they are facing different form of quality presentation in marketing communication and promotion of products they can be easily confused with evaluation of their purchase decision. Although they will be convinced that their purchase decision was based on quality evaluation their experience during consumption process will be different.

Results of such gap among expectation of consumer and real experience have significant impact on market structure. If we are facing in much higher amount the mistrust into authority, political system and political representation in social environment, the same process in less visible form is taken place in commercial field as well. Recommendation of expert and marketers are full of changing approach to communication, need of peer-to-peer communication and below the line communication tools. Usually it is considered as impact of new media and new technologies, which offer new opportunities of communication. But we could rather consider it as reaction of increasing mistrust and decreasing effectiveness of traditional forms of marketing communication.

Looking on the situation from that point of view, new questions and tasks for marketing research and marketing theory could be set. What are the forms of reliable communication and which impact they have on perception of products? What are the risks of decision making process by consumer looking at quality and quality perception?

1.3. Quality perception and information asymmetry

Different perception of product quality by different market bodies, i.e. supply and demand side is in real market condition presented in form

of decision made on market with imperfect information. Understanding that in real condition product value differs by individuals according their situation destroyed the classical theory of value. Need to adapt economics more to the real situation resulted in neoclassical concept of marginal value. But Marshallian models as representation of neoclassical economic thinking still expected the hypothetical situation of perfect competition.

Perfect competition on the market was as theoretical as labor theory of value and was problem for neoclassical economy to solve practical problems of market situation. Slowly economic theory adapted the real condition of imperfect market and tried to develop concept which allow simulate real decisions made by market operations.

Beside market failure situation, externalities analysis important part of imperfect market analysis became during the 70-ies the analysis of information asymmetry. We can assume that looking at rising safety, health and environmental scandals which were roots of consumer resp. environmental movement, economists tried to analyze reasons of this market failures and missing ability of market to avoid them. Very simple answer, that source of wrong purchase decision by customer was lack of relevant information by demand side, led to attempt describe and analyze market impact of such situation were important information are not equal spread to demand and supply side of the market.

Information asymmetry models as we know from the market, assume that at least one business party has relevant information, whereas the other(s) do not. Normally are information asymmetry models oriented on purchase side, where buyer is not completely informed about condition of purchase.

As opposite exists adverse selection models where one side with better information tries to misuse the situation in favor of the purchase conditions. This situation is connected with moral hazard, where information asymmetry is used to get better condition. As it was described in famous article Tragedy of the Lemons of George AKERLOF (1970) impact of such situation is overall mistrust into market condition and tendency to decrease the price under the real value of the sold goods.

Information asymmetry is process relatively often analyzed and described in economics, insurance and financial economics (BOOD A.D., LEV B. 2000; BROWN S., HILLEGEST S., LO K. 2004; IZQUIERDO S.S., IZQUIERDO L.R. 2007). On the other hand impacts of information asymmetry impact on marketing activity and especially promotion is relatively untouched topic. But if we look at forms in which information asymmetry occurs and adapt it for real conditions of market, we would see that marketing process is by information asymmetry touched on very high level.

1.3.1. Forms of information asymmetry

As we mentioned above, real forms of information asymmetry are very much connected with marketing strategy. In recent strong marketing competition producer face increasing number on competitors from different regions and selling products through different distribution channels. In such situation perception of products as it was described by marketing changes.

Core benefit as it was characterized by Philip Kotler as the center of product level has much lower importance in real marketing strategy. Other product levels as they are characterized by Kotler (MULDER, P. 2012) are much more important. Even generic product could be easily copied by competition. But differentiation achieved through product on level of expected, augmented or potential product is much more reliable and sustainable.

Strong market competition doesn't allow achieve long time core benefit for producer. Even if the core benefit is protected as intellectual property rise and development of similar systems occurs very soon. Core benefit by majority of product categories is rather homogenous and therefore not really suitable for marketing strategy. Differences on higher level of the product can be copied as well, but, on the other hand, because they are marketing develop they use in marketing strategy is much more simple. And especially by characteristics and attributes connected with

this level the information asymmetry is much bigger and misuse of information asymmetry is much easier.

To understand the information asymmetry in forms in which it can occur we need to classify the forms which we can meet in real environment. Although there is no unified classification of information asymmetry forms by basic information concerning information asymmetry we can meet tri forms of information asymmetry (BABAYAN D., KADLEČÍKOVÁ M. 2016):

- **Hidden characteristics,**
- **Hidden action and information,**
- **Hidden intention.**

Hidden characteristics situation is the case where customer² does not know certain, unchangeable (or no longer freely changeable) properties of the goods and services offered by supply-side prior to purchase process conclusion (BABAYAN D., KADLEČÍKOVÁ M. 2016). In the same way he can't judge and determine the quality of the service offered before the contract is fulfilled. Since the seller can move to the buyer the wrong facts, there is the danger that it comes to an adverse selection (disadvantageous selection). Then systematically undesirable contractors are selected as it was analyzed on case of lemons by George A. Akerlof.

During the realization of contract, what in our case is represented through consumption process, hidden characteristics can be identified by demand-side. Hidden characteristics can be marketing problem especially in case, where purchase is not based on personal evaluation of the product but on the base of mediated information. By purchase of products where fitness for individuals is very important (i.e. shoes, textiles) through e-shop, where only limited amount of information about size can be transmitted, can that occur as barrier for purchase especially by atypical market segment.

² Principal-agent theory describes both sides of relation as principal and agent. Looking ad marketing process we will use simplified description as demand-side represented by customer and supply-side represented by seller.

With the **Hidden action and hidden information**, the information asymmetries only occur ex-post, after the purchase has been concluded and during the fulfillment of the contract (CERIC A. 2012).

Hidden action means that the supply-side can't (completely) observe actions of purchase side during the realization of contract. (BABAYAN D., KADLEČÍKOVÁ M. 2016). With use of hidden action can we meet especially by strategy based on product perception on higher level. If marketing strategy and communication moves from core benefits and generic product toward augmented and potential product several forms of hidden action can be used by producer. Costs of free services, accessories and additional equipment, repair parts and services costs are for customer hardly to identify and therefore difficult to compare with other products.

Hidden information occurs when the demand-side can observe the actions, but quality and relevance of them cannot be assessed (eg due to a lack of specialist knowledge).

In both cases, the problem is that the demand-side, even after contract fulfilment (ex post), can't judge whether the result was achieved through skilled efforts of the agent, or whether (or how much) the environmental conditions affected the outcome (CERIC A. 2012).

If, for example, you go to the doctor with a cold and get prescribed medication, then it is rarely clear whether the improvement would not have occurred without medical assistance ("A cold takes a week, you go to the doctor only seven days."). The demand-side can use the principles opportunistically without being subsequently exposed, which is called moral hazard (TUMAY M. 2009).

Even if the demand-side has opportunities to observe the action of the seller and there are no hidden action and hidden information problems, then in certain cases problems may still arise. It is because of **hidden intention**, where demand-side ex ante does not know the supply-side intentions. If the principal makes investments that he can't reverse (irreversible specific investments, English sunk costs), he comes into a dependency relationship with the supplier. After conclusion of the contract, he no longer has the opportunity to induce the supply-side to act

in a desired manner (no credible threat potential). In this context, one speaks of the “hold up” threat when the supply can exploit this to give himself an advantage at the demand's expense.

Another example from service market was content of John Grisham legal thriller novel Rainmaker (GRISHAM J. 1995). In this case, health insurance signed the contracts with intention not to pay their duties by the first requirement. As they internal standards prescribed firstly reject all bill, they refused several customers from payment of their duties. Similar examples of intention by insurance and financial institution are often complained by customer organization as the “special conditions” of contract are written bellow the line, in annex or in small unreadable letters.

Of course by some forms of information asymmetry we can't identify if it belongs to one or another form. Activity which can be described as hidden in form of information asymmetry can have more aspects, i.e. intention, action and characteristics. Important is to understand what is necessary to avoid misuse of information asymmetry by company.

Although misuse of information asymmetry can be part of activity of one or two companies, it is necessary to understand that it has impact on whole market. Experience of customer with misuse of information can influence credibility of whole market and that makes the condition of sellers much more difficult. Negative communication of experience with insurance or credit companies can have huge impact on customer willingness to sign new credits.

Understanding of different forms of information asymmetry can be important by avoidance of its misuse. Different forms can be effectively solved through different tools, which again cause different cost and funds. Therefore is important to understand the instrument, which can impact of information asymmetry on market effectiveness decrease or avoid.

1.3.2. Signalling as form of information asymmetry overcoming

Existence of information asymmetry has negative impact on market situation. As it was proved by Akerlofs case, it can throw high-quality products out of market. Especially in time of scandals and negative information about products it supports trends to move toward low quality products sold for low price. Low price can be achieved only through decrease of costs what again results in decrease of quality of the product.

We assume that overcoming of information asymmetry is not only the task for commercial organization, which can achieve competitive advantage. Because of positive environmental, ecological and social impacts of trust into quality, safety and reliability of products it should be part of interest of government as well.

Process of overcoming the information asymmetry is in economic theory described under the term signalling. Signalling theory focuses primarily on the deliberate communication of positive information in an effort to convey positive organizational attributes (CONNOLLY B.L. ET AL. 2011). Impact of different signals can differ. Some signals of quality may be more readily detected by the receiver than other signals are, so management scholars sometimes suggest that signals may be “strong” or “weak” (CONNOLLY B.L. ET AL. 2011).

The most theoretically developed and described form of signaling is reputation. **Reputation** as well as similar forms of **references** describes the situation where the prestige achieved by building customer confidence is a way of reducing risk. However, there is a high risk for the offeror if he is not able to confirm the built-in image by objective evidence.

Very good analyzed is reputation by online markets, where it is particularly important. Cabral emphasizes the important role of reputation as a mechanism for establishing trust to address the risk of fraud in online transactions: “While there are various mechanisms to deal with fraud, reputation is one of the best candidates—and arguably one of the more effective ones.” (AGRAWAL A.A., CATALINI C., GODFARB A. 2014).

Designers of online markets have developed many mechanisms for establishing trust through reputation, which can be divided into three types of tools: (1) quality signals, (2) feedback systems, and (3) trustworthy intermediaries. Quality signals as tool is connected with brand strategy and brand equity. Feedback system is achieved through reporting and/or review system, where ranking achieved by evaluation is considered as important measurement of quality especially in services. Trustworthy intermediaries reflect the importance of place where purchase is made. Perceived quality of product purchased through online market is influenced by credibility of place where purchase is made (AGRAWAL A.A., CATALINI C., GODFARB A. 2014).

Another form of signal which the signaling theory considers as form of signaling is a **product warranty**. Since Spence paper (1977) several studies has shown the signaling relationship between the product and its warranty. A longer and more comprehensive warranty usually indicates better product quality (LI K., CHHAJED D., MALLIK S. 2005).

Warranty and guarantee can be used as efficient signal of reliability and safety of goods. Liability for product faults, injury caused by product and for costs caused by defect product creates good instrument how to avoid information asymmetry in the most sensitive aspect of protection of health and life of people. Inside this form we can see obligatory influence of government in forms of regulated warranty period, as well as voluntary tools of competitive advantage especially by prolonged guarantee period.

Longer warranty or guarantee period can be considered as good instrument of hidden action and hidden information avoidance. Insurance theory sees the role of warranty in form of insurance against product failure. Because consumers are more risk-averse than sellers, so that warranties are provided to consumers as a form of insurance and as compensation paid to consumers in case of product failure.

Of course in can't solve problem of hidden intentions, when time schedules for warranty are set without scientific evidence of product reliability and durability. In that case prolonged period is used only as

marketing instrument whereby barriers of commitment filling are set in contracts in administrative form, i.e. need of original invoice or proof of payment, use of specific complementary products, weak setting of banned manipulation instruction.

Last form of overcoming information asymmetry is information about the product. From marketing point of view we can see information delivered to customers as form of signals of attributes and characteristics. After enactment of liability for misleading marketing, promotion and use of information, misuse risk for consumer decreased. Although producer have still opportunity to use variety of marketing tricks of creating excessive expectation about purchased product, they must much more carefully deal with information and data offered to support the situation.

In several product categories, where extensive use of information was creating false expectations, government created obligatory principles of information use. Typical example are food supplements where very often marketing tried to create perception of medicine and healing effect, although such effect could not occur by existing concentration.

As we can see, these tools are very closely related to marketing. In some aspect all mentioned instruments provide information which decreases the negative impact of information asymmetry. As part of communication between supply and demand sides we can find such activity in regular form. The name and prestige of product and producers can't be achieved without the use of promotion activities and quality signaling plays important part of that communication.

Information can be considered as a basic tool for reducing information asymmetry. First, they are also necessary for the effective use of the other two instruments, but they also form the most extensive and most widespread toolbox to overcome the demand-side information deficit.

Information is about providing information about products and their offers and it is the most common way to overcome the consumer's information deficit. Consumer ultimately decides under conditions of uncertainty, but the supply-side can offer sufficient information to make

his decision. Seller of course focuses on the positive aspects of his product, but using information from competitors can customer generate comparison of products with expectation that truth is assured through the competition.

On the other hand, customer has little chance to verify where the information is the result of controlled process and where it is part of marketing communication and information is adapted for marketing purposes.

1.4. Classification of signaling instruments

Although we mentioned above that signaling and methods of signaling have a lot to do with marketing and promotion, in reality we see lack of relevant recommendation and theoretical principles for use of signals. We mentioned several studies concerning the problem of signaling but as we mentioned mostly they deal with topics of financial market and services and give only seldom recommendation for practice.

On the other side, we can see that producer can select from wide range of signal. If they are don't have recommendation and criteria, choice of used signals, is rather result of empirical knowledge as form of professional decision process. Number of existing signals raises the related issue of *signal consistency*, which is defined as the agreement between multiple signals from one source (CONNOLLY B.L. ET AL. 2011).

The seller must look at credibility by every individually used signal. Use of low credibility signal can harm the perception of product quality and is, at least less efficient. If the signal used in communication can't separate the offer of different producer among high and low quality sellers, the efficiency of use of such signal is again very small. Signal suitable for high quality products should be available for producer of low quality only with such attempt and financial instrument, which created effective barriers for misuse of signals.

1.4.1. Signals and conformity assessment

Signals represent form of information asymmetry overcoming. Through signal gets demand-side information that its expectation regarding the product will be fulfilled.

In technical processes as part of international trade are processes of fulfilling the requirements covered through conformity assessment processes. Conformity assessment became important for international trade after the GATT agreement declined the role of tariffs and quantitative measures as barriers of trade. Very soon the negative impact of voluntary and obligatory processes of product evaluation, regulation and assessment became visible by achieving the GATT goals (KOLLÁR, V., KRISTOVÁ I. 2007).

Starting with Tokyo round and finishing with Uruguay round GATT continuously improved their interest in processes of technical barriers of trade. As part of technical barriers processes of conformity assessment became more important for international trade.

By definition of conformity assessment process we can built on work made by International organization for standardization ISO. In ISO standard ISO / IEC 17000: 2004 is conformity assessment defined as evidence that the specific criteria relating to the product, process, system or person have been met (STRHAN R. 2009) . It is therefore clear that a positive result of a conformity assessment means for the consumer to verify that certain specified parameters, characteristics, characteristics of the product are met.

If concept of conformity assessment is good described through the work of ISO and GATT and signalling concept is developed through the economic theory we can put both system in ones especially, if we accept the variety of processes, which belong to the conformity assessment systems. According to the participants involved in the functioning of the conformity assessment system, we can also distinguish three different types of systems (STRHAN R. 2012):

- **Conformity Assessment by the First Party - Declaration of Conformity**, in which the Offeror declares in his official form and by way of meeting the required criteria.
- Second Party Compliance Assessment are based on assessment made by customer on the base of customer requirement.
- **Third Party Compliance Assessment** where the third party's compliance with the requirements and criteria is verified by the third party. If this third party involved into assessment process fulfils criteria of independence, knowledge, etc., process can be characterized as certification.

1.4.2. Signal and credibility

Conformity assessment system as we classified it above has very close link to system of signals as we mentioned as part of economic theory. By reputation is clear that the main part of reputation is based on system of assessment through customer, i.e. second party assessment. By information we can meet variety of real content, ranking from declaration of achieved characteristics to information showing meeting really demanding requirements. Even for economics analysis of impact on information asymmetry different perception of information can influence the results of scientific work.

Years ago we tried to adapt conformity assessment system of product oriented government policy. Increasing number of different voluntary and obligatory systems of conformity assessment let us think about the differences of government intervention into process of conformity assessment. Depending on the degree of state involvement, we recognized three different types of systems (STRHAN R. 2012):

- **System without government influence** where a conformity assessment system is the result of commercial or non-commercial activity of market participants, and the results are only rarely taken into account by the State and its authorities. There is no need for

entrepreneurial activity in this case, as systems also arise in areas of public interest with indirect support from public sources.

- **Systems with indirect participation of government** and institution a state where the state by its legislative activity, the institutional system creates the prerequisites for the development of the systems and to a certain extent accepts their results, but the actual implementation and operation of the system takes place without the direct intervention of the state and the state authorities.
- **Systems with direct participation of government (authorities)** where compliance assessment is a condition for the market activity of a business entity and the system of conformity assessment and information provision becomes part of state intervention in the market.

Such a classification solves problem of classification of signals credibility only to some amount. State intervention into conformity assessment system increases its credibility. On the other hand by signal are we facing much wider range of available forms and not can be formally adapted as government systems.

In that form we can use slightly modified form of feedback form by conformity assessment. Instead the government impact we could use the use of control systems as criteria to divide different forms of feedback and checking system.

Lowest credibility we can assume by **systems without feedback**. We can't say that there isn't any control system for such information. Due to legal situation company is liable for all untrue information used in communication and presentation of product. Although liability legislation makes situation of damaged customer stronger, still process of proving the occurrence of damage is very difficult for normal customer. Therefore such system has very normally very weak credibility based on personal presentation and reputation. Especially for new customer and people not involved into process (without insider information) is then such system very risky and that opens the opportunity to use hidden activities.

System which want achieve higher credibility should develop at least **informal feedback system**, where stakeholder, customer or user can control and inform system provider about misuse of the conformity assessment and about its weaknesses. Such system can be created through informal reporting scheme, where negative experience can be shared or advanced toward system provider. Besides that exists inside the system control and inspection system avoiding or identifying the hidden activity attempts. The applicability of the rights of system provider can be difficult in the case that company, which broke the system rules, doesn't follows the rules.

Formal feedback systems can use for it applicability legal market surveillance system. As we mentioned above, all system with state intervention have such position. Because they are based on legal regulation, market surveillance bodies are responsible to oversee following the rules and they can use legal instruments in case of rules breaking. Besides that some systems using the formal system of laboratory accreditation and authorization can achieve such position.

1.5. Signalling of information asymmetry

Although there was a lot of research made in the field of information asymmetry and signalling, we are still missing classification system, which would help companies to decide how to communicate their products without risk of misunderstanding.

One aspect is involvement of different persons into process of signalling. As we used the work made in international trade and avoidance of technical barriers, we identified three bodies which are included into process of signalling. First is the producer itself and its promise to fulfil requirements, second is involvement of user, customer or other representative of demand side and third is involvement of third more or less independent body, which will evaluate the fulfilment of requirements.

Second aspect, we considered as very important, is credibility of signal. We identified the existence of formal system of inspection and control as the criteria, which can communicate the credibility of system for public.

In marketing and management literature are matrixes considered as very useful and efficient form of market situation analysis. With very simple use of two axes we can through two levels achieve 4 classes and three levels will lead to nine different classes of the market. In our case we have two axioms of signalling system with three different level, what allows us to create matrix with nine different position.

Our attempt to identify signalling matrix to identify efficient form of information asymmetry overcoming can be found in Table 1.1.

Table 1.1. Signaling instrument matrix

| | | HOW? | | |
|------|------------------------|----------------------|--------------------------|------------------------|
| | | Without Feedback | Informal feedback system | Formal feedback system |
| WHO? | Declaration | Persuasive Promotion | Informative promotion | Liability system |
| | Customer assessment | References systems | Review systems | Award systems |
| | Third party assessment | Comparative Testing | Labelling systems | Certification |

Source: Own processing

First two categories in our matrix are connected with traditional marketing approach. Every marketing communication can be considered as information transfer, and even promotion can be defined as the provision of information about the availability and quality of a commodity (STIGLER G. 1987). Although even persuasive information can be considered as information, advertisers spend resources trying to persuade consumers with “creative” content that does not appear to be informative in the Stiglerian sense (BERTRAND M. ET AL. 2010).

Research in advertising impact can be according CHANDY R. ET AL. (2001) classified into two streams: laboratory studies of the effects of ad cues on cognition, affect, orientations and econometric observational field studies of the effects of advertising intensity on purchase behavior. As point CHANDY R. ET AL. each type of research focuses on different variables and operates largely in isolation of the other (CHANDY R. ET AL. 2001).

Research made for consumer credits case (BERTRAND M. ET AL. 2010) suggests that seemingly non-informative advertising may play a large role in real consumer decisions. But even in that research they had modest success predicting which specific content features would significantly impact demand. One interpretation of this failure is that we lacked the statistical power to identify anything other than large effects of any single content treatment, but it is also likely that some the findings generated in other contexts did not carry over to ours.

Results of survey in that case fit with a central premise of psychology - that context matters. We can state, that we know little about how, and how much, such advertising influences consumer choice in natural settings.

Indirect proof of lower efficiency of such form of signalling we made some years ago as part of thesis research. Group of students have to rank five products on the base of their description. By product description different forms of presentation were used, including the certification and labelling schemes, informative objective attributes and relative persuasive advertising statements. Although the group was small and there was not deeper scientific analysis of results, in majority of answer the declaration using the subjective (persuasive) form of description was placed the last, as product with lowest perceived quality (GROSMANOVÁ L. 2011).

Last form of signalling in form of declaration we called liability systems. As instrument of state intervention we can consider product liability as very powerful pressure on producer make declaration on the base of scientific proof.

Under this system we place even legal regulations managing use of positive and/or negative impacts on consumers. Such restriction for information we know from cigarette market (need of information about negative impacts) or from nutrition supplements and other similar products with health impact (i.e. herbal tea). By them legislation restrict use of positive information about medical impact on very clear set content requirements.

As we mentioned, negative of first party assessment is the subjectivity of evaluation and relative high risk of hidden activities as they are described above. By second side assessment such risk still exists, but especially by professional customer is relatively lower. On the other hands higher is the risk of hidden activity from demand side, i.e. situation where evaluation will not be made correctly to the hidden intentions of customer.

Second party conformity assessment are closely related to reputation as form of signalling. In that case it is difficult to set exact definition of activities, which belong under that form. In marketing literature are some of activities created into form of reputation management. This term originally from public relation theory was used to describe active form of influence the way how are company products characterized and described by third, especially online available social media. Reputation management is then the systematic form how to influence presentation of products social media and networks where producer have only limited opportunity to control the information flow. We can consider reputation management as protection against negative results of evaluation made by customer and as such the process should be systematic and strategic (CONOR C. 2016).

We can find in literature some studies about impact of **references or review** on perception of products (HERR P.M., KARDES F.R., KIM J. 1991). Most of them have theoretical source in brand analysis and deal with brand development as form of signalling. Some consider references as part of Word Of Mouth marketing and analyse the impact of WOM activities of brand.

Internet era brought new opportunities for disruptive market innovations. They mostly are connected with shared economy. Principles of existence of disruptive innovation, shared economy and e-solutions are very similar.

All three processes with their similarity have the same problem with information asymmetry and its overcoming. Because they are made for low-end segment and based on low-cost system they can difficultly apply the approved forms of overcoming known from mass market. In the same way use of same regulation form as we know from existing offers normally will have destroying influence on such solutions.

We can mention recent judgement of European Court of Justice where Uber was classified as company working in transport systems, not in IT segment (BOWCOTT O. 2017).

In countries where government will use the same regulation as is used for taxi services, Uber must probably close their activities. In countries, where specific regulation for shared products is/will be prepared, Uber can develop their activity and use benefit of the product.

New type of products for shared e-markets needs new form of signalling, which will work effectively and have relatively high reliability. That was the origin of new type of commercial activity combining the individual activity with customer evaluation and reference system. We know the aggregate systems from different forms of market, but especially in service they are very popular and very successful.

We can mention booking.com, Airbnb.com or tripadvisor.com as best examples of such approach. They offer services according their interest and made aggregation from different mass or individual offers. Of course especially by small services has company problem how to signal quality without negative impact on economic results. It is problem for company which offers such products and in the same way problem of provider of aggregation, because input inspection and control would cause additional costs and ruin the strategy principles.

Solution how to allow low-cost acceptance of offer in combination with avoidance of low-quality offers and hidden activities as necessary to

achieve high reliability of overall product (system) was very simple. Declaration of quality as first party assessment, achieved through system of internal audit or prescribed information offered by offering company was improved through formal feedback system from user and/or consumer. Existence of feedback system has the same influence on product perception as can be achieved through Word of Mouth marketing, can be used from consumer without need of personal knowledge or market proximity.

System, we speak about, have some similarities in form of their feedback system. We made distinction according to level of feedback requirement which are set for user/customer.

System with use of **reference** we can consider as the lowest level of feedback. User/consumer evaluates the consumed products in rather poor form (i.e. likes, stars system) without evidence of their experience and/or expert knowledge. Especially by low number of references is relatively high the risk of hidden intention by referencing.

In December the most popular Slovak economic journal Trend published article about existence and risk of payed referencing in health sector. Private medical companies declared that they have evidence about “strange” negative references describing negative experience from persons (accounts) which they do not have in evidence as customer. Some of such institution confirmed that they have got offer to increase the number of positively references at Facebook or other forms of institution presentation (webpage, aggregate web of medical services etc.)

As specific reference system we can consider BestBuy prize, which use some companies as instrument to communicate the value of their products. By deeper view in process of evaluation we would discover, that the base of award is questionnaire made by market research institute, in which respondents answer their perception of price/quality relation by different categories of products and services. In that form is the prize only reference of customer perception of price quality relation.

Use of the prize as proof of product quality would be example of misleading information, because quality is in that system not evaluated.

Company Lidl which uses this prize systematically declares that award is the results of customer decision that Lidl products have best relation price and quality.

Second form of **review** expects higher involvement of customer in evaluation process. We assume in this category to find forms of evaluation with control and check of personal experience with product and some form of personal identification, structured evaluation and need of open evaluation. Through that, the risk of hidden activities is lower and the perception of evaluation made by customers is higher.

Review system created second step in formation of internet aggregation systems. If we look at system as booking.com, trivago.com (to mention maybe the best known systems) the evaluation can be made only by user with personal experience with the system. Although the evaluator mustn't be public, system has relevant information, which allow identify the user exactly for the case of misleading activity. Although it doesn't avoids cheating by reviewing, it makes it much more complicated. Evaluation is structured, and asks about several aspects of attributes important for the perception of quality. Reference of evaluation is accompanied by word evaluation what allows to have better view inside the evaluation process.

Another benefit of review systems is possibility to use experts as part of evaluation. Through expert experience and review customer can get high level information. Of course such expert review must be written in objective form and create visible perception of independence.

Expert review and evaluation system we know from especially from technical products where technical content of product is complex and difficult and testing process by product takes long time. Short drive experience by car use or testing of IT or electronic equipment during purchase process, can't give relevant information about product functions and attributes. Very often in such situation are consumers visiting review made by professional.

Second category of products where review is used frequently are services where products perception is based on sensitive attributes. By

restaurants, movies or theatre productions are review the most important instruments which can decide about success of the product. Number of good voluntary reviews from customers is replaced by one expert review

Professionals with experience use their knowledge and on the base of personal use and experience with product, they write objective evaluation of products with its positive and negative aspects. Because requirements of different consumer groups can differ, even aspects perceived by one category of customers as negative, can be evaluated by other category as positive. As we already mentioned such systems are known from technical products and review in this category of products are considered as very important.

Last form of second side assessment we covered under **Award systems**. Awards are relatively often used in communication of quality and product attributes. Difference among review and award is in formal presentation of achievement.

By review and references we deal with individual activity of user and credibility of the presented information is achieved through the number of evaluations. By award system the reviews are summarized and compared and on the base of criteria which are set comparison of different products available on the market is made. Although formal inspection system is not used, public presentation of results makes the opportunity to misuse the system almost impossible.

Such award system can achieve relatively good resonance by customer, but not always is representing the real quality of products. On the other hand it is relatively cheap and doesn't require scientific evidence.

On the market we can find several examples of award system based evaluation. Important boost for movies has nomination and winning of Oscar (in USA) or European Film Awards and similar system we know from several forms of art (cinema, music, theatre, literature, books, design, architecture) or sport. Usually they are based on evaluation made by experts (member of the committee or organization providing

evaluation) and through summarization of such evaluation and comparison different products the winner of awards are set.

Similar system based on the customer, user or supporters evaluation is system of popularity awards again known especially by art products or sport. In that case the expert view is replaced by much higher number of evaluations in form of votes from “customers”. Of course, credibility of such evaluation is relatively low. Especially cultural products are difficult to evaluate and very subjective and people can have problems to evaluate them. Therefore sum of experts view in form of known award can be very good help by purchase decision. As we know such awards work very efficient and boost the products sales.

But such system we can find not only by cultural products. System of awards we know from services and products as well. One of the most used award system, which plays regularly important role in marketing and advertising is Car of the year award. This competition compares attributes and expert experience of cars, which applied for the award. Experts are representing different countries and different journals who write about automobiles and car market. Their evaluation is perceived as good signal about achievements of different producers although their don't represent traditional third party system. Beside car, we can find such system of awards by electrical equipment of in IT industry. From food production we can find such system of awards for example by wine competition, where wine testing results can have high influence on selling price and strategy of sale of the wine.

Highest form of assessment is use of third party. **System of third party** became very popular in recent years. Declaration of quality by independent body increases credibility of such information. Of course it allows several forms of misleading activity especially. Traditionally third party assessment requires independent and scientific approved third party. Customers are facing by evaluation of third party giving recommendation of product the same problem of information asymmetry as by product. Uncertainty about hidden attributes of product is replaced by hidden attributes of third party. Therefore is important distinguish third party

evaluation according the level of feedback which is used by third party. According the previous forms we can use the same three levels of credibility of control.

As lowest level we placed **comparative testing** of products made by third independent body. Comparative testing is similar to review system as we mentioned above. If reviewer is independent expert, i.e. journalist, review has several aspects of third body assessment. On the other hand by review are not set criteria, which would allow comparison of different products available on the market. By comparative testing as form of conformity assessment first step of evaluation is creation of criteria and their weight. Through such criteria, the requirements on products are set, and products are on scientific level compared. Evaluation is based on scientific principles even by evaluation of subjective attributes.

Example of comparative testing we know as part of consumer protection policy and it is wide spread in several countries of the world. Probably best known system is system of Warentest Stiftung, which organizes testing of products in Germany. Tests are based on products taken from the market, published in printed form in journal Warentest and online on webpage. Producer, whose products were placed among the best, can purchase the right to use logo of test results as part of their communication for limited period of time. In that way system is financed without creating pressure to decrease the requirements.

Labelling system create higher form of third party assessment. We decided to distinguish labelling system from traditional certification systems although they are very close. Actually we can meet system where would be difficult to divide if it belongs to one or other category.

In our table one axiom is created through level of feedback. Influence and participation of government or state authority we considered as important signal of independence and assurance of feedback. In that way we want in our classification distinguish systems with higher level of formal feedback from commercial activities using some aspects of certification.

Under labelling systems we understand especially voluntary systems where several principles of certification are used. They are exactly set quality requirements, standardized processes of assessment, third body participating on assessment. Independence of third body is relatively high and control systems are set in possible form.

System declared as labelling system is for example FairTrade scheme. FairTrade products must fulfil special requirements in field of social, economic and environmental development. Although there exists inspection system creating feedback about hidden activity of producer, relative decentralized system of national bodies doesn't allow increase operability of the system. Same principle we can find by labelling schemes based on place of origin labelling. Differences by individual regional system create barrier by inspection system and its efficiency.










Certification system represents highest level of signalling in form of methods of evaluation of products and credibility of information by overcoming information asymmetry. Using third party by conformity assessment increases the efficiency of information transferred to customer, so they know that they get such information which are relevant for their product decision. Use of credible system of control and feedback assure high reliability of information content what again has influence on information asymmetry.

Typical certification systems as we know them use direct or indirect intervention of state authorities. It can be in participation by creation of certification system, its realization or by control and inspection system. Environmental labelling in European countries is based on European Directive applied into national legislation. System is realized through by government authorized organization and evaluation is made by authorized testing authorities. Because state impact results are subject of control by market surveillance bodies with corresponding legal consequences.

Example where labelling system transferred into certification system according our classification is FSC certification for responsible forest management. It started as private initiative of environmental activist, with

aim to protect especially jungle forest. Later were principles developed for overall management principles of sustainable management. And further step was the use of formal system of accreditation of certification bodies realizing the system of certification.

Table 1.2. Example of signalling instrument matrix use

| | | HOW? | | |
|------|------------------------|---|--|---|
| | | Without Formal | Informal feedback system | Formal feedback system |
| WHO? | Declaration |  |  |  |
| | Customer assessment |  |  |  |
| | Third party assessment |  |  |  |

Source: Own processing

In table 1.2 we adapted information from text and additional information about different system of quality evaluation. We used existing examples to show, which practical examples we can find by different forms. As we tried to point in text, we don't consider such systems of evaluation as good and bad.

By all evaluation systems we expect as their goal to inform customers about product attributes and benefits. They can, doing that, decrease risk of purchase decision. Of course due to capacities and situation they have different credibility and informative value. If they try to sell them as better as they are, they destroy, in some sense, the purpose of their existence. Besides that we can expect that soon or later such discrepancy

among the communication and reality will be discovered and repair of negative impact of such information can be even more costly as the avoidance of such situation.

1.6. Conclusion

Increasing market sensitivity and quicker transfer of information at the market make the work of marketers more difficult. They must react to the negative information much more efficiently. Highest efficiency has prevention of such information. Existence of information asymmetry is the matrix for rise of negative reaction of the market. Hidden activities are in short period efficient form how to win new customers and increase sale. In time of social media and strong competition hidden activities increase the risk of hidden activity detection. That can have long-time impact of product and company perception.

As we mentioned in article, marketer at the moment lack information about efficient form of communication to avoid such negative response. We used information about principal-agent theory, information asymmetry and combined them with principles of conformity assessment and own analysis of different evaluation system available on the market. Doing that, we created matrix expanding knowledge about signalling forms. Created matrix opens for marketing new alternatives for strategic decision by communication strategy. Using it can be useful to develop efficient strategy which can attract the wishing target segment.

On the other hand we must consider the matrix proposal as first empirical step in research of it. To assure for marketer real achievement of marketing goals we need more information about perception of signals on different levels and in different position. Although we already made some attempt to identify that, much more work must be done. Scientific evidence of difference by perception of different forms of signalling would support the use and attractiveness of such matrix form.

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PERCEPTION OF ENERGY LABELS IN SELECTED HOUSEHOLD APPLIANCES

Abstract: The energy label represents one of the most important EU policy instruments, in order to achieve the energy goal of reducing energy consumption, by increasing energy efficiency. The current research is to assess the importance of the energy label during consumer purchasing decisions when buying a household appliance. The survey was conducted using an online questionnaire, distributed on Facebook, on sites that were dedicated to purchasing domestic appliances. The results were processed in statistical program SPSS, version 22.0. To verify the statistical significance of interrelationships between variables, one-dimensional variance analysis (ANOVA) was used. Our findings reveal that the energy label holds third position as a criterion in consumer decision making after the price ceiling and the brand reaching first and second position respectively. The energy label is considered to be an important parameter when purchasing a home appliance for 3/5 of the respondents, in particular in age groups above 35 years. The research also shows that high percentage of young people (53.4%) consider energy labels as unimportant. The originality of this study lies in shedding more light into consumer behavior linked with energy label information on household appliances.

Key words: consumer behavior, household appliances, energy labels, sustainable behavior

2.1. Introduction

The Energy Label represents one of the most important EU policy instruments, in order to achieve the energy goal of reducing energy consumption, by increasing energy efficiency (DIRECTIVE 2012/27/EU). Energy efficiency of household appliances has improved since the

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introduction of the Energy Label in 1992. However, actual electricity consumption has increased by 2% per annum from 2001 to 2011. This trend can be partly explained by a higher level of equipment, a general increase in basic comfort, population growth (ANIBALA *ET AL.* 2011). Although, some European countries (for example the UK) were able to significantly reduce the energy consumption per capita, in recent years, the overall 27 EU Member States consumption has declined very little and many countries have even increased their energy consumption (EUROSTAT. 2013).

The effectiveness of energy labels can only be properly evaluated based on buyer behavior. However, empirical data regarding the impact of energy labels on buyers' responses are very limited and there is a lack of studies on understanding consumer behavior linked with energy labels and consumer consideration of the information on the labels in their purchasing decisions. A few studies have examined the impact of an energy label on consumer choices' regarding household appliances (SAMMER K., WÜSTENHAGEN R. 2006; SHEN J., SAIJO T. 2009; WARD D.O. *ET AL.* 2011, HEINZLE S.L. 2012).

2.1.1. Historical Development of Energy Labeling

In 1992, the Council of the European Communities presented an energy label, aimed at the consumer at the point of sale. The directive on mandatory labeling of household appliances took effect on 1 January 1995. Under the EU Directive, each country is responsible for executing, implementing and enforcing the national legislation. According to the original scale, the European Union Energy Label measured the energy efficiency of products on a seven-point scale from A to G, while it was applied to more than one appliance and was later adopted in several countries around the world, including China, Brazil, Iran, Egypt and others.

The Energy Label should facilitate an energy-saving selection of electrical products. It provides two sources of information: Energy

Efficiency and Actual Energy Consumption – to assess the energy efficiency of an appliance (DIRECTIVE 2010/30/EU).

The letter scale originally ranged from A to G, with A marked the most effective products and G those that were the least effective. Whilst the original idea was to have only the best appliances “A-rated”, this highest class of energy efficiency has become de facto the standard in many product categories to such an extent that up to 90% of products such as refrigerators, dishwashers and washing machines on the European market nowadays belong only to this category (European Commission, 2010).

The rapid development of highly energy-efficient appliances and the banning of those inefficient on the market required the introduction of new rating classes with the aim to distinguish between the best-rated products (A) in the field of energy efficiency (DIRECTIVE 2012/27/EU). Two solutions were designed to overcome this problem. One of the options, favored by consumers and environmental organizations was to maintain an existing seven-point scale from A to G, but with the condition to tighten the evaluation criteria on a regular basis, so that only the most effective products would be labeled in category A each year. The product that would be placed at the top part of the scale in one year would then be transferred to a lower class next year. This option would require the inclusion of label data of how long the label will be valid. The second option, supported by industry associations, was to extend the scale by introducing a new "beyond" category. The energy efficiency class of a particular appliance would remain unchanged over time, so there is no need for an updated label in the retail store (HEINZLE L., WUSTENHAGEN R. 2012). After months of discussions and debates on different proposals in the autumn of 2009, Members of the European Parliament and representatives of the European Commission reached an agreement. They approved the use of letters A to G for classification, but also the implementation of three additional classes at the top of the existing class A (A+, A++ and A+++ for the most efficient products). However, the new proposal also limits the total number of energy classes to seven

(ECEEE, 2009). The layout of the existing energy efficiency label gives space for up to three new energy classes, to reflect technical progress.

The new Energy Labeling Directive has introduced new energy efficiency classes A+, A++ and A+++ to the top of the existing classification. For the most energy-efficient household products, the most effective class is represented by the label A+++.

However, the total number of classes remained still limited to seven. "A" to "G" meter can look like this (Fig. 2.1).

- If the highest class is classified as A+, the lowest class will be F.
- If the highest class is classified as A++, the lowest class will be E.
- If the highest class is classified as A+++, the lowest class will be D.

The color labeling system has been appropriately modified accordingly so that the highest energy efficiency remains dark green and the lowest energy efficiency class red.



Fig. 2.1. Illustration of Energy Efficiency Classes with two Label Options (The Scale A/G vs. the Scale)

Source: Assessing Consumer Comprehension of the EU Energy Label, 2016

The new label is linguistically neutral - the text was replaced by pictograms and the label is the same for all 28 Member States. The icons at the bottom of the EU label will vary depending on the product type and will provide additional product information, such as its water consumption, noise, or capacity in the case of a washing machine (Fig. 2.2).

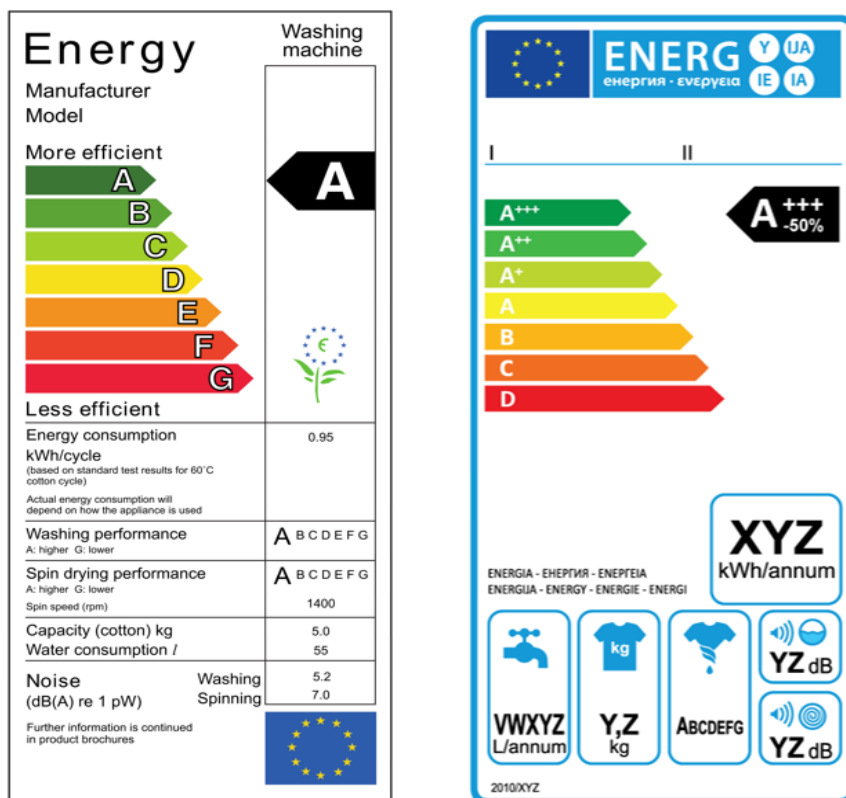


Fig. 2.2. Energy labeling for washing machine before and after 2010
 Source: *Assessing Consumer Comprehension of the EU Energy Label, 2016*

The legislative process, however, insufficiently reflected the technological development, which led to the creation of such labels that did not highlight truly energy efficient products on the market. This is mainly because the range of energy efficiency classes on labels varies by product category. The label usually shows seven energy classes, but products classified in lower part of the scale cannot be commercialized on the EU market. For example, refrigerators, freezers, dishwashers and washing machines, have to reach the A+ class as minimum requirement.

Classes A through D, are visible on the label, but products reaching those classes cannot be sold in stores (Table 2.1). The European Commission has therefore drawn up a proposal to modify the energy labeling so that the label can again in the long run confidentially assist consumers in their choice.

Table 2.1. Comparison of Energy Efficiency Classes in Energy Labeling and Ecodesign Requirements in 2017

| Product type | The energy efficiency classes shown on the energy label | Energy efficiency classes allowed on the market in accordance with the minimum ecodesign requirements | Energy efficiency classes shown on the label, but not allowed in accordance with the minimum ecodesign requirements |
|---------------------|--|--|--|
| Washing machines | A+++ / D | A+++ / A+ | A, B, C, D |
| Dishwashers | A+++ / D | A+++ / A+ | A, B, C, D |
| Refrigerators | A+++ / D | A+++ / A+ | A, B, C, D |
| Vacuum cleaners | A/ G | A+++ / D | E, F, G |
| TV sets | A++/ E | A++ / E | - |

Source: own processing

The European Commission published the revised Framework for Energy Efficiency Labelling on 15 July 2015. This proposal proposes a return to the A to G scale, which would help consumers identify the most efficient products more easily. This means removing classes A+ to A+++,

as it is very difficult for consumer to find out which product consumes less energy as A+ to A+++ classes are all in green field.

Several studies have shown that the original A to G scale is best understood by consumers. The proposed scope does not include classes that are not permitted under the Ecodesign Directive (BROCKLEHURST F., TAIT J. 2016).

The Commission proposed that the classes A and B should always be blank right after scaling for all appliances. This specification will, however, be inappropriate for some products that have undergone considerable technological development in the recent past. Two blank classes, therefore much higher efficiency may be a very ambitious aim for further development, while for other products it may not be enough to meet the ten-year period goal. The number of blank classes should be determined individually for each product category, since the speed of technical progress will vary from individual groups of appliances (HEGARTY K. 2016).

The second major planned change is the mandatory registration of products offered on the EU market. The Internet database is supposed to contain existing documents (energy label, factsheet, etc.) and its aim is to ensure greater market transparency and easier surveillance activities. It is estimated that 10 to 25% of the products on the market do not meet the energy efficiency labeling requirements and that due to non-compliance about 10% of the projected energy savings is not reached (KRIVOŠÍK J. 2014). The creation of a new digital database of energy-efficient products should lead to greater transparency and better compliance. According to the proposal, producers will register the products, which they place on the market in the EU. The product database will provide an overview of the models and their energy efficiency, designed to be publicly available. It will provide market intelligence for decision-making, facilitate market surveillance and serve as a tool for informing consumers.

2.1.2. Sustainable Consumer Behavior

Consumer behavior has a significant impact not only on the state of the economy but also on the state of the environment. At the end of the 20th century, therefore, an emphasis was placed not only on sustainable development but also on sustainable consumption.

As defined by the Oslo Symposium in 1994, sustainable consumption and production (SCP) is about "the use of services and related products, which respond to basic needs and bring a better quality of life while minimizing the use of natural resources and toxic materials as well as the emissions of waste and pollutants over the life cycle of the service or product so as not to jeopardize the needs of further generations" (UN, 2015).

Sustainable consumption means the change of habits, usage and elimination of products and lifestyle.

Sustainable consumer behavior can be summarized in the following points (JANIKOWSKI R. 2000):

- purchase of eco-products – organic food, less energy-intensive products that are more environmentally friendly during the production and consumption process;
- reducing the level of consumption – an effort to lower product and energy consumption, food saving;
- longevity of product life cycle – use of repairs and maintenance in order to extend product life cycle;
- separation and waste recycling.

The vision of changing consumption patterns toward more sustainable "less is more" attitude is hampered by production and consumption culture from the industrial era. In post-industrial countries producing less and shopping less is seen as a threat for companies, employees and consumers. Companies are used to think that following the principle of "less is more" leads to falling sales and profits. Employees are used to think that it leads to losing jobs and employment and consumers think that it leads to shrinking their quality of life (HALL-

HÜBNER R. 2012). Changing this model of wealth creation to more sustainable one is much more cultural and social challenge than technological. The sustainable development of our societies and economies can only be reached and safeguarded if we significantly reduce the material turnover, volume and hazard potential of production, distribution and consumer waste going to landfills by changing production and consumption patterns which leads to a new paradigm in creating welfare for all stakeholders (VOGEL G. 2012).

Environmentally relevant behavior and public support for environmental policies seems to be embedded in a wider context of people's perceptions of humankind. In A. Fisher's et al. research (2011) people were characterized as inherently selfish and governed by habit and/or convenience. Thirdly, money was often regarded as the only factor that could change people's behavior. Contemporary society was characterized by a strong focus on consumption even consumerism that has come from the industrial era. In individualistic societies collaboration and collective action does not work. Specific characteristics of people in relation to energy and sustainable consumption are namely lack of knowledge and information for the correct response, and short-term thinking at the expense of the future, which was often mentioned as an explanation for unsustainable behavior.

Responsive and ethical behavior is rooted in the consumer's psychic, information and awareness can develop it, but it cannot be enforced. Achieving the EU's climate change and energy efficiency commitments depend on consumer involvement, which requires coordinated strategies. Building trust in the provided information on products and services is an important element of the consumer interest strategy.

We analyzed the Flash Eurobarometer 367 (2012) results, the consumer survey which was conducted to verify the knowledge of EU citizens on green products and identify their reasons for buying or not buying environmentally friendly products. Europeans support taking a variety of actions for environmental reasons, and they are increasingly changing their behavior. EU citizens believe the actions that would have

the greatest impact on solving environmental problems are recycling and minimizing waste (54%), purchase of low energy consumption home appliances (39%), home and apartment insulation (38%) and purchase of local agricultural products (35%). To a lesser extent, also reductions of travel and the use of more sustainable modes of transport (34%) and purchasing from environmental-oriented manufacturers (22%) have impact on solving environmental problems.

The perception of Slovak respondents is very similar, differing from the EU-27 average by a higher emphasis on recycling and minimizing waste (65%), purchasing of local agricultural products (38%) and purchasing from environmentally-focused manufacturers (25%), (Fig. 2.3).

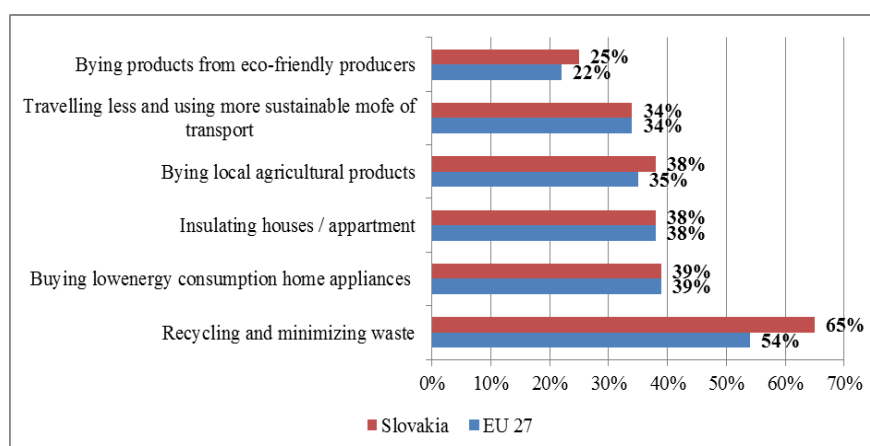


Fig. 2.3. Activities with the Greatest Impact on Solving Environmental Problems

Source: Based on Flash Eurobarometer 367 Results

EU citizens take several considerations into account when buying products. The results for EU 27 and Slovakia are presented in Figure 2.4.

The quality of the product is the most important consideration for consumers (97%) followed by the product's price (87%) and its

environmental impact (84%). The least important factor to consumers is the brand name of the product (46%). There has been a significant increase in the number of respondents who say that the environmental impact is more important than price in a purchasing decision since 2009 (25%, +6 points). For Slovak consumers, the trend is the following: the quality of the product is also the most important criterion with growing trend (96%, +1 point) followed by the product's price with decreasing importance (85%, -5 points) and its environmental impact with growing importance (83%, +13 points). The least important factor to consumers is the brand name of the product (56%, -1 point) which is more important for Slovak consumers than for European 27.

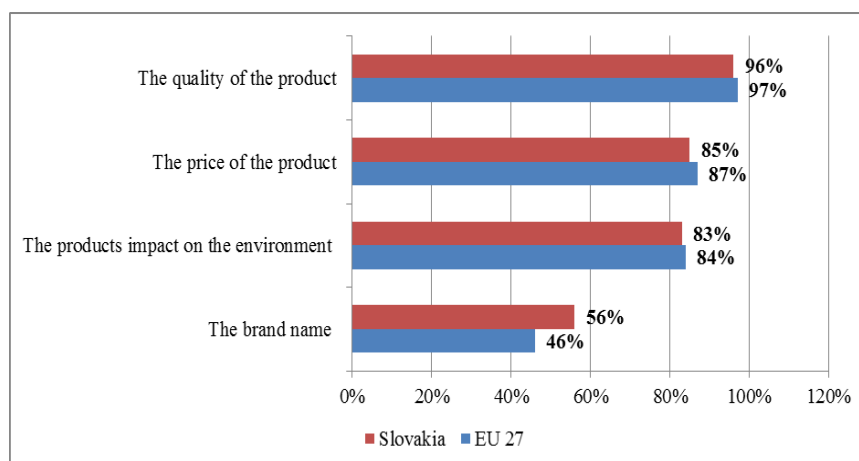


Fig. 2.4. Consumer Buying Criteria

Source: Based on Flash Eurobarometer 367 Results

From analyzes of consumer survey results of the Flash Eurobarometer 367 (2012), follows that Slovak respondents support various environmental activities and are increasingly more often involved in them. One of the activities that can have the biggest impact on solving environmental issues is the purchase of home appliances with low energy consumption. When purchasing such appliances, the most important

buying criterion for them is the quality of the product, product price and the impact of the appliance on the environment.

2.3. Methodology

Quantitative Survey

A quantitative survey was aimed at consumers (≥ 18 years), who bought a home appliance. The primary consumer survey was conducted using an online questionnaire, which was distributed through the social network Facebook, on sites that were dedicated to purchasing home appliances. The questionnaire contained a total of 12 questions, of which 2 were open, 4 closed and 6 scaled. The survey was conducted during the months of January and February 2017.

The main objective of the survey was to determine the importance of the energy label during consumer purchasing decisions when buying a household appliance.

The first partial goal was to determine the perception of the energy label when purchasing a household appliance, depending on the characteristics of the respondents.

We were finding out the consumer perception of the energy label and the parameters that are listed on it, in the “old” product groups of refrigerators and washing machines that have been using energy labels since 1995 and consumers come in contact with them from a long-term point of view and repeatedly and secondly, in the “new” product groups of vacuum cleaners and televisions that have mandatory energy labels since 2010 and 2014 respectively and consumers are not accustomed to it.

The second partial goal was to identify the consumer perception of the energy label and the parameters listed on it, in the “old” product groups.

The third partial goal was to identify the consumer perception of the energy label and the parameters listed on it, in the “new” product groups.

The survey was conducted at the University of Economics in Bratislava and came out of the “European Committee of Manufactures of Domestic Equipment – CECED Slovakia” request.

Participant Characteristics

Table 2.2 shows the demographic details of participants in the quantitative survey. The sample included 147 adults living in Slovak Republic, of which 59.2% (n=87) are female and 40.8% (n=60) male. There was a relatively even distribution across the age range between 18 – 54 years, with the largest segment aged 25-34 years. Most respondents 55.1% (n=81) achieved university education. Respondents come mainly from the Bratislava and Žilina regions.

Table 2.2. Characteristics of Participants in the Quantitative Study

| Characteristic | n | % |
|--|----|-------|
| Gender | | |
| Female | 87 | 59,2 |
| Male | 60 | 40,8% |
| Age (years) | | |
| 18-24 | 30 | 20,4 |
| 25-34 | 48 | 32,7 |
| 35-44 | 31 | 21,1 |
| 45-54 | 30 | 20,4 |
| 55-64 | 6 | 4,1 |
| 65-70 | 2 | 1,4 |
| Level of education | | |
| Secondary without graduation examination | 5 | 3,4 |
| Secondary with graduation examination | 56 | 38,1 |
| Academic degree | 81 | 55,1 |
| PhD degree | 5 | 3,4 |
| Region of birth | | |
| Bratislava region | 45 | 30,6 |
| Trnava region | 12 | 8,2 |
| Trenčín region | 9 | 6,1 |
| Nitra region | 19 | 12,9 |
| Žilina region | 44 | 29,9 |
| Banská Bystrica region | 8 | 25,4 |

| | | |
|-------------------------------|----|------|
| Prešov region | 6 | 4,1 |
| Košice region | 4 | 2,7 |
| Monthly consumer income (EUR) | | |
| 300-600 | 47 | 32,0 |
| 600-800 | 29 | 19,7 |
| 800-1100 | 35 | 23,8 |
| 1100- 1300 | 23 | 15,6 |
| >1300 | 13 | 8,8 |

Source: own processing

2.4. Results and discussion

The Reason for the Purchase a New Household Appliance

Respondents were asked to select the home appliance, which they had purchased last (Fig. 2.5). The TV set has been purchased by 31.3% (n=46), washing machine by 18.4% (n=27), refrigerator by 17.7% (n=26), vacuum cleaner by 16.3% (n=24), washing machine by 6.8% (n=10), electric oven by 6.1% (n=9) and gas oven by 3.4 % (n=5).

When determining the reason for the purchase of a new appliance, respondents chose from six responses offered, while the last option was open with the option to add their own response (Fig. 2.6). Not more than 31.3% (n=46) of respondents stated that their old appliance broke down, 21.8% (n=32) of respondents said they were arranging a new household. The third most frequent answer “my appliance still works, but it is old” has chosen 21.1% (n=31) of the respondents. 11.6% (n=17) of respondents bought the appliance for the first time. Only 8.8% (n=13) of respondents reported high noise and high consumption as a reason for purchasing a new appliance. 5.4% (n=9) of respondents used the option to indicate another reason for purchasing the appliance. The most common answer was the purchase of another appliance to another room, e.g. TV set to the kitchen.

The most important reason for purchasing a new appliance was the replacement of an old one, broken or morally obsolete appliance 52.4%. Only 11.6% of the respondents were a first-time home appliance buyer.

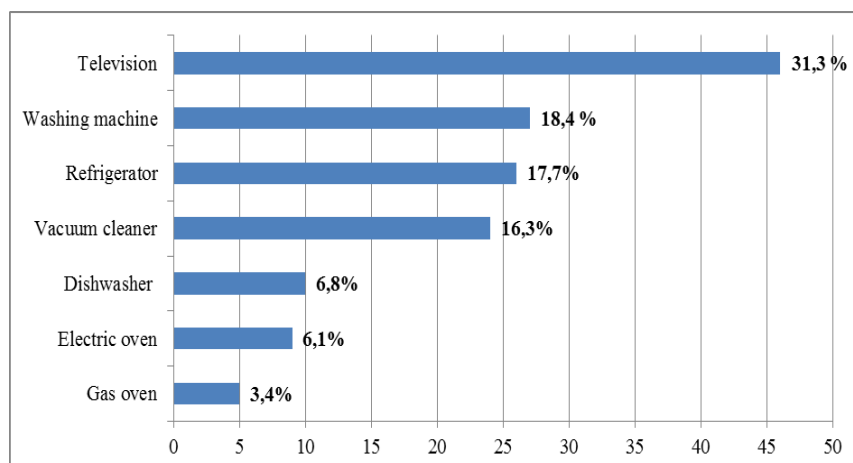


Fig. 2.5. Responses to the Question “What home appliance did you last purchase?” n=147, among Adults Aged 18-70, Slovak Republic

Source: own processing

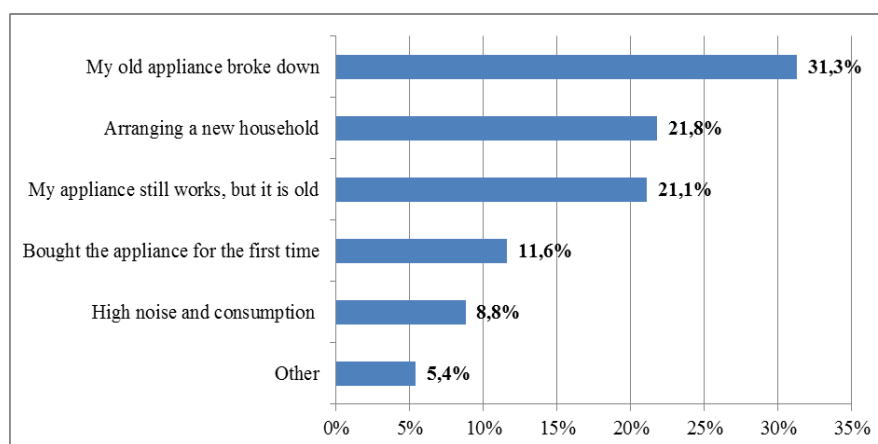


Fig. 2.6. Responses to the Question “What was the Reason for your Purchase of the Appliance?” n=147, among Adults Aged 18- 70, Slovak Republic

Source: own processing

Consumer Decision-Making Regarding Purchase of a Household Appliance According to the Selected Characteristics

Respondents considered being the most important, when choosing domestic appliances, the price of an appliance 79.6% (n=117) in the sense of the price ceiling, brand 60.6% (n=89) and the energy label 59.2% (n=87). 49% of respondents consider a very important personal experience with the appliance, respectively brand the previous purchase. The lowest impact on respondents regarding the purchase of appliances, from all of these parameters, was the type of transport 44.2% (n=65), the recommendations from relatives and friends 36.1% (n=53) and the design of the product 32.0% (n=47).

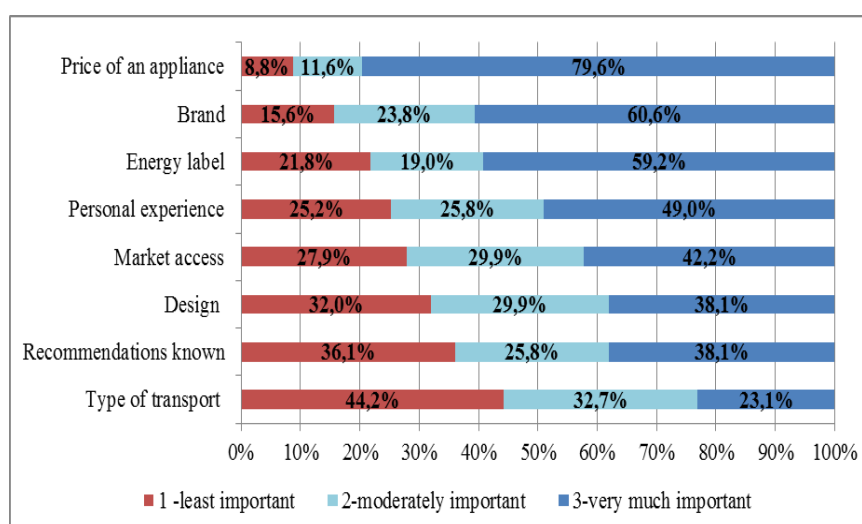


Fig. 2.7. Responses to the Question “Rate from 1-3, where 1 - least important, 2 - moderately important, 3 - very important, to what extent were important to you, when buying an appliance, parameters from the above-mentioned options”, n=147, among Adults Aged 18- 70, Slovak Republic

Source: own processing

The Impact of the Energy Label on Consumer Buying Behavior

The aim of our research was to find out the impact of energy label on consumer buying behavior. We were finding out the relations between variables, while the qualitative variable being the energy label and the quantitative variables were the respondent's classification data. To verify the statistical significance of interrelationships between variables, one-dimensional variance analysis (ANOVA) was used. The results were processed in statistical program SPSS, version 22.0. The importance of energy label according to respondent age, education, and income are presented in Table 2.3, 2.4 and 2.5 respectively.

Table 2.3. The Importance of the Energy Label when Purchasing a Household Appliance according to the Age of the Respondents

| | Sum of Squares | df | Mean Square | F | Sig. |
|----------------|----------------|-----|-------------|-------|------|
| Between Groups | 20,685 | 5 | 4,137 | 7,504 | ,000 |
| Within Groups | 77,737 | 141 | ,551 | | |
| Total | 98,422 | 146 | | | |

Source: own processing

Table 2.4. The Importance of the Energy Label when Purchasing a Household Appliance according to the Level of Education of the Respondents

| | Sum of Squares | df | Mean Square | F | Sig. |
|----------------|----------------|-----|-------------|-------|------|
| Between Groups | 8,140 | 3 | 2,713 | 4,298 | ,006 |
| Within Groups | 90,282 | 143 | ,631 | | |
| Total | 98,422 | 146 | | | |

Source: own processing

Table 2.5. The Importance of the Energy Label when Purchasing a Household Appliance according to the Level of Respondents' Income

| | Sum of Squares | df | Mean Square | F | Sig. |
|----------------|----------------|-----|-------------|-------|------|
| Between Groups | 9,753 | 4 | 2,438 | 3,905 | ,005 |
| Within Groups | 88,668 | 142 | ,624 | | |
| Total | 98,422 | 146 | | | |

Source: own research

Based on results from ANOVA, the statistical dependence ($p < 0.005$) between the energy label and the gender parameters of the respondents ($p = 0.128$), as well as the region where the respondents come from ($p = 0.575$), was not found. For the other parameters (age, education and income of respondents) dependence was detected (age – $p = 0.000$, education – $p = 0.006$ and income – $p = 0.005$). These parameters are closer discussed in the next part of the article. The size of each circle represents the number of respondents forming the group.

The Importance of the Energy Label when Purchasing a Household Appliance

The energy label as a selection parameter when purchasing a household appliance is least important for 1/5 of consumers (21.8%, $n = 32$) and very important for 3/5 of consumers (59.2%, $n = 87$).

For the 18-24 age group, the energy label is an unimportant parameter, higher importance (56.2%, $n = 27$) is already attributed to it by the age group 25-34. The most, energy label affects purchasing decisions in the 55-64 age group (83.3%, $n = 5$), but it also significantly affects consumer groups aged 35-44 (77.4%, $n = 24$) and 45-54 years (76.7%, $n = 23$) (Fig. 2.8).

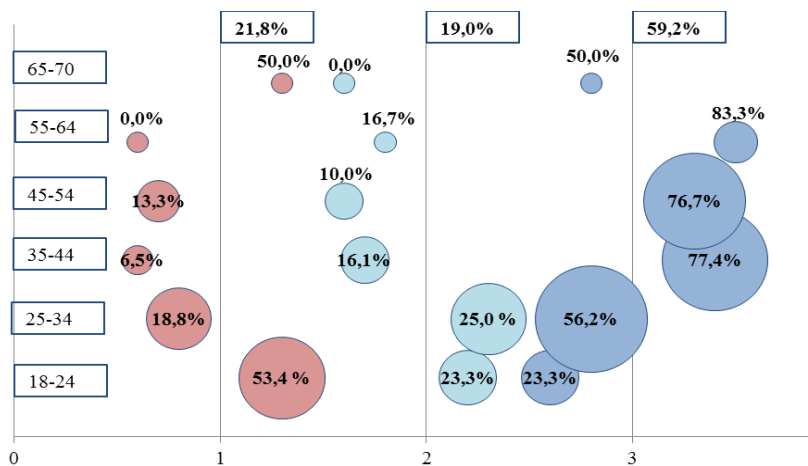


Fig. 2.8. Responses to the Question “Rate from 1-3, where 1 - least important, 2 - moderately important, 3 - very important, to what extent were important to you, when buying an appliance, the energy label”, n=147, among Adults Aged 18-70, by Age Groups, Slovak Republic. The size of each circle represents the number of respondents forming the group

Source: own research

Consumers with higher (academic) education (70.4%, n=57) most often decide to purchase an appliance according to the energy label. This consumer group can read the energy label correctly and understand the information provided by the label. Energy label has the smallest impact on purchasing decision for respondents with completed secondary education with graduation examination (35.7%, n=20), (e.g. GCSE, high school diploma) (Fig. 2.9).

Because of a low number of respondents (n=5) with completed secondary education without graduation as well as respondents with postgraduate (doctorate and higher) education (n=5), the importance of the energy label as a factor of purchase of a household appliance is not evaluated.

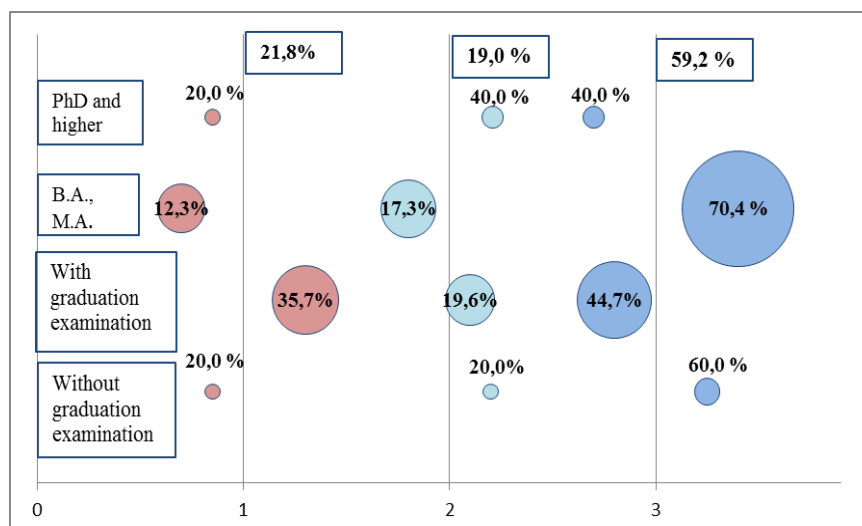


Fig. 2.9. Responses to the Question “Rate from 1-3, where 1 - least important, 2 - moderately important, 3 - very important, to what extent were important to you, when buying an appliance, the energy label”, n=147, among Adults Aged 18-70, by Level of Education Slovak Republic, The size of each circle represents the number of respondents forming the group

Source: own research

The energy label is one of the determining parameters for purchasing a household appliance (Fig. 2.10) for respondents with an income of 800 – 1100 EUR (71.4%, n=35), with an income of 1100 – 1300 EUR (78.3%, n=23) and for respondents with an income higher than 1300 EUR (69.2%, n=13).

Consumers with an income of 600 – 800 EUR (31.9%, n=15) and 300 – 600 EUR (34.5%, n=10) do not decide on the basis of the energy label data, when buying a household appliance. Low-income consumer groups have a fixed price ceiling and decide mainly on the basis of the purchase price of the appliance.

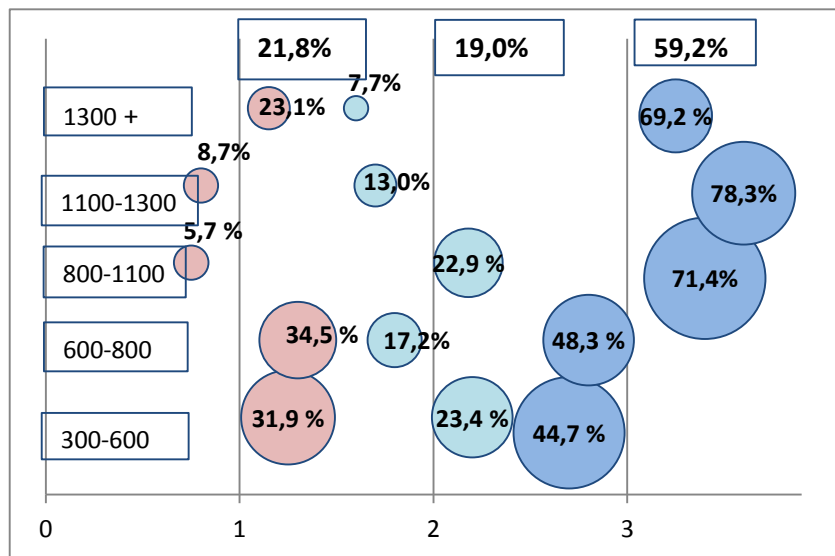


Fig. 2.10. Responses to the Question “Rate from 1-3, where 1 - least important, 2 - moderately important, 3 - very important, to what extent were important to you, when buying an appliance, the energy label”, n=147, among Adults Aged 18-70, by Income, Slovak Republic,

Source: own research

Energy label as a selection parameter, when buying a household appliance was very important for 3/5 of respondents. Only 1/5 of respondents did not pay attention to energy label. From the point of view of the respondent's characteristic, the energy label was a very important parameter when buying a household appliance for the 55-64 age group, but it also significantly affected consumer groups aged 35-44 and 45-54 years. The decision to purchase an appliance based on the energy label is mainly accepted by respondents with a higher education and respondents with an income over 800 EUR (average income in Slovakia in 2017 is 945 EUR).

Energy Label of the Refrigerator

The second partial goal was to identify the consumer perception of the energy label and the parameters listed on it, in the “old” product groups, therefore in the case of refrigerators and washing machines.

A total of 18% of respondents (n=26) chose refrigerator.. From the above-mentioned data on the energy label, consumer decision-making is influenced most by the annual energy consumption in kWh (88.5%, n=23), energy efficiency class of the product (80.8%, n=21) a refrigerator volume in liters (76.9%, n=20). The capacity of frozen food storage compartments in liters was very important for 57.7% (n=15) of respondents. The refrigerator noise emission in dB was perceived as unimportant parameter, 26.9% (n=7). However, it was perceived as very important parameter by (38.5%, n=10) of respondents. Results are shown in Figure 2.11.

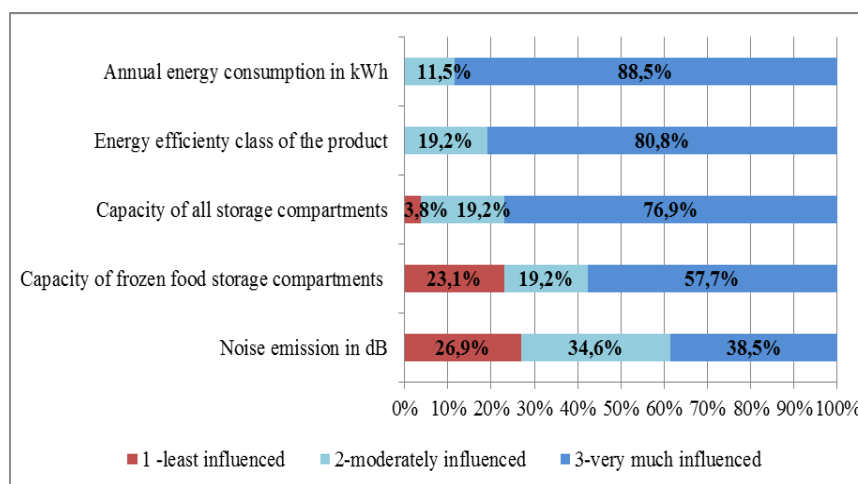


Fig. 2.11. Responses to the Question “Rate what affected you the most on the energy label, when buying a refrigerator? Rate from 1-3, where 1 - least influenced, 2 - moderately influenced, 3 - very much influenced”, n=26, among Adults Aged 18-70, Slovak Republic

Source: own research

Energy Label of the Washing Machine

A total of 18% of respondents (n=27) chose washing machine. All the parameters on the washing machine label are important for the respondents (Fig. 2.12). The most influence, similar as in the case of the refrigerator energy label, has the annual energy consumption in kWh (88.9%, n=24) and energy efficiency class of the product (88.9%, n=24). In addition to these data, the respondents are also interested in the water consumption in liters per year (81.5%, n=22) and the capacity of the washing machine in kilograms (74.1%, n= 20).

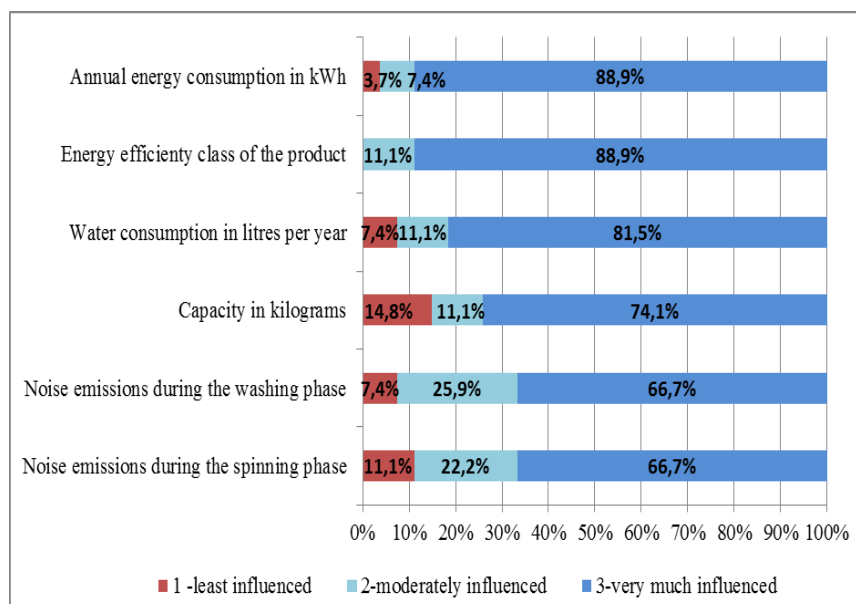


Fig. 2.12. Responses to the Question “Rate what affected you the most on the energy label, when buying a washing machine? Rate from 1-3, where 1 - least influenced, 2 - moderately influenced, 3 - very much influenced”, n=26, among Adults Aged 18-70, Slovak Republic

Source: own research

Unlike in the case of the refrigerator, acoustical noise emissions, during the washing and spinning phase affects 66.7% (n=18) of respondents.

Energy Label of the Vacuum Cleaner

The third partial goal was to identify the consumer perception of the energy label and the parameters listed on it, in the “new” product group, which in our research represented by a vacuum cleaner and a television.

A total of 16% of respondents (n=24) from our sample chose vacuum cleaner. For 54.2% of respondents (n=12) the most important parameters on the vacuum cleaner energy label are the carpet cleaning performance class and the average annual energy consumption in kWh. The energy efficiency class of the product is important for ½ of respondents (50,0%, n=13) (Fig. 2.13).

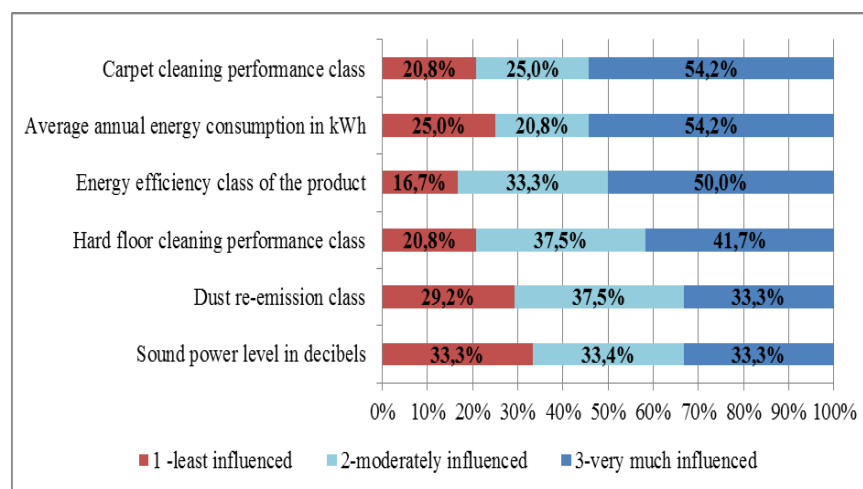


Fig. 2.13. Responses to the Question “Rate what affected you the most on the energy label, when buying a vacuum cleaner? Rate from 1-3, where 1 - least influenced, 2 - moderately influenced, 3 - very much influenced”, n=26, among Adults Aged 18-70, Slovak Republic

Source: own research

The impact of the vacuum cleaner energy label data on consumer purchasing decisions is not as clear as that of other, long term used energy labels on "old appliances" as washing machines and refrigerators. Respondents in the case of vacuum cleaner much more often consider these parameters to be of little importance (on average for 20% of respondents), compared to the "old appliances". The consumer is in contact with the energy label of a vacuum cleaner only from the year 2014, so some data from the label are not common to him/her.

Other parameter such as the power consumption of the vacuum cleaner, which was very important decision criterion prior to the introduction of energy labels, is currently losing its importance. Power consumption is limited by the legislation and replaced by other parameters, such as the cleaning efficiency class.

Energy Label of the TV set

TV set belongs to "new appliances", which have to be labeled since 2010. The TV set was selected by 31.3% of respondents (n=46) from our sample. The two parameters, namely the annual energy consumption in kWh (63.0%, n=29) and the screen size diagonal (73.9%, n=34) are the most important for consumers. Availability of a hard switch off button was rated as a parameter that does not significantly influence consumers during their purchasing decision-making (47.8%, n=10). Results are shown in Figure 2.14.

The greatest benefit of introducing the energy label for "new appliances" is according to the responders (34.8% n=47) the easier comparison of products, energy saving (30.4%, n=41) and improvement of product quality (18.5%, n = 25). The negative contribution of the energy label is represented by the product price increases according to 8.1% (n=11) of respondents. The introduction of an energy label brings, in particular, an improvement in the quality of the product, as cheap and lower quality vacuum cleaners and televisions had to leave the market because they did not meet the criteria of eco-design directive.

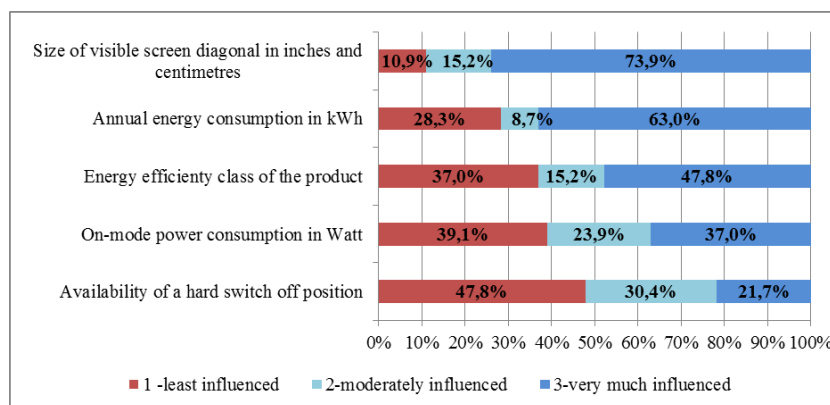


Fig. 2.14. Responses to the Question “Rate what affected you the most on the energy label, when buying a television? Rate from 1-3, where 1 - least influenced, 2 - moderately influenced, 3 - very much influenced”, n=26, among Adults Aged 18-70, Slovak Republic

Source: own research

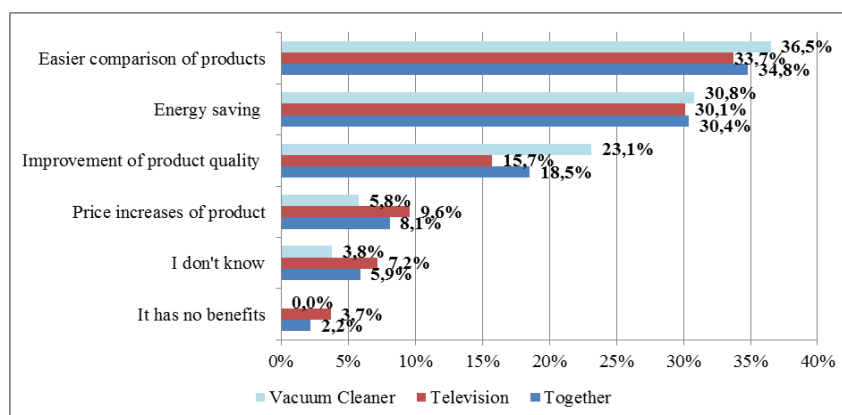


Fig 2.15. Responses to the Question “Until recently, TVs and vacuum cleaners did not need to be labeled with an energy label. Nowadays, these new appliances must already have an energy label. What do you think, what benefits does it have for the consumer? Choose from the options listed above”, n= 75, among Adults Aged 18-70, Slovak Republic

Source: own research

2.4. Conclusion

The main objective of the survey was to determine the importance of the energy label during consumer purchasing decisions when buying a household appliance. We found out that the energy label holds third position as a criterion in consumer decision making after the price ceiling and the brand being on first and second places respectively.

The first partial goal was to determine the perception of the energy label when purchasing a home appliance, depending on the characteristics of the respondents. The energy label was an important parameter when purchasing a home appliance for 3/5 of the respondents. It affects the purchasing behavior of, in particular, the age group of consumers from 35-44 and from 45-54 years, consumers with higher education and income higher than 800 EUR.

The second partial goal was to identify the consumer perception of the energy label and the parameters listed on it, in the “old” product groups, in the case of refrigerators and washing machines. From the data listed on the energy label of refrigerator and washing machine, respondents are most likely to decide on the basis of the annual energy consumption in kWh and the energy efficiency class of the product. Other parameters listed on energy labels (except of refrigerator noise) are considered by more than half of respondents as very important. The consumer behavior giving higher impact to real energy consumption in kWh over energy class can give buying preference to smaller appliances with lower overall energy consumption over big ones and bring real energy savings.

The third partial goal was to identify the consumer perception of the energy label and the parameters listed on it, in the “new” product groups. In our research the respondents identified the size of visible screen diagonal and the annual energy consumption as the most important parameters when purchasing a TV set.

Since 2010, TV manufacturers have been obligated when distributing these products to label them with their energy labels. After their

introduction to the market, energy consumption has become an important criterion when selecting a TV to buy, which is confirmed by our research. TV screen technologies with high energy consumption were in “red field” on energy labels (which means stop in consumer behavior) and started to be refused by customers. Most manufacturers have therefore ceased production of plasma TV screens which consumes disproportionately more energy than LCD or LED technology in TV panels.

When purchasing a vacuum cleaner, respondents identified as the most important parameters the cleaning efficiency class and the annual energy consumption. The energy labeling of vacuum cleaners started early 2015. The consumer has so far been interested only about the power consumption in watts (W), the suction power and the accessory equipment, which were in the packaging. Information about the power consumption is after 2015 being replaced by new data, which are listed on the energy label. Namely, it is the annual energy consumption, dust re-emission and floor cleaning efficiency on carpets or on hard floors. Over time, manufacturers will also have to meet the minimum lifetime of vacuum cleaners, which is also expected to be a major step in the selection and production of these appliances.

The impact of data from the energy label on consumer purchasing decisions is different in “old” and “new” product groups. For “old” product groups, respondents are influenced by almost all the parameters on the energy label, when choosing domestic appliance; for “new” product groups this effect is not so evident. Knowledge of energy labels in “old” product groups may cause respondents to respond positively to the parameters listed on their energy labels giving the priority to energy consumption over other parameters.

Research Limitations

The first limitation of the research was the use of an online data collection channel. The Facebook social network has been used, which has reduced the number of respondents to Facebook users as well as to younger age groups.

The second limitation of the research was the form of the research. Quantitative research has been chosen, conducted using online queries. With this form of the query, we do not see the respondent's direct reactions and respondents can give answers that are more socially accepted, rather than their real views on the questions asked.

The third limitation of the research was the low number of respondents regarding the individual home appliances. In some responses, the number of respondents was so low that the answers did not reach statistical significance and were not used in the research results.

Practical Implications

Respondents perceive the electricity consumption in kWh as the most important parameter on the energy label, despite the fact that it is not noticeably and significantly communicated as an energy class. The energy class is marked with a distinctive color arrow from dark green to red, which attracts the consumer's attention at first glance. Electricity consumption is only communicated by number, but respondents attribute more importance to energy consumption than to the energy class. From a sustainability point of view, this is a very positive finding because lower electricity consumption represents a more economical solution than a low energy class (big appliance and small appliance with the same energy class have different energy consumption, more favorable for the small appliance). We propose additional information - the conversion of kWh into costs in EUR however, not for annual consumption (which can be seen by consumers as a low amount), but for the life of the appliance for about 10 years. This calculation has to be made by country as the electricity price differs in different countries.

The research shows that high percentage of young people (53.4%) aged 18-24 years consider energy labels as unimportant. That is the reason why we propose the CECED Slovakia, in particular, to motivate young people changing their consumer behavior towards more sustainable pattern by making a creative, entertaining and informative video about the meaning of energy labels for the consumer that would

spread virally and would, therefore, appeal to a young age group of consumers. One of the other options is to create a mobile application regarding the energy label.

In some respondents' answers lack of trust in manufacturers' data appeared. It is partly because the laboratory conditions in which manufacturers test appliances and thus gain the values of the energy label individual pictograms are not at all the same as the domestic conditions and partly because of some manufacturers' tendency to communicate as positive data as possible. It is for this reason we suggest home appliance manufacturers to improve PR in terms of consumer awareness about performing tests and the conditions under which these tests are carried out.

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ELECTROMOBILITY AND ITS PERSPECTIVE

Abstract: The development of electromobility in the world as well as in the European Union shows unprecedented progress. The chapter deals with the current challenges and perspectives of the development of electromobility on a global scale, but primarily under the conditions of the European Union. The chapter contains a summary of the current situation of electromobility, expected development scenarios, SWOT analysis of electromobility in the European Union, as well as recommendations for its favorable development. In the European Union, electromobility is a very studied issue at both technical and economic levels. Primary research is necessary for its further development. It should be targeted into the consumer behavior of potential electric vehicle users, impacts on the environment, the structure of national budgets and transport infrastructure. The presented chapter examines and explains these issues in part. The positive development of electromobility is unsustainable. The question is in what direction and at what pace will it be taken.

Key words: electromobility, electric vehicles, automotive

3.1. Electromobility

Transport plays a macroeconomic perspective vital role in the economy of each country. It creates not only a lot of jobs for residents of the state itself, but also contributes to the GDP and provides economic growth of the internal market, which impacts on the living standards of citizens. The number of cars is growing constantly in the world, consumers demand is high, production costs are falling and this is reflected ultimately in price (BELLA T. 2014). Same trend has been increased care and in particular public interest in a healthy lifestyle in

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recent years. Traffic congestion is also increasing with growing number of cars and the boom of private transport and urban residents are in addition to emissions also exposed to excessive noise. More than half of population lives in cities precisely, while public transport is responsible for one quarter of CO₂ emissions from transport (DESA 2015). We would not have to speak about emissions and about rapid increase in greenhouse gas emissions, if the majority of the industry, along with transportation is not dependent on oil supplies (NRC 2016). Oil stocks are constantly open to debate and views are different from each other only slightly optimism or pessimism. However, the oil will be probably rarer in coming decades and its increasingly scarce resources are limited in both cases. Greater problem is itself dependent on oil as its own reserves in the context of transportation. Alleviate of this condition and achieve sustainable mobility require mainly the introduction of new technologies and innovations, as well as modernization of transport and infrastructure investment. Transport recently becoming greener, but due to its increased volume is slight changes and its current functioning is unsustainable in the long term. Further development of transport should be based on improving energy efficiency in vehicles, development and deployment of propulsion systems, and renewable fuels, more efficient use of transport modes and infrastructure. Problems in the field of transport are also aware of the European Commission, which responds to the unfavorable situation by issuing directives and measures binding on all member countries. Alternative fuels are extremely important in pursuit of the independence of European transport on fossil fuels and reducing greenhouse gas such as natural gas, biofuels, hydrogen. Given the fact that natural gas is already for a long time well established in the market and fuel cell cars will be launched first in 2007 (EBERLE U., MUELLER B., VON HELMONT R. 2012), we will dedicate to electromobility of third generations.

3.2. The types of electric vehicles

Vehicle manufacturers presently use five main types of electric vehicle technology. These technologies vary in the way the on-board electricity is generated and recharged, and the way the internal electric motor and combustion engine are coupled. The mix of battery capacities, charging capabilities and technological complexity provides consumers with a choice of options when it comes to vehicle ranges, refuelling options and price.

The following sections describe each of the main electric vehicle and hybrid technology types, how each works, and their associated advantages and disadvantages.

Battery electric vehicles (BEVs) BEVs are powered solely by an electric motor, using electricity stored in an on-board battery. The battery must be regularly charged, typically by plugging in the vehicle to a charging point connected to the local electricity grid. BEVs have the highest energy efficiency of all vehicle propulsion systems, typically able to convert around 80 % or more of the energy stored in the battery into motion (EEA 2016). The electric motor is particularly efficient, and regenerative braking provides further efficiency gains. Regenerative braking systems help keep the battery in an electric vehicle charged, by converting into electricity much of the energy that would normally be lost as heat through traditional braking. There are no exhaust emissions while driving a battery electric vehicle. This helps to improve local air quality. The greatest benefits for the environment occur when BEVs are powered by electricity from renewable sources. However, there are fewer emissions even when electricity comes from the average mix of renewables and fossil fuels used presently in Europe (EEA 2016). In the EU-28, almost 30 % of electricity was produced from renewables in 2014 (EUROSTAT 2016).

BEVs, however, still have somewhat limited driving ranges compared to conventional vehicles and typically need a long time to recharge the on-board batteries. BEVs tend to have large batteries to

maximise the energy storage capacity and hence allow longer driving. Hybrid electric vehicles (HEVs) HEVs have been commercially available for more than 15 years. They combine an internal combustion engine and an electric motor that assists the conventional engine during, for example, vehicle acceleration. The battery of an HEV cannot be charged from the grid but is typically charged during regenerative braking or while the vehicle is coasting.

As an HEV is predominantly powered by its conventional engine, hybridisation can be regarded as a technology added to conventional vehicles with the aim of increasing fuel efficiency, reducing pollutant and CO₂ emissions, rather than being an entirely separate type of vehicle.

HEVs typically have lower fuel consumption and exhaust emissions than conventional technologies. The more sophisticated the hybrid system, the greater the potential to lower emissions. Many different types and models of HEVs exist, ranging from 'micro-HEVs', whose only fuel-saving feature is regenerative braking and where the electric engine on its own is not capable of powering the vehicle, through to 'full HEVs', which are able to drive small distances in electric-only mode.

The ways in which the conventional engine and electric motor are joined can also differ across different HEV models. Parallel hybrids employ an electric motor and a combustion engine that are connected so they power the vehicle together. Series-parallel hybrids, or power-split hybrids, combine power from the conventional and electric motors to drive the wheels but, unlike a parallel hybrid, these vehicles can be driven from the battery alone, although typically only at low speeds for short distances. Their configuration can allow the vehicle to be powered 100 % from the conventional engine, 100 % from the electric motor or in any intermediate ratio, e.g. 30 % electric motor and 70 % combustion engine.

Batteries for hybrids, both plug-in and nonplug-in, tend to be more expensive than the ones for battery electric vehicles in terms of price per kWh. This higher price is mainly because hybrid vehicles require greater power-to-energy performance. Indicative electric driving range: 0–10 km. ranges. These large batteries generally cost more than those used in

hybrids. However, battery costs per kilowatt-hour (kWh) tend to be less expensive for BEVs. Indicative electric driving range: 80–400 km.

Plug-in hybrid electric vehicles (PHEVs) PHEVs are powered by an electric motor and an internal combustion engine designed to work either together or separately. The on-board battery can be charged from the grid, and the combustion engine supports the electric motor when higher operating power is required or when the battery's state of charge is low. The electric driving range is smaller than for BEVs, as the batteries tend to have smaller capacities. The batteries can have less energy storage capacity because they rely less on electrical power alone to power the vehicle. The battery capacity in PHEVs is designed more for short trips in the city or commuting, for example, than for long-distance journeys. However, as for REEVs, the combustion engine allows a much longer overall driving range. Batteries for PHEVs tend to be more expensive than for BEVs in terms of price per kWh. This higher price is mainly because PHEVs require greater power-to-energy performance.

The environmental impact of PHEVs depends on their operation mode. Running in all-electric mode results in zero exhaust emissions, but relying only on the conventional engine can lead to fuel consumption and emission levels equal to or higher than those of conventional vehicles of a similar size, because the additional batteries increase the vehicle mass.

Range-extended electric vehicles (REEVs) REEVs have a serial hybrid configuration in which their internal combustion engine has no direct link to the wheels. Instead the combustion engine acts as an electricity generator and is used to power the electric motor or recharge the battery when it is low. The on-board battery can also be charged from the grid. The electric motor is therefore solely responsible for directly powering the vehicle. One advantage of REEVs is that the conventional engine can be small, as it is needed only when the vehicle exceeds its electric driving range. This helps reduce the vehicle's weight. As for a PHEV, an REEV overcomes the problem of a restricted driving range associated with BEVs because it can be fuelled at conventional filling stations. Indicative electric driving range is 70 to 145 km. renewables in

the electricity generation mix. PHEVs can be financially attractive for drivers if the electricity used is cheaper than the petrol or diesel that would have otherwise been used. Indicative electric driving range is from 20 to 85 km.

Fuel cell electric vehicles (FCEVs) FCEVs are also entirely propelled by electricity. In this case, the electrical energy is not stored in a large battery system, but is instead provided by a fuel cell 'stack' that uses hydrogen from an on-board tank combined with oxygen from the air. The main advantages of FCEVs over BEVs are their longer driving ranges and faster refuelling, similar to those of a conventional vehicle. Because of the current size and weight of fuel cell stacks, FCEVs are better suited for medium-sized to large vehicles and longer distances. Fuel cell stack technology is in an earlier stage of development than the technologies described above and few models of FCEVs are currently commercially available. Further technological development is needed for FCEVs to improve their durability, lower the costs and establish a hydrogen fuelling infrastructure, including standalone stations or pumps for hydrogen. Indicative electric driving range is 160 to 500 km (EEA 2016).

3.3. The charging infrastructure in Europe

Depending on the vehicle, there is a need to charge the EV. We recognize three types of charging: plug-in charging, battery swapping or wireless charging.

Plug-in charging is used by the vast majority of current BEVs and PHEVs in Europe. Vehicles are physically connected to a charging point using a cable and a plug. Plug-in charging can occur wherever charging stations are located: at homes, in public streets or on commercial or private premises. Electric vehicles can, in general, be charged using normal household sockets, but this is slow because normal domestic sockets provide only a low amount of electric current. It can therefore take approximately eight hours for a typical charge. This can be quite

suitable for overnight charging, however. Faster plug-in charging requires specialised infrastructure. To date, most public plug-in stations established at a city, regional or national level offer only normal-speed charging (EAFO 2016).

Battery swapping involves replacing a used battery with a fully charged one at a special swapping station. This offers a rapid way of quickly 'recharging' a vehicle. At present, no major providers in Europe offer battery swapping. A number of barriers have prevented battery-swapping technology from becoming widespread, including the lack of electric vehicle models that support battery swapping, no standard type or size of battery, and the high cost of developing the associated charging and swapping infrastructure.

Wireless charging, also known as induction charging, does not require a fixed physical connection between the charging facility and the vehicle. Instead, the system creates a localised electromagnetic field around a charging pad, which is activated when an electric vehicle with a corresponding pad is positioned above it. The wireless method currently operates at only a selected few pilot locations and is yet to be used commercially. Examples of inductive charging pilot projects include wireless charging for buses at bus stations in Belgium, Germany, the Netherlands and the United Kingdom, as well as some pilot testing for users of electric cars in Sweden.

Charging can take between 10 minutes and up to 8 hours of charging depending on the actual charging requirement while charging can be made at home. Domestic charging points These charging points are found in homes and business premises or at the Public charging points

The number of plug-in stations has increased rapidly in recent years. More than 92 000 public charging positions are now available across Europe (EAFO 2016).

In the EU, I have different payment models for their use (from free to Tesla) to private charging.

The Alternative Fuels Infrastructure Directive (EU 2014) provides one estimate of the desired proportion of charging points to electric

vehicle numbers: at least one public charging point for every 10 vehicles, always taking into account new developments in vehicle, battery and charging infrastructure technology and assuming that most private electric vehicle owners install their own charging points.

The recently published European strategy for low-emission mobility further highlights the importance of publicly available electric recharging points. In order to achieve mass acceptance and deployment of electric vehicles, it recognises that charging and maintenance infrastructure needs to become widely available throughout Europe (EC 2016).

There are two general approaches to building up charging infrastructure. The first involves developing a complete electric vehicle charging network in one step. The second is incremental growth, based on enlarging the infrastructure as user demands increase over time.

In most European countries there are only a few thousand public charging points, and they are for slow charging. Such public charging points are typically installed by public authorities, utilities, electric vehicle manufacturers or other companies. In Europe, the Netherlands leads the way with a network of over 23 000 public charging positions in 2016. Other countries with large numbers of public charging points include Germany (more than 14 000), France (more than 13 000), the United Kingdom (around 11 500) and Norway (more than 7 600). The lowest numbers of charging positions (fewer than 40) are in Bulgaria, Cyprus, Iceland and Lithuania (EAFO 2016). Some countries are slowing down the installation of new public slow-charging points, with more focus shifting to the expansion of fast-charging infrastructure. The European Union established the Trans-European Transport Network (TEN-T) programme to support the construction and upgrading of transport infrastructure across the region. On infrastructure for electric vehicles, the programme has invested in various projects including the pilot deployment of 115 high-power recharging points on central European roads, to help enable the long-distance driving of electric vehicles and promote sustainable transport (EC 2012). Several years ago, proposals were put forward to include charging point targets for each EU

Member State in the Alternative Fuels Infrastructure Directive (EU 2014). This would have resulted in up to 8 million charging points in the EU by 2020, with at least 800 000 available to the general public. However, these targets were dropped during negotiation of the final text of the directive. Instead, governments were required to design national action plans on charging point infrastructure and to install an 'appropriate number of electric recharging points accessible to the public' by the end of 2020 (EU 2014).

3.4. E-Mobility in the European Union

One of the most important markets for alternative fuels should be Europe for a few years. By 2030, according to the International Energy Agency (IEA), 20 million batteries should be sold in Europe (OECD/IEA 2016). According to a joint study by the Brussels Transport & Environment (T & E) NGO of Brussels and the European Automobile Manufacturers Association, ACEA) made in 2016, 600,000 electric vehicles, including REEV and plug-in hybrids (PHEVs), are currently traveling on European roads (TRANSPORT AND ENVIRONMENT 2016). In comparison with 2014, the number of electric vehicles has almost tripled.

The development of electromobility in Europe is supported mainly in Norway, Sweden, Denmark, the BENELUX countries, the UK, Germany, France, Italy. Owners of electric cars use the benefits in the countries mentioned as free parking in city centers or no taxes or tolls (ICCT 2015).

The interest in buying electric cars by consumers and legal entities is growing in all EU countries. We have to realize that the success of electric cars depends on the sufficiently built-in charging infrastructure, the adequate vehicle's arrival and its acceptable acquisition price. The development of the growth of registered electric vehicles is presented in the following graph.

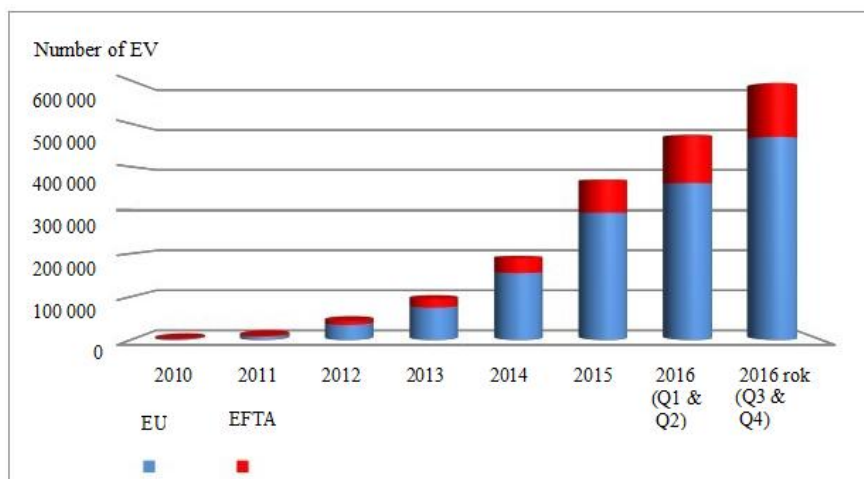


Fig. 3.1. Number of registered electric vehicles (including REEV and PHEV) in Europe (in pieces)

Source: TRANSPORT & ENVIRONMENT. (2016). *Electric vehicle sales in Europe. In Electric Vehicles in Europe 2016 - In-house analysis by T & E.* Available on: <https://www.transportenvironment.org/sites/te/files/publications/TE%20EV%20Report%202016%20FINAL.pdf> (accessed 3.4.2017).

Europe has become the second largest market for electric vehicles after the United States and the number of electric cars sold surpassed Japan. Conventional (non-plug-in) hybrid electric vehicles have been available in Europe for almost two decades. Unfortunately, past sales numbers for these types of vehicle are not easily available from official EU statistics, as national authorities have generally categorised them simply as petrol or diesel vehicles. Of the other types of electric vehicles, BEVs were the first type widely marketed in the EU, although sales in early years were very low. In 2010, fewer than 700 BEVs were sold across the EU. PHEVs have been commercially available since around 2011 (EEA 2016). Again, statistics for plug-in hybrid sales in those early years are uncertain, as many Member State authorities have categorised them as petrol, diesel or battery electric vehicles. From 2013 onwards,

petrol and diesel plug in hybrid models became significantly more popular as both the range of vehicle models available for consumers increased and more governments promoted various subsidies to encourage electric vehicle ownership. In that year, there were just over 49 000 electric vehicles sold in the EU, of which half were BEVs, and half PHEVs. The number of electric vehicles sold has increased steeply in each year since. The latest preliminary data for 2015 indicate that almost 150 000 new plug-in hybrid and battery electric vehicles were sold in the EU that year (EAFO 2016). Almost 40 % of these were BEVs. Collectively, just six Member States account for almost 90 % of all electric vehicle sales: the Netherlands, the United Kingdom, Germany, France, Sweden and Denmark. The largest numbers of BEV sales within the EU 28 were recorded in France (more than 17 650 vehicles), Germany (more than 12 350 vehicles) and the United Kingdom (more than 9 900 vehicles). The largest numbers of PHEV sales were recorded in the Netherlands (more than 41 000 vehicles) and the United Kingdom (more than 18 800 vehicles). In Latvia, Lithuania, Malta and Romania, fewer than 50 BEVs and PHEVs were sold in 2015. None were sold in Bulgaria and Cyprus (GAUTAMA, S., GILLIS, D., PACE, G. AND SEMJANSKI, I.2015).

French government provided subsidies for the purchase of an electric car with a value of EUR 5 000 in 2012. This financial amount increased by a further 2,000 after year, which ultimately reduces cost of electric car by 7 000, and left us to pay 13 700, to become the owner of a new car. Also remarkable is that in order to reduce the selling price to sell a vehicle with batteries, but the batteries would be rented through a contracted delivery cheap electricity. There are several tariffs in respect of the lease the battery, but in cities the electric car is still worth it, because electric cars are exempt from congestion charges, parking or even road taxes. In the UK, customers have the opportunity to use allowance of 5,000 pounds.

The Netherlands has allocated in 2015 for the promotion of electromobility budget of EUR 9 million. These funds are used for the

purpose of implementing the national action plan, ie. to stimulate electric mobility, strengthening international cooperation and creating partnerships, improving communication and science and research.

Nor other European countries are lagging in favoring electric vehicles. In Germany as the owner of an electric car is exempt from road tax for the first five years from the date of registration of the vehicle. Support of research plays an important role in this area. The result created from this platform was called Electromobility model regions 2009 – 2011. The Federal Government has allocated over these years to support electromobility around EUR 500 million and fair share of this budget stimulated just the supply side. It is expected to double that investment in the next period. The following table shows supporting tools electromobility in other European countries.

Despite past technological improvements, the transport sector is responsible for around one quarter of Europe's greenhouse gas (GHG) emissions, contributing to climate change. Emissions from road vehicles also contribute to high concentrations of air pollutants in many of Europe's cities, which often don't meet air quality standards set by the European Union (EU) and the World Health Organization (WHO). Furthermore, road transport is the main source of environmental noise pollution in Europe, harming human health and well-being.

The EU is committed to developing a more sustainable circular economy and decarbonised transport system. Developing a circular economy that inter alia aims to increase resource efficiency is key in realising the second main objective of the 7th Environment Action Programme, that the EU should turn into a resource-efficient, green and competitive low-carbon economy (EC 2013). To focus this transition, a number of future targets have been set to reduce the environmental impacts of transport in Europe.

Table 3.1. Summary of system tools support electromobility

| Country | single | | regular | | Support for Business |
|---------|---------------------------------|------------------------|------------------|--------------|--------------------------------------|
| | financial contribution | financial contribution | fee waiver / tax | nonfinancial | |
| Italy | | 5000 € | ✓ | ✓ | |
| Spain | 25 % of price (max.6 000 €) | | | | 15 000 € resp. 30 000 € ² |
| Belgium | 3500 € | over 9190 € | ✓ | | depreciation 120 % |
| Denmark | | over 2000 € | ✓ | ✓ | |
| Sweden | 4500 € ³ | | ✓ | | |
| Austria | to 4000 € ⁴ | ✓ | ✓ | ✓ | 30-50 % from price |
| Estonia | to 18 000 € (on charger 1000 €) | | | | to 18000 € |

Source: IEA : Global EV Outlook : Understanding the Electric Vehicle Landscape to 2020. <http://www.iea.org/publications/globalevoutlook_2013.pdf>. (Accessed 18.03.2017)

The transport sector's GHG emission reduction targets are, for example, designed to contribute to the EU's overall goal to reduce GHG emissions by 80–95 % by 2050. In its 2011 Transport White Paper (EC 2011), the European Commission outlined a roadmap for the transport sector to achieve, by 2050, a 60 % reduction in its GHG emissions levels compared with those of 1990. The White Paper shows how the transition to a more sustainable transport system can be achieved, and how Europe's reliance on oil can be reduced. It also supports the development and

² 15 000 € for vehicles cat.N2; 30 000 € for buses

³ Support is limited to the first 5,000 registered EVs

⁴ True if the electric charge using electricity generated from photovoltaic system

deployment of new and sustainable fuels and propulsion systems. Moreover, it describes goals for a competitive and resource-efficient transport system, including benchmarks such as:

- halving the use of conventionally fuelled cars in urban transport by 2030 and phasing them out entirely in cities by 2050;
- setting a 40 % requirement for the use of sustainable low-carbon fuels in aviation;
- shifting the amount of freight transported by road to other transport modes, 30 % by 2030 and 50 % by 2050, for distances over 300 km.

More recently, the European Commission has published a European strategy for low-emission mobility (EC 2016). The longer-term objectives of the new strategy are to decrease oil import dependency, increase innovation and competitiveness and foster opportunities for growth and jobs. Furthermore, it highlights the importance of removing obstacles to the electrification transport, and improving the efficiency of Europe's transport system by moving towards low and zero-emission vehicles as well as scaling up the use of low-emission alternative energy sources such as renewable electricity. In the future, it is clear that a large share of the planned GHG emissions reductions will have to come from road transport through the use of new, cleaner technologies and by reducing transport oil consumption. This will require a considerable effort, especially as the transport sector is the only major economic sector that has increased GHG emissions since 1990. Making internal combustion engines more efficient is unlikely to be sufficient by itself to achieve the EU's long-term goals of reducing emissions. Instead, an integrated approach is needed, covering vehicle efficiency, renewable fuels as well as measures that help reduce transport demand itself. Electric vehicles are just one of the potential ways in which Europe can move towards a more sustainable transport system. Other key factors in increasing the sustainability of transport will include further development of renewable biofuels, a shift towards non-motorised and/or public transport, and changing the ways in which we use our transport systems. Replacing conventional vehicles with electric vehicles can help reduce emissions,

although how much it helps depends significantly upon the source of the electricity used to charge vehicles: renewable sources, nuclear power or fossil fuel. However, simply replacing conventional vehicles will not solve other problems such as growing congestion or increasing demand for road infrastructure and parking. In the short and medium term, it is clear that Europe will still have to rely on conventional road vehicles, while new and cleaner technologies develop.

While *GHG emissions* from all other major economic sectors have fallen in recent decades, those from transport have increased. In the EU, road transport's emissions are today around 17 % above 1990 levels, while the contribution of road transport to total EU GHG emissions has increased by around half — from 13 % of the total in 1990 to almost 20 % in 2014 (HACKER, F., WALDENFELS, R. AND MOTTSCALL, M. 2015). The EU is committed to reducing the fuel consumption of road vehicles, to both lower GHG emissions and improve energy security. Vehicles have become more fuel-efficient over recent decades. However, there is wide recognition that the official test procedure used to measure emissions is out-dated and does not accurately represent real-world driving conditions. Real-world driving CO₂ emissions are now around 30–40 % higher than officially declared emissions (ICCT 2015). The EU is, however, updating procedures for measuring emissions to better reflect actual vehicle performance on the road, with certain new measures scheduled for introduction from 2017 onwards.

Road transport remains an important source of harmful *air pollutants* such as nitrogen oxides (NO_x) and particulate matter (PM). Pollution released by vehicles is particularly important for health, as these emissions generally occur close to the ground and in areas where many people live and work, such as cities and towns. Therefore, emissions from the road transport sector can be more harmful than those from other sources, such as power plants or large industrial facilities, which often tend to be in remoter, less populated areas. Emissions of the main air pollutants from transport have generally declined over the past two decades. However, many of Europe's urban dwellers remain exposed to

air pollution levels that exceed EU air quality standards. For example, the EU annual limit value for nitrogen dioxide (NO₂), the harmful component of NO_X, was widely exceeded across 19 Member States in 2013, mainly at roadside locations (EEA 2015). On average, more than 60 % of NO₂ air pollution at such locations comes from road traffic. In some areas, the contribution attributable to traffic exceeds 80 %. Similarly, a number of Member States report PM levels higher than the EU air quality standards.

Road traffic is by far the main source of *traffic noise* in Europe, both inside and outside urban areas. High levels of noise harm human health and well-being. In 2012, almost 90 million people living in cities were exposed to long-term average road traffic noise levels exceeding EU thresholds. At night, over 83 million people were exposed to high levels of road noise (EEA 2014). The noise from vehicles comes from two main sources: the engine and the contact between the tyres and the road. Tyre noise increases more than engine noise with increasing speed, and predominates at high speeds. At low speeds, such as in cities, engine noise is relatively more important because of frequent acceleration and deceleration. At higher speeds (upward of approximately 50 km/h) the noise difference between electric and conventional vehicles is negligible.

Manufacturing vehicles, both conventional and electric, requires significant amounts of *raw materials and energy*. Furthermore, many of the raw materials needed for manufacturing are either not available in Europe or not available in sufficient quantities, and so must be obtained and transported from other parts of the world. Within the EU, end-of-life vehicles also create many millions of tons of waste each year. While some vehicle parts can be recycled, the rate of recycling generally depends upon the types of materials used in production as well as the economics of recovery compared to the costs of acquiring raw materials.

The following SWOT analysis is presented to summarize the current situation of electromobility in the EU.

Table 3.3. SWOT analysis of development of electromobility in EU

| Strengths | Weaknesses |
|--|---|
| <ul style="list-style-type: none"> • strong position of the automotive industry in the national economies and the developed network of suppliers • strong position of electrotechnical industry in the national economies • the availability of experts in technical and scientific fields, including IT • relatively low labor costs in some countries compared to key markets for electromobility • functioning platform and professional dialogue focused on the development of electromobility all around the Europe • suitable energy mix | <ul style="list-style-type: none"> • slower economy and increased focus on price often at the expense of quality • separate perception of the need to introduce green technologies in each country • harmonization of norms and standards • lack of infrastructure for charging electric vehicles • lower sensitivity of the adoption of environmental, respectively. innovative solutions |
| Opportunities | Threats |
| <ul style="list-style-type: none"> • reduce dependence on oil • reduce emissions and pollution concentration transport locations • creation of new skilled jobs • developing research base in some areas related to electromobility • impetus for innovative automotive companies and their suppliers • creation of new innovative business models and services • effective integration of mainly smaller, respectively local RES • the use of electric vehicles in smart energy networks (SmartGrids) | <ul style="list-style-type: none"> • lag in competitor countries, failure in stimulating investment and employment • delay reduction in input prices due to slow implementation of economies of scale in mass production • unsystematic ad hoc solutions • competition of other green technologies (hydrogen, solar etc.). |

Source: Own processing

3.5. Recommendations for the development of electromobility in the European Union

This chapter subscribes the appropriate tools which can lead to the development of electromobility in the member states of the European Union as well as in the European Union as a whole.

State intervention in member states or common support strategy of EU - during the analysis of various documents and studies, we know across on a number of measures that could help the current situation in the field of e-mobility, but this application requires a systematic approach. It is important to suggest a timetable for their introduction and temporal scope, because due to this sustainability cannot be introduced all at once. It would be attractive for consumers remission of fees and charges associated with the operation of an electric vehicle (registration fee, road tax, tolls and tolls), the opportunity to recharge their electric vehicles for a discounted tariff for supply of electricity to park in designated areas for electric cars in the city center, as also use the lanes for public transport, but their extension would certainly be worth considering municipal bodies to improve and thinking “ground” clearance and public transport. It would also still reserved for parking space for the owners of an electric car in his residence. That is why it is important to consider the introduction of various tax breaks and incentives, co-financing, aid in finding financial resources, building permits for developers who think of e-mobility, procurement of electric vehicles into the ranks of police and firemen. EU has not always developed a strategy for the development of charging stations, and without their further development it is not possible to develop electromobility. These strategies are still in the hands of individual governments that deal with their networks separately. Within this area, a single strategy for the development of electromobility charging stations across the EU is needed.

Support from car manufacturers and importers - automotive industry managers know that the future of transport belongs to alternative fuels.

The production of electric cars is included in their programs. In decades, however, they have invested heavily in the development and production of internal combustion engines and their sales. The launch of the mass production of electric cars is therefore set aside. The electric vehicle is no longer expensive due to battery, but mainly because of small-scale production. A combustion engine car is a state-of-the-art machine that can only be manufactured by technologically well-equipped and competent companies. On the other hand, simple electric vehicles can also produce smaller startups, which are not supported by the states.

Support by groups supporting the development of electromobility - the support for the sale of electric vehicles on the EU market can also support the development of electric vehicles in EU. In addition to electric mobility, drivers offer a comprehensive system of related services, such as the possibility of simple cross-system payment, flat-rate payment, vehicle charging management over time, a detailed overview of the functionality and availability of charging stations or customer support. Owners will also be thinking about the availability of the services provided before buying an electric vehicle in the future. The more flexible and comprehensive the portfolio of services will be offered to the driver, the sooner will deprive the customer of a feeling of uncertainty when deciding on the vehicle. It is also important to find the right balance between the services for which the customer is willing to pay.

Segmentation – we can argue under studied of secondary surveys that potential consumers and those interested in electric cars have emerged as modern humans, mostly to 34, interested in technology and its surroundings, open innovation and indicating trends (KRNÁČOVÁ 2013). As Tesla Motors focuses on the premium segment, other car manufacturers should be targeted also to a specific segment based on actual surveys. Electric vehicle would be communicated as a vehicle whose possession reflects the image of the consumer and makes it exceptional in relation to the surroundings. Besides these characteristics, electric car owner looks like rational and educated consumer who is aware of the negative impact of industry and human activity on the

environment, achieves success in work and daily raids around 20 km, ie. primarily used car for short distances within the city. Electric vehicle should therefore be exclusively presented as a vehicle for urban areas, which in comparison with conventional cars seems to be more practical and more economical.

Marketing communication - to be able to selling electric vehicles in in EU, the potential owners have at least know their positive aspects. We have in mind the wider community also. Many people in electric vehicles imagine only a high price and short range (GENOVESE A., ORTENZI F., VILLANTE, C. 2015). The aim should be to inform and educate the public as well as direction of advertising message to the target segment. Appropriate forms can be considered product placement, guerilla marketing, mobile marketing, internet marketing and other less traditional forms that are somehow modern, imaginative and accepted by the target group.

Education - For education system are typical research and development activities in the field of electric vehicles. If we consider a real expansion of electric vehicles in EU in the future, we have experts in this field. It is necessary to establish cooperation at all levels, ie. we should involve all market EVs in education and forgive the outdated teaching methods. The results are not only worthy projects in student competitions. We must enable students to learn and learn about electro-accredited under the new program, elective courses or courses whose completion would guarantee success in the labor market. Courses opened by the carmakers or other commercial companies on campus seem as a supplementary education to students of the theoretical basis for their learning curve in business processes, where the company would train their future employees. This model need also the investment or cooperation from the side of state and public institutions.

Partnerships, leasing and service - cost of electric vehicles will be the biggest obstacle in EU for which many consumers have not bought a vehicle. Carrying high initial development costs for the customer is also unpromising. Carmakers have to consider creating global partnerships in

technologies that allow them to achieve lower costs for the introduction of large-scale, as well as reduce overall risk. Electric vehicles current price could be reduced, for example, if the seller offered the most expensive components of the vehicle - battery - for leasing, or could be interested about electric vehicle designed repayment program (QNOVO. 2016). If carmakers want to gain new customers, they must provide certain guarantees to the consumer losing the sense of insecurity when he decides on the automobile. The battery life is one of the causes of doubt and hesitation. The battery should be warranted, during which there would be, if anything goes wrong the customer would be given a temporary replacement vehicle until the fault has been removed or replaced without charge the battery with a new one. Also, in order to avoid that the owner of an electric car remains on the road somewhere with the battery without recharging it from any source, vendor or other entity should establish a mobile assistance service, which would in an emergency recharge the electric vehicle. Other incentives could be less frequent checks and controls, free service and simple to install recharging equipment at the customer's home, enabling to comfortably recharge your electric car while you sleep and have it fully ready for each day.

3.6.Conclusion

The chapter allows us to understand the nature of e-mobility and deployment of electric vehicles in road traffic. The important elements are production of electric vehicles, charging net and infrastructure, information and communication technology and legislation. The electric mobility appears to be an alternative solution meeting the economic, ecological and social aspects of sustainability in view on the current traffic situation, which is characterized by strong growth performance and share emissions from transport. Traffic problems are registered by European and other world countries that they have decided to implement national strategies to promote the development of e-mobility in the form of direct financial subsidies or through non-financial instruments, or a

combination thereof. Funds spent in the electromobility sector should also ensure increased employment in all countries while reducing dependence on fossil fuels. Not less important is the contribution of electric mobility and improve the environment by reducing CO2 emissions, noise reduction or other adverse consequences for human health. Among the driving characteristics and specifications it should be emphasized efficiency of energy use, lower operating costs than conventional cars, the engine runs smoothly and energy recovery. The main disadvantages is discourage of many potential consumers from buying an electric car, consider a limited range (up to 500 km on a single charge), battery life and recharging, the length of which depends on the type of charging station, and the high selling price.

Electromobility has currently the greatest opportunity to establish itself in the market, thanks to its great variety of international agreements and partnerships for the purpose of its development, as well as increased public interest in this topic for the last time. Mentioned national strategies help to the development of e-mobility, which not only motivate people when buying an electric car, but is also involved in the development of infrastructure. The leaders on a global scale in electro vehicles are countries like USA, Japan, the Netherlands, France, Norway, Germany and so on. We can when buying an electric vehicle to meet with government support in the form of direct financial contributions or tax credits. Semantically equivalent are also public investment in science and research in the field of e-mobility and individual support to local governments. We have also taking into account other measures in force in foreign countries as free charging, parking in the city center, the possibility of using marked lanes for public transport, forgiveness toll, the electric vehicle becomes in the eyes of consumers attractive means of transport. The benefits can outweigh the negative aspects.

Subchapter Recommendations for the development of electromobility in the European Union is devoted the options how make attractive the electric vehicles in our conditions. It is necessary to focus on non-financial support programs, because direct financial subsidies are for us

rather unreal as real in long time future. Other mission is create an attractive business model for entrepreneurs whose ideas of electromobility and the associated cost savings interesting rather than end consumers. It's the only way to develop electromobility in EU to this times, while prices of batteries and electric vehicles doesn't decrease due to introduction of new technology and more efficient production.

The future of electric vehicles may be viewed as vehicles primarily intended to urban areas for short distances. Although the EU aims in urban transport by 2030, reduce the use of conventionally fueled cars in half, it is important to note that the role of electric vehicles is not fully replace cars with internal combustion engine and therefore comparison is sometimes not justified. Electric vehicles can be also extremely useful in meeting the objectives to be achieved by the introduction of urban logistics zero emission of CO₂ in the centers of large cities in 2030.

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Chapter 4

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INNOVATION IN AGRICULTURE IN THE ASPECT OF SOCIAL AND COMMUNITY FACTORS OF THE ENVIRONMENT

Abstract: This article is an introduction to the issue of innovation in agriculture. The concept of innovation and selected data on innovation in Europe are presented. It was explained how innovation depends on the social factors of the work environment and the relationships that document them. The social and psycho-social conditions of work include the climate for creativity in the workplace, the leadership style of superiors, the relationships between superiors and employees, the nature of work, the decision of the farmer, their individual differences (creative personality, gender, education, motivation, self-efficacy, and openness to experiments). Is a wide variety of factors that can either motivate or hinder a farmer to adopt a sustainable agriculture practices. These factors include individual characteristics and philosophies, federal agricultural policies and programs, economic factors, education and information, regional specifics, land tenure issues, and social and community factors. There are currently three important ways to create new solutions: face-to-face contact; social and cultural interactions; and expanding knowledge and innovation towards sustainable food development.

Key words: agriculture, adaptation, acceptance, environment, education, nanotechnology, innovations

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4.1. Introduction to innovation in agriculture

Concerns with diminishing resources and expanding populations are exacerbated by changing diets in many developing countries, enable technologies for digital agriculture (VAN ES H.M., WOODARD J. 2017), farmers are eager to employ automation and digital technologies to reduce challenges with their farm labour force, which often depends on migrant workers and therefore poses legal and management challenges. Digital technologies will also facilitate those management farm enterprises that are larger than would otherwise be possible, and may intensify the global trend of farm consolidation. Recent technological developments have proven that data and model computations can address these uncertainties and offer more reliable nitrogen management advice to farmers through cloud based services. There are two new things in agriculture, the first is Organic fad and the second one is ICT impact in agriculture, though both are important for Quality orientations; the Organic is consumed while ICT is enabled (UMACHANDRAN K. 2014, SAWICKA B., UMACHANDRAN K. 2017). The Organic gets tagged to the product through more restrictive requirements because of environmental conditions or the necessity of specific production or handling practices while the ICT including Transformative technologies such as nanotechnology solutions are creating new pathways for food security and precision agriculture is for process facilitation, identification, traceability and sustainable consistence in deliverable to the customer (GLOD D. ET AL. 2014, SELA S. ET AL. 2017).

4.2. Revolutions in Farming Industry

Farming is an industry today, hence the Industrial management principles are becoming applicable to Agriculture (UMACHANDRAN K. 2014). Modern Industrial farming is carried out on a large-scale, with

enough support for sustainable organic agriculture (HAMEED T.S., SAWICKA B. 2016, 2017).

The tools with which the farming sector in developed countries has increased productivity throughout the last century are modernization and the application of agrochemicals and advances in plant and animal breeding. Irrespective of location, economic conditions, land - labor availability, and differences in the development of the agricultural sector in different regions, modern industrial agricultural systems have congregated in practice (MEIER S. ET AL. 2013, HAMEED T.S., SAWICKA B. 2016, 2017).

The role of Government is very crucial, and it should proactively facilitate in bringing up policies on Business Models in ICT, Application skills in ICT and Supporting infrastructure on the Gadgets and free download applications; so that the farming industry is benefit by this technological wave (VAN ES H.M., WOODARD J. 2017).

Digital agriculture. Digital data will be collected at a rate of 40 zettabytes (ZB-the equivalent of 40 trillion gigabytes, or GB) per year by 2020. Increased capacity and computing capacity, combined with a high-resolution environment such as and remotely detected data, created unprecedented possibilities to explore based on data in agriculture and food systems. Many improvements in agriculture can therefore be facilitated digitally innovations (VAN ES H.M., WOODARD J. 2017).

4.3. Farming Technologies

Mobile computing & 4G networks – portable computers and smartphones to farm tractors. Farmers access high-speed Internet services & cellular communications networks in rural areas (FOLEY J.A. 2011, GLOD D. ET AL. 2014, VAN ES H.M., WOODARD J., 2017) (Table 4.1).

Table 4.1. Enabling technologies for digital agriculture

| Production environment | Type of technology | Purpose and benefits |
|----------------------------|--|--|
| Cross-cutting Technologies | Computational decision tools | Use data to develop recommendations for management and optimize multitudes of farm tasks |
| | The cloud | Provide efficient, inexpensive, and centralized data storage, computation, and communication to support farm management |
| | Sensors | Gather information on the functioning of equipment and farm resources to support management decisions |
| | Robots | Implement tasks with efficiency and minimal human labour |
| | Digital communication tools (mobile, broadband, LPWAN) | Allow frequent, real-time communication between farm resources, workers, managers, and computational resources in support of management |
| | Geo-locationing (GPS, RTK) | Provide precise location of farm resources (field equipment, animals, etc.), often combined with measurements (yield, etc.), or used to steer equipment to locations |
| Field | Geographic information systems | Use computerized mapping to aid inventory management and to make geographical crop input prescriptions (fertilizer, etc.) |
| | Yield monitors | Employ sensors and GPS on harvesters to continually measure harvest rate and make yield maps that allow for identification of local yield variability |
| | Precision soil sampling | Sample soil at high spatial resolution (in zones) to detect and manage fertility patterns in fields |
| | Unmanned aerial systems (UAS, or drones) | Use small, readily deployed remote-control aerial vehicles to monitor farm resources using imaging UAS |
| | Spectral reflectance sensing (proximal and remote) | Measure light reflectance of soil or crop using satellite, airplane, or UAS, imaging, or field equipment-mounted sensors, to make determinations on soil patterns, crop, or animal performance, or on nutrient/pest problems |

| | | |
|--|--|---|
| | Auto-steering and guidance | Reduce labour or fatigue with self-driving technology for farm equipment (including robots); can also precisely guide equipment in fields to enable highly accurate crop input placement and management |
| | Variable rate technology | Allow continuous adjustment of application rates to precisely match localized crop needs in field areas with field applicators for crop inputs (chemicals, seed, etc.) |
| | On-board computers | Collect and process field data with specialized computer hardware and software on tractors, harvesters, etc., often connected to sensors or controllers. |
| Livestock | Radio frequency ID | Transmit identity data with tags attached to production units (mostly animals) that allow data collection on performance as well as individualized management |
| | Automated milking, feeding, and monitoring systems | Perform milking or feeding operations automatically with robotic systems, often combined with sensors that collect basic biometric data on animals, thereby reducing labour needs and facilitating individualized animal management |
| Note: GPS = global positioning system; LPWAN = low-power wide-area networks; RTK = Real Time Kinematic high-accuracy positioning system. | | |

Source: Van Es H.M. & Woodard J., 2017

Telematics – telematic systems use various devices and software and systems: electronic communication, connecting individual elements of the telematics system (wide area networks, local networks, mobile telecommunications networks, satellite systems); information of acquisition (measuring sensors, video cameras, radars); information of presentation for telematics system administrators (GIS systems, access control systems); presentation of information for system users (traffic lights, radio broadcasting, internet technologies: WWW, SMS). This system is easily identifiable on a mobile computer map where rural vehicle are operating and check their fuel levels, how much crop

harvested, and even stated were equipment break down. In the case of nitrogen utilization – system working to collect the data and develop the understanding of the mechanism of how yield can be increased at existing nitrogen levels or maintain yield of plants with reduced nitrogen levels. This technology allows working over herbicide tolerance trait, develop new formulations that tackle spray drift and volatilization to non-target crops and other plants on the landscape while increasing the intended production. (CASTLE, M. ET AL. 2015, VAN ES H.M., WOODARD J. 2017).

Mini-chromosome technology – this technology allows us to add these traits faster and more precisely over the existing by looking at the complex traits like drought tolerance and nitrogen-use efficiency etc. Improved plant and animal genetics help to achieve higher production levels by reducing susceptibility to diseases and pests (CASTLE M. ET AL. 2015, FERNANDEZ P. ET AL. 2016).

Soil and crop sensors – More farm equipment today is being outfitted with smart sensors that can read everything from plant health and water needs in the crop to nitrogen levels in the soil. The sensors then enable on-the-go application of inputs based on real-time field conditions. The newest area of sensor use is in irrigation where the sensors measure water needs. Sensors help optimize water use and avoid yield loss (SELA S. ET AL. 2017).

Electric drive systems – tractors, sprayers and other farm vehicles can generate electric power to run auxiliaries and attachments, these features shall put conservation of energy and prolonged use of the power generated over various appliances (SELA S. ET AL. 2016).

Automated grain off-loading – automatic guiding & navigation systems that combines to improve continuous cart filling as part of forage-harvesting systems. These systems make a very good ROI as it is easier to fill and off load the contents automatically (VAN ES H.M., WOODARD J., 2017).

Nano technology – finds application in Crop Biotechnology, Recycling Agricultural Waste, Delivery Systems for Pests, Nutrients, and Plant Hormones. Nanotechnology can revolutionize agriculture and food

production. It will change the way of production, processing, packaging, transport and consumption. However, before nanotechnology products are flooded by global markets, government agencies should be prepared for this by issuing appropriate regulations, eg ordering products containing nanoparticles; consumers who should be equipped with adequate knowledge. Meanwhile, applications of products obtained through nanotechnology are more than promising. They allow you to increase the efficiency of agricultural production, processing, packaging and nutritional value of food products while reducing costs and extending the shelf life. In agricultural nanotechnology, "precision farming" leads the way, which saves energy, time and money. It uses nan sensors, new delivery systems, increases the efficiency of fertilizers and nutrients, and uses new methods of water and soil purification. Sensors built of nanoparticles capable of identifying a single molecule help to control soil conditions and plant growth, as well as identify and dispose plant and animal pathogens. New substance delivery systems are, for example, nanocapsules with controlled release pesticides, which dissolve in water more efficiently than existing ones or plant protection agents, which are released from nanocapsules only in the stomachs of insects; nanoemulsions based on water or oil, which can then be placed in gels, creams, liquids and added to them nutrients, hormones, and vaccines. Nanotechnology has also invented devices that can recognize the disease of a plant before it is noticed by the farmer and react by either alarming or even giving the right chemical substance. With the emergence of new remote sensing platforms, as well as cheaper non-standard options (e.g. Nano-satellites, unmanned antenna systems, etc.), there will probably be a lot of movement towards designing future risk management programs around technologies that indicate both losses and size (GLOD D. ET AL. 2014, CASTLE M. ET AL. 2016).

Unmanned Aerial Vehicles – a cloud based data management tool can be specifically designed to work with Unmanned Aerial Vehicles. The online tool allows to utilize data on yield, as-planted, drainage tile, soils, shape file layers and various aerial imagery (Oblique Imagery,

Optical Imagery, Soil Imagery and Virtual Video Imagery) for the following Emergence Variability, Drainage Analysis, Hybrid Placement, Plant Health, Soil Performances (MONTGOMERY D.R. 2007).

There is a lot of research and innovations happening in farming. Some of the recent applications in the protection of environment from pollution, use of non-conventional energy sources, new farm techniques and use of natural manure and rejection of fertilizers and chemicals are multipurpose solar pest, insect trapper and garden light - reduces the frequency of spraying pesticides to control the fruit borer and white fly pests. Avoids incidences of farmers being killed due to electric shock in the fields while switching on their agricultural pump-sets (FERNANDEZ P. 2016. SELA S. ET AL., 2016).

Short duration green gram variety through micro-nutrient mixture - The crop is ideal for rain-fed conditions. Agricultural landscapes and knowledge of disposable productivity in natural and managed systems innovatively lead the engagement of feedstock production among different parts of the country and within a region, landscape, and watershed (BRAUN R. ET AL. 2010). Application of micro-nutrient mixture ensure better growth of plants with enhance pods and seed setting leads to early maturity it escapes terminal drought and ensures sustainable yield, determinate growth and synchronized maturity is amenable for single harvest saving labor and time. This variety shows resistance to mung-bean yellow mosaic and stem necrosis; field tolerance to sucking pests like aphids, stem-fly and spotted pod borer (CASTLE M. ET AL. 2015, SAWICKA B., UMACHANDRAN K. 2017).

Innovative sericulture – in Bivoltine cocoon deflossing to increase productivity using mechanized peddling technique avoiding manual operations (FOLEY J.A. 2011).

Innovative attention to the potential areas need not include only business or commercial operations but can cover all sustainable concerns and evitable damage areas that would affect economic and environmental successes. Supplementary encouragement in innovation is the recognition and significant impact of scarcity of land and public sensitivity to landfills

in the neighborhoods (BRAUN R. ET AL. 2010).

Pest management in Chili Seed treatment with imidacloprid is effective; Spray with acaricides such as dicofol and utilization of indigenous materials have confirmed that garlic chili kerosene extract can effectively combat the problem Mite infestation (SAWICKA B., UMACHANDRAN K. 2017, SELA S. ET AL. 2017).

Growing food safety is more than aggregating local food production, Storage, processing, distribution, and retail. These critical components of the supply chain challenge can be taken care through enabling refrigeration space and purchase processing equipment capable for handling commercial volumes. Use of existing facilities for increasing commercial processing facilities, adequate storage capacity to ensure the fresh food access to market available upon harvest. Value addition of on-site refrigeration provided to meet the community and maximizes retail presence; establish arrangements to use church or school kitchens for processing on days when they are not in use (MEIER S. ET AL., 2013).

4.4. Conclusions

Advanced digital technology, technologies in agriculture and the food industry are rapidly growing in developed market economies in and are spreading to developing countries. The current eruption of curiosity in globalization echoes a prevalent sense of something fundamentally trendy with stacks of vast problems interconnected under the global innovation. Due to the unique characteristics of agriculture, variable resources, poor connection in rural areas, gaps in education of farmers, as well as companies supporting global players on the market, digital agriculture requires special attention from governments and industry leaders. Geographical accumulation or bunching enables three significant routes in origination of newer developments: face-to-face contact; social and cultural interaction; and enhancement of knowledge and innovation. This will be the main road to the sustainable development of food supplies.

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NEW PRODUCTS AND THEIR LAUNCHING ON THE FOOD MARKET

Abstract: Our chapter deals with a new type of foods and legislation which is necessary to adhere when launching products on the unified European market. Based on the results of realized survey our chapter also analyzes consumers' opinions on new food products. Competition on the current markets in countries of the European Union is very intensive and dynamic. To survive in this competition means that the enterprise has to pay continuous attention to the improvement of existing products and development of new ones. The aim is to achieve the satisfaction of customers' changing needs as well as to react to competitors' challenge. In the contemporary perception and evaluation of innovative performance in the framework of the European Union, innovation represents the creation of new or substantially improved products or services, the use of new or substantially improved processes, marketing methods or organizational forms. It brings the value to market participants as well as to the whole society.

Key words: new type of foods, innovations, legislation, launching on the market

5.1. Introduction

In present competitive and global environment the ability to innovate is considered to be the key aspect of companies' competitiveness and has become the source of competitive advantage, the main driving force, the engine of economy. The basis of innovation is the ability to see associations, notice opportunities and take advantage of them.

Innovation is very important for Europe's competitiveness in the global economy. The European Union implements policies and

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programmes which support the development of innovations by increasing investments to research and development as well as by better transfer of results of research to new products, services and processes.

The industry represents 80% of the European export, while 65% of investments that go to research and development in the private sector come from the industry. Therefore modernization of the industry in Europe has to concentrate mainly on successful commercialization of innovations of products and services, industrial use of innovative production technologies and innovative commercial models.

The extent of innovations' novelty increases from small, growing improvements to fundamental, radical changes which change the way how we think about things and how we use them.

When implementing radical new possibilities a key role is often played by a new technology and on the other side of the technological spectrum there exists a space for the improvement of old products and gain from old technologies.

The development of novel products which has substantial impact on our everyday life is demanding, risky and costly. The results of research show that when novel products were launched, after five years only 56% of them stayed on the market. Company's orientation on radical innovations is an inevitable prerequisite for a long term survival, although the development of radical innovations in the form of completely new products is more risky and demanding than the derived products which arise from continuous improvement of traditional products.

Ground-breaking innovations represent companies' proactive and strategic approach to innovations which improves the long term competitive advantage of the company in case a company has a vision, expertise, determination and obligation to devote to a risky project that can have an important impact on the market. Stated innovations are characterized by unique advantages for a customer, they can widen or define again the product category, they differ from existing portfolio, require different marketing procedures, comprehend high financial risk and are closely connected with emerging consumers' trends.

Ground-breaking projects with a high level of risk require different ways of management compared to linear products' innovations. The innovative companies are not only those which produce innovative products but also those which can modify the formal process of products' development in such a way that they can reach a change. In the contemporary business setting the development of novel products is more often realized in the multidiscipline and dynamic atmosphere.

5.2. Methodology of a study

The aim of research was the analysis of novel food products on the Slovak market, problems connected with their launching as well as consumers' opinions on them.

The basis for obtaining and subsequent application of theoretical knowledge that is essential for investigation of stated problems was the literature search and study of bibliography sources including domestic as well as foreign magazines and publications complemented by up-to-date sources in the electronic form. All necessary information about innovations of products and technologies in the area of food industry was compiled by methods of analysis, synthesis and abstraction.

In the framework of solving stated issues the survey was realized with the aim to identify the current level of consumers' awareness about novel food products on the Slovak market. As a tool for collecting data was used the standardized questionnaire consisting of fifteen questions as well as the classification data of respondents. Questionnaires were sent to respondents in the electronic as well as printed form.

Introductory questions in the questionnaire concentrated on finding out the scale and level of respondents' knowledge about novel food products on the Slovak market. The aim of further questions was to define the profile of consumers who consumed stated products and to define their attitude to them. 318 respondents participated in the survey which represents 91% recoverability of questionnaires as initially 350

questionnaires were sent. It was necessary to transform acquired information to the form that was suitable for processing and then to interpret it by means of analytical and statistical methods. The collected data were processed and interpreted by using statistical programs Statgraphics and Microsoft Excel. Survey's outputs were adapted for better lucidity in the form of graphic, table and written interpretation of answers to questionnaire's questions.

5.3. Results and discussion

Characteristics of innovations and an innovative process

Innovation is understood as a complex process of creating, widening and using of a new tool for new social needs or for better use of already known needs. In more general meaning innovation is every change in the production process (in material, capacity, organization, technology and other) that can but need not have to have an impact on the quality of the final product. The consequence of innovation has to be the economic effect, either direct or indirect. The economic effect is besides profit e.g. the increased turnover or stabilisation on the market.

The aim of innovation should be the improvement of utility value of products, their new combinations or the application of new, until now not used features, while increasing effectiveness (KNOŠKOVÁ Ľ. 2015A). We cannot consider the substantial changes in production as the only way of innovation but there exist also improvements of existing products which acquire better esthetical appearance and utility characteristics.

The innovative process is not a mechanical one that starts with the scientific invention and finishes with its application into practice. It is more economic process in which the criteria of technical and economic characters encounter. Therefore it is necessary to keep in mind the general targets and capabilities of a product (KNOŠKOVÁ Ľ. 2015B). When managing the innovative processes it is necessary to come out from given conditions, from the meaning of innovative product, from the

degree of necessity and from a fact if it is going to be used once or repeatedly, on a mass scale or only on a minuscule scale.

If the development goes in a wrong way, it may put enormous requirements on the financial indemnity of the whole innovation and therefore it is necessary already in the first phase to evaluate the strengths and weaknesses of the enterprise. The decisive criterion for determination of the success of innovation is the economic result. A profit can result from income, savings from production costs or differences between revenues and costs on the technical equipment. If the innovation is to be successful, it has to be:

- aim oriented,
- implemented in a short time with the lowest possible costs, minimum risk and in accordance with formulated goals of the enterprise.

With innovation are always connected certain risks following from the fact that a novel product may not be launched on a market in a supposed time, the supposed rate of market growth and expected company's share on it will not be confirmed or planned revenues, amount of profit and recoverability of investments were overestimated.

In spite of stated risks every marketing- oriented company is forced to innovate due to:

- external causes,
- internal causes.

External causes that have to be accepted by a company, lie in the fact that due to the scientific and technological progress and development of the society, consumers' requirements are permanently changing. In the competitive fight only such a company can break through if it can react immediately to new requirements and if it can innovate its products in accordance with consumers' demands.

A company is forced to innovate by internal causes, too. After a certain period of time some products that represent the production program of the company, come to the period of decline in their life cycle, the turnover is decreasing and products do not bring expected profit. Therefore it is necessary to substitute them by completely new products

or to modify them in a right way and increase turnover and profit or at least maintain them on the previous level.

Innovations in the food industry

In the Slovak economy the food industry represents a very important sector with a long lasting tradition. It is connected with the agricultural basic industry which apart from the basic food production generates also services, offers jobs and secures nutrition of the population. After the Slovak Republic joined the European Union, competition increased and a non-balanced support in the framework of food industry as well as insufficient investment to innovations and modernization weakened its position in the economy. Inevitable demand for increasing the competitiveness of food industry is a flexible reaction and adaptation to the changing external and internal conditions. One of the basic conditions for economic growth of food companies is their innovative development.

Necessity and support of innovations in food industry belongs to the fundamental priorities of the Research and Innovation Strategy for Smart Specialization of the Slovak Republic which is connected with the Europe 2020 Strategy. The capacity of current food industry is big enough to process agricultural products but it inevitably needs investments to innovations and the ecology of production.

When dealing with problems of innovations in the food industry it is necessary to come out from the specific character of products which are produced by this industry.

Although food products are not influenced so much by sharp changes, as it is in fashion, e.g. clothes, shoes, household equipment, etc., one part of products (approximately 30%) (besides basic food and a group of products with long term traditional brand names) requires a continuous change in the form of innovation. It concerns many emergency food, instant products, final assortments with higher utility value and packaging design. When orientating on the effective innovation of food products three possibilities have to be taken into account:

- substitution,

- complementarity,
- multipurpose use.

Substitution means the summary of relations that emerge from possible replacement of one food product by another one on the market or during consumption. Food products' consumers try to satisfy their demand by more suitable products with lower prices, mainly in cases of higher substitution of products. The holder of substitution is e.g. in food a vegetable salad or stewed fruit, bread or bakery products, potatoes or rice and others; other food competes with products that can be used during travelling or can be found on the road route in motels and restaurants. The most potential holder of substitution for food companies is the domestic production of some food products, as e.g. bread, cakes, stewed fruit, syrup, etc. In practice we can meet with optional substitution which resolves the contradiction between features of food products found out objectively and subjective judgment of individual consumers, or forced substitution during certain situation on the market (e.g. level of supply on the place and at a time, price, selling of technique).

An important role in the innovation of food products is also played by their **complementarity** as an attribute and interdependence of consumption of a certain food product with another one, which means that cooperative relations are also formed among companies. The combined products (e.g. yogurt with jam, sour cherries in chocolate, etc.) diversify the assortment, increase the consumers' interest and lead to higher utility values of food products.

The higher degree of utility value connected with higher consumers' interest gain food products also by their **multi-purpose use** in the household or in the catering canteens (e.g. frozen peas can be used in soups, mayonnaise salads, risotto, etc.).

Innovating food products means that every producer has to take into account stated specifications. Novel products have a decisive importance for securing the existence and growth of marketing oriented company. Necessity and importance of products' innovations in the framework of

product policy results from strong competition as well as markets' saturation.

On the contemporary markets of the European Union the competition is very intensive and dynamic. To survive this competition means for a company to pay a continuous attention to improvement of existing products and development of new ones. The aim is to reach satisfaction of changing needs of customers and react to competitors' challenge.

A system that would incorporate organization and management of the whole process of innovation of products in a company is very important even for the survival of a company. It is not easy to form such a system. The development of novel products requires great effort and includes the risk of failure. Only a very small number of innovation proposals finish successfully in the innovation process and finally bring profitable commercialization.

Therefore the development of a novel product is a systematic process during which priority is given to the users' demands on all levels. If they are acceptable, there exists the possibility that a novel product will assert successfully on the market.

The systematic arrangement of food products' innovations requires the division of innovations connected with:

- change of the structure of a product,
- increasing the socioeconomic function of a product.

Among innovations that lead to the increase of product's socioeconomic function belong innovations focusing on lengthening the durability and shelf life of products, emergency products e.g. ready-to-cook food or ready meals and products from waste.

It must be clear for the company's management which markets they are going to enter and with which food products and technologies. In the long term perspective the solution of these questions is guided by innovative strategy of the organization which focuses all entrepreneurial activities on reaching a lasting success on the market by means of continuous development of novel food products. The development of novel products, scientific and technological development and

development of new technologies is for majority of organizations the driving force of their entrepreneurial strategies, enables them to enter new markets and make use of new entrepreneurial opportunities.

Contemporary trends in the food industry

Increasing the quality of food products is a permanent task of the food industry and it is a logical continuation of qualitative satisfaction of the consumers' market. The innovative process has to respect requirements for improving food products' quality as well as to keep the optimal speed of change maintaining the economic efficiency (LEE B.H. 2014). Therefore the program of food products' innovation has to come out from the requirement to be more economical by using all sorts of raw materials, materials, energy, by taking into account substantially better use of production-technical base and by using mainly domestic raw materials and sources.

The process of food products' innovation, that is under way in the whole world, has several characteristics typical for different economic conditions. They are as follows:

- maximum use of traditional food raw materials,
- use of non- traditional raw materials which have not been used so far for human nutrition,
- introduction of new products with special orientation on certain, precisely defined groups of consumers,
- introduction of new, ecological technologies and technologies with low energy intensity.

At present the food companies try to manage the product innovations to satisfy entirely the consumers' needs in the area of nutrition. By means of qualitative changes in the assortment of products, the main targets of nutritional policy are gradually promoted. In the area of food industry the innovative process concentrates mainly on:

- increasing the nutritional value of food products while decreasing their total consumption (the increase of consumption of products from fruit and vegetables, reduction of consumption of animal fat, the

increase of vegetable oil in the total consumption of fat, reduction of consumption of proteins, etc.),

- development of food products' assortment that save time when preparing meals at home and development of ready-to-cook dishes for canteen catering,
- development of food products' assortment with prolonged durability, production of products with new technologies and use of packaging materials that increase durability of products (KRNÁČOVÁ P. 2014),
- modification of novel products, e.g. so called "light type" food,
- substitution of some basic components, especially fat, by non traditional combinations of raw materials and unusual representation of some components,
- introduction of new technological procedures including modern biotechnologies,
- decreasing the energetic demands during production of food,
- characterising food raw materials from genetically adjusted sources and monitoring their impact on the quality of life,
- development of assortment of those products which are intended for special groups of customers (baby food and children's food, food for old people, pregnant women, sportsmen, people jeopardized by degenerative illnesses, people working in noxious environment, etc.),
- development of assortment of special and luxurious products which fulfil requirements of demanding consumers,
- introduction of products which enable the effective evaluation of raw materials, mainly domestic, full use of production capacities, workforce, etc.,
- improvement of food products' packaging from the point of view of trade, consumers promotion and advertisement.

Increasing the quality and value of nutrition as well as the effort to saturate market with food leads to growing qualitative changes. New tasks for the food industry follow from these facts, especially the change of production structure, enrichment of the market with novel products

which satisfy the demand not only globally but they satisfy also the individual demands of consumers.

Novel food and technologies in the food industry

Demographic changes, changes in the life style and globalization tendencies in the sphere of circulation of food products are the reasons of changes in consumers' behaviour. Growth of demand of consumers for healthy, nutritive and valuable food increases the pressure on producers to innovate and develop already used techniques and technologies of processing and leads to the production of more qualitative and safe food with a higher nutrition value (Ghosh D. 2012). Mainly due to these reasons the production of new sorts of food is growing where we can include bio food, functional food, genetically modified food and nano food.

Bio food labelled also as ecological, natural or organic food, are products produced exclusively from bio products, that means vegetable and animal products produced by a system of organic farming while using legally authorized components, additive substances and materials. Organic farming is characterized as the production of plants in which are used special sowing procedures, green fertilization, fertilization by organic manure, authorized natural inorganic fertilizers, mechanical, physical and biological methods for protection of plants as well as the breed of livestock for which only fodder from organic vegetable production is used and the livestock is under special veterinarian care. Specific approach to breed of livestock reflects in their more natural living conditions; one part of which is feeding with food from organic production. Growing a higher number of crops on a smaller territory supports in the framework of organic farming biodiversity, i.e. the biological variety of environment.

Distinctiveness of bio food is the result of particularly strictly defined conditions for production; by respecting them is eliminated the negative influence of production on the environment (soil, water and air) as well as the content of chemical substances and genetically modified organisms in

the final products. In many cases bio food has a higher nutritive value and better, more intensive flavour than conventional (“ordinary”) food due to respecting strict norms, so they contain less water and more aromatic substances (BENDLOVÁ K. 2013). The importance of bio food as a part of food products results not only from ecological but also economic contributions of its production. Organic farming contributes to creating new working possibilities, development of countryside, increase of GDP; as a part of produced bio food is exported abroad, it also participates in improving the country’s balance of trade (LACKOVÁ A. 2015).

When food products are sold it is possible to label and promote them as “bio” and “eco” only if the processed food does not contain less than 95% of ecological components of the farming origin. Because for bio products and bio food is characteristic a special method of production, it is important for consumers to be able to identify them easily as well as to differ them from food produced by the conventional method. Therefore since 2010 all packed and produced bio products in one of the countries of the European Union must have on the packaging a unified European logo which simplifies the identification of bio food for consumers. On the packaging must be these data (JAROSSOVÁ M.A. 2016):

- labelling related to the organic production according to Council Regulation (EC) No 834/2007 which is a voluntary name “bio” or “eco” in the product’s trade name,
- number code of an inspection organization, to which the operator, who makes the last production operation or preparation, is responsible to (in Slovakia these organisations are Naturalis SK, code SK-BIO-002 and Biokont, code SK-BIO-003),
- logo of the organic farming of the European Union (figure 5.1) while in the same field of sight as logo is stated also the place of production of farming raw materials from which the product consists of in one of these ways:
 - a) “EU Agriculture” if the farming raw materials were produced in the European Union,

- b) “non-EU Agriculture” if the farming raw materials were produced in the third countries,
- c) “EU/non-EU Agriculture” if one part of farming raw materials was produced in the EU and the other one in the third country,
- graphic character of the organic production in Slovakia according to the Act 189/2009 Coll. about organic farming (figure 5.2),
- labelling of the product’s country of origin (for Slovakia the labelling is SK).



Fig. 5.1. Logo of the EU organic farming

Source: http://ec.europa.eu/agriculture/organic/downloads/logo/index_en.htm



Fig. 5.2. Logo of the organic farming of the Slovak Republic

Source: Act 189/2009 Coll. about organic farming

For organic products imported from third countries the use of logo of the organic production of the EU is voluntary.

State administration's bodies responsible for control in the system of organic farming are Ministry of Agriculture and Rural Development of the Slovak Republic and Central Agricultural Institution of Control and Testing. Besides stated state organizations there are in Slovakia also inspection organizations Naturalis SK and Biokont which control and grant a certificate for organic farming producers.

Functional food which is called also the "food of the future", super food or food of the third millennium belongs to new trends in nutrition. Food can be considered as functional if it has been proved that apart from an adequate nutritious effect it positively influences one or several functions in the human body by improving health conditions or decreasing the risk of occurrence and progress of chronic diseases. This food is enriched and contains the increased amount of healthy components (COLES L. 2013). These components cannot be found in common food and if they are there it is only a small or insufficient amount.

The country of origin of functional food is Japan where in 80 ties a concept of this type of food was born. The main reason for the origin of functional food was that in developed countries people accomplish higher age and the number of seniors is increasing. This group of people suffer from different diseases and costs connected with health care are becoming a burden for the countries' budgets. In Japan they decided to support research of food which would decrease the origin of diseases of adults and seniors if this food was consumed regularly. This system started to spread to other developed countries. Since 1991 Japan has approved a program which enables to label this food as "food for special use". In this way producers can use on packaging a logo which informs that it is a product with supposed therapeutic or preventive effect.

The area of functional food in Slovakia has not been adjusted legislatively and it has resulted in the fact that some producers launch their products in such a way that common consumers are not able to

judge from stated qualitative structure if the food contributes or does not contribute to support of their health. To get rid of this ambiguity, which can be misused by some producers, it is necessary to accept legislative measures. Japan, the USA, Canada and Brazil belong to the countries which have already done so.

In Slovakia according to Act 152/1995 Coll. about food subsequently amended is in force that no assertion stated on the product can be misleading and only such affirmations about nutritive and health effects can be used which are scientifically approved.

In the framework of the European Union there are several regulations in which the concept of functional food is not directly declared but is closely connected with food of this type. These are mainly regulations concerning the labelling of food (European Parliament and Council Regulation (EC) No. 1924/2006 about nutritive and health assertions about food as amended). At present the nutritive and health assertions are submitted to the European Food Safety Authority (EFSA) with the aim to create the list of authorized assertions in connection with certain nutrient, so to be able to prove scientifically that it has a positive health or physiological effect.

Functional food is not specifically labelled in Slovakia, but it is emphasized that on the packaging of food cannot be stated misleading information concerning the nutritive or health contributions for the human organism.

Genetically modified food is food that contains, consists of or was produced from genetically modified organisms (thereinafter GMO) eventually from, in this way modified, components. According to the Act of the National Council of the Slovak Republic 151/2002 Coll. about the use of genetic technologies and genetically modified organisms subsequently amended, genetically modified organisms are understood as every organism with exception of the human being whose hereditary material (DNA) was changed by the genetic modification, i.e. it is an organism in which the genes were changed by the application of modern biotechnologies - gene splicing.

Genetic modification was firstly applied in 70 ties and at present it is one of the newest methods of introduction of new characteristics in microorganisms, plants or animals (SMITH J.M. 2015). The use of genetically modified organisms follows the acquisition of such raw materials and products which are resistant e.g. to pests, unfavourable climate conditions or enable to increase revenues and animal production.

Application of genetic modification opens a new area of food production. One of the first applications, which is rarely mentioned in connection with food containing GMO, is the use of enzymes which are products of genetically modified microorganisms (STRATILOVÁ Z. 2014). For fermentation of milk, meat, vegetables but also wine and beer are used traditionally germs of lactic fermentation. In-depth knowledge of their genetic characteristics together with the application of genetic modification led to the possibility of changing fundamentally their fermentation and technological properties.

In Slovakia no food products prepared by using genetically modified raw materials have been approved till the year 2004. On the other hand it was not possible to exclude their presence, taking into account the globalization of food trade and possible import from states where these products are commonly accessible on the market. These countries are mainly the USA, Brazil, India, Australia and Argentina where genetically modified farming crops are cultivated on large areas.

In the European Union the approval of launching the product GMO takes at least 1-2 years. In 2006 Slovakia became the sixth country of the EU that for the first time sowed genetically modified maize resistant to pests but it cannot be grown freely and it is determined only for animals' engrossing and food objectives.

In the framework of the EU following legal regulations deal with GMO: European Parliament and Council (EC) Regulation No. 1829/2003 about genetically modified food and feed and European Parliament and Council (EC) Regulation No. 1830/2003 about accountability and labelling of GMO and accountability of food and feed produced from GMO. In the framework of rules of Regulation No. 1830/2003 the subject

who places a product on the market must take over and store information about products containing GMO or are produced from GMO, in every phase of their placement on the market. On the packaging of products which contain more than 0.9 % of GMO has to be stated “This product contains genetically modified organism” or “This product contains genetically modified (name of the organism/organisms)”.

In the Slovak Republic problems connected with genetic modification and mainly the use of products of biotechnologies is adjusted by the Act 151/2002 Coll. subsequently amended about the use of genetic technologies and genetically modified organisms; the Ministry of Environment is via the Department of Biological Safety the competent authority for its state administration. An act sets general conditions for using GMO and their products but it does not cover the whole scale of problems with GMO or the newest scientific knowledge about this area.

According to the legislation valid in the Slovak Republic (Act 152/1995 Coll. about food subsequently amended) genetically modified food can be placed on the market only packaged and only with approval and under conditions set by the Ministry of Agriculture and Rural Development of the Slovak Republic and authorized by the European Commission.

Nano food is food that was grown, produced, processed or packed by using nanotechnologies or into which nanomaterials were added (KVASNIČKOVÁ A. 2011). It is expected from the application of nanotechnologies that they will bring advantages in the food sector including new flavours, textures, lower use of fat, additives soluble in water as well as in fat, increased absorption of nutrients, better food packaging, better accountability and security of food. Contemporary application in the European food sector is only in the initial phase but it is expected that in the following decades more and more products produced by nanotechnologies will enter the market. They represent a broad scale of new technical possibilities and therefore it is not possible to predict exact consequences of these innovations. At present we know only little about risks connected with these technologies. It is important to realize

that nano food has physical, chemical and biological attributes which differ from its conventional macroscopic food. New approaches and research studies of the impact of nanoparticles on the living cells are desperately needed for the assessment of potential risks for the human health. Besides this in the European Parliament is under way a discussion about legislation concerning labelling of nano food. The obligatory statement of all nanoparts, i.e. parts of dimension less than 100nm would include also the natural materials which are present in conventional food in nano dimension (e.g.in dairy products, mayonnaise, etc.).

Launching of novel food on the market

Quick development of technologies, shortening of products' life cycle, development of new solutions and permanent effort of companies to increase their competitiveness require managing of launching of new type of products without problems.

Food and additives, which according to available information were not used for human consumption in a substantial degree before the date 15th May 1997 in some of member countries of the European Union, are considered by the European Commission (thereinafter Commission) as **novel food and additives**. Before being launched on the single European market they have to be approved by procedures stated in Regulation of the European Parliament and Council (EC) No. 258/97 about novel food and additives. Granting permissions and using novel food has been harmonized in the EU since 1997 when stated legislation was accepted. According to the Regulation No. 258/97 these food categories belong to novel food:

- food with new or deliberately modified primary molecule structure,
- consisting of or isolated from microorganisms, fungi or algae,
- consisting of or isolated from plants or animals, with exception of food acquired by reproductive or breeding methods which were required as safe in the long term,
- food where the new production process was used leading to substantial changes in the composition or structure, due to which the

nutritive value or metabolism has been influenced or the level of unwanted substances has been increased.

Food included in this regulation must fulfil these criteria - food must not :

- be dangerous for a consumer,
- be misleading,
- differ from food which it substitutes to such a degree that its standard consumption would be nutritionally disadvantageous for a consumer.

When approving a novel type of food the procedural process in the EU is as follows:

1. A person responsible for product placement of the association (applicant) submits the application to the member country in which the product has to be launched for the first time and the copy is delivered to the Commission.
2. The application has to include information together with copies of studies already carried out and any other accessible material with the aim to prove that given food suits to above stated criteria as well as to the suitable proposal of presentation and labelling of such food. Besides this the application has to contain the summary of set of documents.
3. After delivery of the application a member state ensures implementation of the first appraisal. With this aim the member country announces the Commission the name of the competent authority for judgement of food that will be responsible for a report about the first appraisal or it asks the Commission to appoint one of the competent authorities to elaborate such a report.
4. A report about the first appraisal is elaborated within 3 months since the application's delivery and it decides if food needs or does not need further judgement.
5. A related member state immediately submits the report to the Commission which proceeds it to other member states. Within 60 days the member states or the Commission can submit comments or

they can give well-grounded objections to placement of given food on the market.

6. If no objections about safety are submitted, novel food can be placed into circulation. In case the well-grounded objections about safety are submitted, the permission decision of the Commission is required. In the majority of cases this procedure is accompanied by additional judgement carried out by the European Food Safety Authority (EFSA).
7. The decision defines the scale of permission and in case it is necessary it stipulates conditions for use of food, its accurate labelling and specification or specific demands for labelling.
8. The Commission immediately informs the applicant about the accepted decision which is published in the Official Journal of the European Union.

If a member state, due to new information or repeated judgement till valid information, obtains more precise sources according to which the use of one food, suitable to given regulation, threatens human health or environment, this member state can temporarily limit or stop trading and using given food on its own territory. This member state has to inform other member states and the European Commission immediately and state reasons for this decision.

According to Act 355/2007 Coll. about protection, support and development of public health and about change and replenishment of some acts, in the Slovak Republic it is a duty when placing novel food on the market to submit to the Public Health Authority of the Slovak Republic an announcement about composition and labelling of novel food at latest on the day when novel food is launched on the market. Each application for launching of novel food has to contain data about a producer, importer or distributor together with documentation needed for placement of novel food on the market according to Council (EC) Regulation No. 258/97 which will be abolished on the 1st January 2018 and substituted by a new regulation of the European Parliament and Council (EU) No. 2015/2283 about novel food. The technical

documentation about health risks is enclosed to the application and if it is necessary the documentation about risks for farming production and environment is attached, too.

The analysis of consumers' opinions on novel food products

The survey was realized to find out the opinions of Slovak consumers on novel food on the domestic market within which the standardized questionnaire was used as a tool for collecting primary data. The survey was carried out in May 2017 and the total number of respondents was 318.

These facts were found out in connection with their classification data. From the total number of 318 respondents 79% (i.e. 250) were women and 21% (i.e. 68) were men. Taking into account the structure of age, the highest number of respondents was recorded in the age category from 31 to 40 years (49% that stood for 155 respondents). From the point of view of division according to regions, the highest number of respondents was from Nitra region (31%, i.e. 97 respondents) and in connection with dividing respondents on the grounds of the highest degree of education, majority of respondents stated the secondary education with a school leaving examination (43%, i.e. 136 respondents). Nearly two thirds of respondents stated that their net monthly income was from 500 to 1000 euro (63%, i.e. 199 respondents).

Next part of the questionnaire concentrated on findings if the consumers are interested in new trends in food products and if they have already come across concepts concerning these problems. On the ground of survey's results we can state that majority of consumers pay attention to novel food as 71% of answers to this question were positive (figure 5.3). It is connected with the orientation of especially young people to the healthy life style and modern way of eating due to which the number of e.g. vegetarians, vegans, etc. is increasing.

As it follows from the survey the best well-known type of food is bio food. 98.2% of respondents have some information about it, while only 22.9% in the case of functional food (figure 5.4).

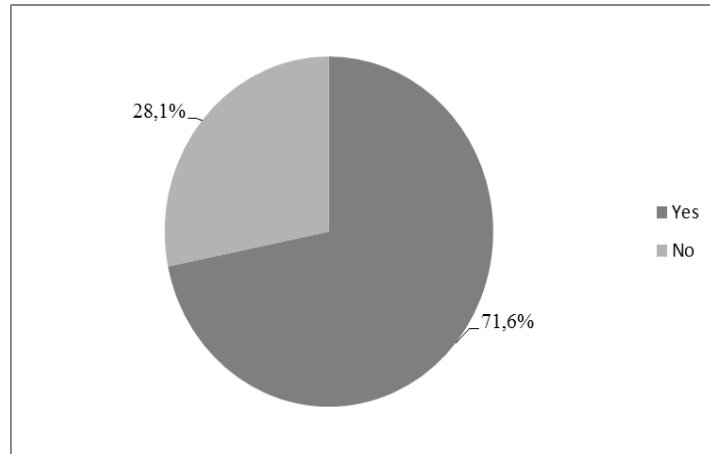


Fig. 5.3. Respondents' interest in new trends in the area of food products

Source: own processing

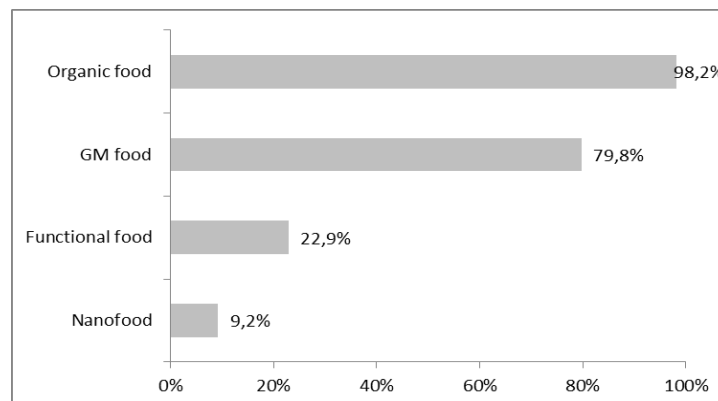


Fig 5.4. Respondents' knowledge about novel food

Source: own processing

79.8% of respondents have some knowledge about genetically modified food mainly due to permanent discussions and polemics about their adverse effects on human health, but these effects have not been

scientifically proved or confuted so far. The least known concept is nano food and only 9.2% of respondents know about it as it is completely new type of food and its development and launching on the market is only at the beginning.

As it follows from the findings we can state that at present consumers are more interested in food which enters the Slovak market due to new technologies in the food industry. The increase of intolerance to some parts of food as e.g. lactose, gluten, etc. as well as adaptation to possibilities and trends of healthy eating contributed to this fact.

5.4. Conclusion

Under the influence of globalization new trends of food products come into focus. People begin to concentrate more on the appropriate nutrition, health and prevention of illnesses. Due to this reason not only new technologies were monitored, but also the products of agricultural and food production. The necessity to adapt to more developed countries forces producers to pay more attention to innovations and offer new types of food to consumers.

The results of a survey showed that an interest in new trends in food products is increasing (JAROSSOVÁ M.A. 2016). Consumers are more interested in their health, a healthy life style comes into focus and the increase of awareness and interest in novel food is an inevitable part of the society.

The development of new type of food products and implementation of new technologies represents proactive and strategic approach of a company to innovations and improves its long term competitive advantage, in case the company has a vision, expertise and commitment to be engaged in a risky project that can have an important impact on the market. Stated innovations can be characterized by unique advantages for a customer; they differ from the existing portfolio, require different marketing procedures, incorporate high financial risk and are closely connected with emerging consumers' trends.

Novel products are one part of vast functioning food chain and their role is to ensure consumer's trust in what he consumes, the protection of environment, the quality of food and the positive effects on the human being with a healthy life style.

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THE FOOD BRANDS IN THE CONTEXT OF SALES PROMOTION OF SLOVAK FOODS

Abstract: The chapter deals with the food brands implemented by various public or private organisations in Slovakia to promote sales of Slovak products, especially foods. We conducted primary quantitative research by inquiry method via standardized questionnaire that addressed three main topics: (1) consumer interest, (2) consumer awareness and (3) consumer information and knowledge of food labelling. As a part of research we focused on consumer perception of Slovak food brands. The aim of this chapter is to analyse importance of food brands in the context of sales promotion of Slovak foods and to find out consumer perception of Slovak food brands. Research results show that 87% of consumers are interested in food labelling, but they emphasize more the food quality and food information than the food origin. We found out that majority of consumers (71.22%) considers the campaigns to be appropriate and useful and another 31.65% of consumers claim that the campaigns help them to simplify buying decision process. The partial results indicate that the brand “Značka kvality SK” motivates the largest amount of consumers to buy Slovak foods. In terms of consumers, the results also reveal a lack of knowledge and information about Slovak food marks.

Key words: food brand, regional product, traditional product, consumer behaviour, Slovak food, sales promotion

6.1. Introduction

At present understanding the consumer buying behaviour determines commercial success in competitive markets (ESTIRI M. et al. 2010). There is a large amount of published studies describing the purchasing behaviour and revealing the factors that influence buying decision process of consumers (AMPUERO O., VILA N. 2006; PINYA S., MARK S. 2007; BO R. 2009; HANNELE K.R., HARRI T.L. 2010, ZHU Q. et al. 2013; DARKO J. et al. 2013, DRÁBIK P. et al. 2014). According to Bo (2009) the

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design of package is the most important factor to interact with consumers and to increase retail performance. Packaging materials, shapes, pictures on the packages (mountains, beaches and luxury homes), special packs, logos, the print fonts, holograms and symbols also affect purchasing of products. Silayoi and Speece (2007) claim that packaging is one of the critical factors that affects the purchasing behaviour. They divide package elements into visual and informational attributes. According to some consumers, informational elements (product information and technology) are more important for the final decision-making process than visual elements (graphic and size/shape of packaging) (SPEECE M, SILAYOI P. 2004). Visual attributes (colour, shape, image, design, logo and illustration) are associated with affective side of decision making, while informational elements (labels, instructions, cultural context and segmentation) relate to the cognitive side of determination (ESTIRI M. et al. 2010; VENTER K. et al. 2011). According to Aday and Yener (2014), socio-demographic characteristics of consumers, price, product quality, package type, package attributes, labels and brands have a greater impact on the purchasing decision of food products (ADAY M. S., YENER U. 2014).

Studies have shown that sales promotions have a significant impact on the consumer's decision making process as well (MELA C. F. et al. 1997; PAPTALA P., KRISHNAMURTHI L. 1996). Approximately 70% of decisions about which brand to purchase are made instore (DE PELSMACKER P. et al. 2001). Whether to continue with the brand or to switch to a new one is part of this decision making process. Companies want to understand and influence this decision process. Understanding the reasons influencing an existing or potential customer's purchase behaviour is essential in designing an effective marketing mix that generates sales. Besides product characteristics and price, promotional activities are among the most popular instruments used by manufacturers and retailers to influence this process. However, much of the nature of the effects of sales promotions still remains to be understood (NAGAR K. 2009). As consumer attitudes have an essential role on the success of

sales promotion activities, the business entities should attempt to identify different consumer groups to target using customized strategies. Furthermore, the increased availability of information about consumers' behaviour enables and simplifies to customize marketing efforts to the consumer preferences (VENKATESAN R., FARRIS P. W. 2012).

Research results confirm that consumers prefer products made in Slovakia and consider Slovak product to be of high quality. Increasing share of Slovak products in shopping baskets shows that implemented strategy of promoting and supporting Slovak products can force consumers to think about what they are buying (DUDEKOVÁ A. 2015). Slovak consumers want to buy Slovak products, but producers have to implement appropriate tools of sales promotion as the part of their marketing communication (JAROSSOVÁ M. A. 2016). Over the last years, a number of public and private initiatives have started communicating origin-related information about food to consumers, introducing labels and logos in-store and on-pack. There are initiatives/projects in Slovakia aimed to promote sales of Slovak products, but each of them has some specifics. We decided to find out the consumer perception of selected Slovak food brands and results of conducted research are part of this chapter.

6.2. Sales Promotion as a Tool of Marketing Communication

Sales promotion can be defined as marketing activities usually specific to a time period, place or customer segment, which encourage a direct response from consumer or marketers, through the offer of additional benefits. Sales promotion has been labelled almost exclusively as short-term and tactical instruments. The nature and duration of the effects of sales promotion is still a topic of contention among marketing practitioners. The incremental, and usually temporary, effect of sales promotion on sales seems to be widely accepted, while the profitability of sales promotion is a more contentious issue. There is also evidence that increased promotional activity weakens brand loyalty, detracts brand

quality image, and generates a short-term management orientation. The fundamental features of sales promotion can be summarized as follows:

- Incentive or inducement to generate immediate sales boost;
- Effects are short rather than long-term;
- Secondary and subordinate status or role when compared with advertising.

Sales promotions are being used not only at the business-to-customer (B2C) but also business-to-business (B2B) market. There are several various sales promotion classifications, such as “active” or “passive”, “price” or “non-price”, “value-increasing” or “value-adding” and “monetary” and “non-monetary” sales promotions. Even if there have been different classifications, there are three main sales promotion categories as follow (KÖKSAL Y., SPAHIU O. 2014): (1) consumer-oriented sales promotion (samples, coupons, cash refunds, cents-off deals, premiums, Point-Of-Purchase promotions); (2) trade-oriented sales promotion (discounts, allowance, free goods, advertising items, etc.); and (3) business- or retailer-oriented sales promotion (trade shows, sales contests, rewarding customers, motivating sale people).

Sales promotion has been collected to attract consumers' attention such as price and brand perception, brand choice, evaluation and equity, etc. (SRILEKHA J., JAWAHAR R. K. 2011). One of the purposes of a consumer-oriented sales promotion is to elicit a direct impact on the purchase behaviour of the consumers (OWENS D. L. et al. 2001).

6.3. Slovak Food Brands in the Context of Sales Promotion

In the Slovak Republic, we currently have several projects and initiatives that are focused on sales promotion of Slovak products, especially foods. Individual projects are coordinated by governmental institutions and/or civil or interest associations. Therefore the efforts devoted to the sales promotion of the Slovak products are divided among individual interests of coordinators of the individual projects. Within the projects or initiatives, coordinators created Slovak food marks (we use

“mark” and “brand” as synonyms) that help consumers to identify products easily and provide a guarantee of high product quality. On the other hand, the labelling of Slovak product with the mark enables a producer to obtain marketing advantages because Slovak product marks brings them higher economic savings from promotion compared to their own promotion activities. It also increases the sales of the products as a result of easily obtained product information by consumers.

We can identify main objectives of the implementation of the Slovak food marks that are as follow: (1) to promote region, (2) to support local producers and service providers, (3) to support preservation of regional traditions and uniqueness, (4) to support the use of local resources and raw materials. It also enables: (1) to support a positive relationship between consumers and the region, (2) to preserve the rural way of life in the region, (3) to develop local agriculture, (4) to support sale of Slovak products and services, (5) to encourage the exchange of information, experience and practical knowledge between producers and consumers, and (6) to develop appropriate conditions for the start of the business in the field of local products and related employment growth.

For better identification and promotion of Slovak products Slovak producers and/or service providers have several options to label their products with Slovak food marks that can be divided into 5 groups: (1) marks of the EU Quality policy coordinated at the European level, (2) marks implemented by the governmental institutions at the national level (i.e. “Značka kvality SK”), (3) brands created by civil or interest associations and/or other organizations at the national level (i.e. “Kvalita z našich regiónov”, “Slovak Gold”, “Vyrobené na Slovensku”, “Slovenský výrobok”), and (4) regional product brands created by national coordinator and other brands of regional products which are created on the basis of individual interests of civil associations, local action groups or organizations, usually as outcomes of projects supported by the EU funds; (5) brands of retail chains promoting the Slovak origin of products (Tesco Stores – “Poctivá receptúra – pravá chuť”; Kaufland – “Z lásky k tradícii”; Coop Jednota – “Tradičná kvalita”).

EU Quality Schemes

Agricultural products produced in the European Union reflect the rich diversity of different traditions and regions in Europe. To help protect and promote products with particular characteristics linked to their geographical origin as well as traditional products, the EU created quality logos, named “Protected Designation of Origin”, “Protected Geographical Indication” and “Traditional Speciality Guaranteed”.

The EU quality schemes represent the common agriculture policy tools that help to highlight the qualities and tradition associated with registered products and to assure consumers that these are genuine products, not imitations seeking to benefit from the good name and reputation of the original. As a result, these schemes and their logos help producers market their products better, while providing them legal protection from misuse or falsification of a product name. In broader terms, geographical indications are part of wider intellectual properties rights of the European Union. In concrete terms, the EU product quality schemes relate to agricultural products and foodstuffs, wines, spirits and aromatized wines, which producers or producer groups have registered according to the rules. A product name identified as a geographical indication is one that is closely linked to a specific production area. This concept encompasses protected designations of origin and protected geographical indications for foods and wines, while spirits and aromatized wines have geographical indications (EUROPEAN COMMISSION 2017a).

Above mentioned quality schemes which provide the basis for the identification and, where appropriate, the protection of names and term are established in the Regulation (EU) No 1151/2012 of the European Parliament and of the Council of 21 November 2012 on quality schemes for agricultural products and foodstuffs and in the Commission implementing regulation (EU) No 668/2014 of 13 June 2014 laying down rules for the application of Regulation (EU) No 1151/2012 of the

European Parliament and of the Council on quality schemes for agricultural products and foodstuffs.

Protected Designation of Origin (PDO) identifies products that are produced, processed and prepared in a specific geographical area, using the recognized know-how of local producers and ingredients from the region concerned. These are products whose characteristics are linked to their geographical origin. They must adhere to a precise set of specifications and may bear the PDO logo (see fig. 6.1.).



Fig. 6.1. Logo of the Protected Designation of Origin

Source: European Commission, 2017a

Protected Geographical Indication (PGI) identifies products whose quality or reputation is linked to the place or region where it is produced, processed or prepared, although the ingredients used need not necessarily come from that geographical area. All PGI products must also adhere to a precise set of specifications and may bear the logo below (see Fig. 6.2.).

The traditional speciality guaranteed (TSG, see Fig. 6.3.) is not a geographical indication, but focuses on tradition. It identifies products of a traditional character, either in the composition or means of production, without a specific link to a particular geographical area.



Fig. 6.2. Logo of the Protected Geographical Indication

Source: European Commission, 2017a



Fig. 6.3. Logo of the Traditional Speciality Guaranteed

Source: European Commission, 2017a

The European Commission maintains the databases of all registered products under the different schemes (there are more than 3300 products) as follow: (1) DOOR (“Database Of Origin & Registration”) includes product names for foodstuffs registered as PDOs, PGIs and TSGs as well as names for which registration has been applied; (2) E-BACCHUS is the database which consists of the Register of designations of origin and geographical indications protected in the EU in accordance with Regulation (EU) No. 1308/2013; (3) E-SPIRIT DRINKS is a database on geographical indications protected in the European Union for spirit drinks originating in member states and third countries as well as new

applications for protection; (4) Geographical indications for aromatised wine products protected in the European Union.

At present 17 Slovak products are registered in the DOOR database (2 products: “Stupavské zelé” and “Žitavská paprika” in the category PDO; 10 products: “Klenovecký syrec”, “Zázrivské vojky”, “Zázrivský korbáčik”, “Tekovský salámový syr”, “Oravský korbáčik”, “Slovenský oštiepok”, “Slovenská bryndza”, “Slovenská parenica”, “Skalický trdelník” and “Levický slad” in the category PGI; and 5 products: “Liptovská saláma”, “Lovecká saláma”, “Spišské párky”, “Ovčí hrudkový syr – salašnícky”, “Ovčí salašnícky údený syr” in the category TSG (the status of another product “Bratislavský rožok”/Pressburger Kipfel/Pozsonyi kifli is applied for registration) (European Commission 2017b).

A total of 20 geographical indications from Slovakia, of which 3 are in the category PGI and 18 in the category PDO, are registered in the E-BACCHUS (European Commission 2017c).

In the database E-SPIRIT DRINKS there is only one Slovak product registered – “Spišská borovička” (juniper-flavoured spirit drink) (European Commission 2017d).

Značka kvality SK

Značka kvality SK (in English “the Quality Mark SK”) as property of the Ministry of Agriculture and Rural Development of the Slovak Republic was established in 2004 when the National Programme of Agricultural Products and Foods Promotion Quality Mark SK entered into force. The priority of the programme was to support the consumption of domestic food production in the competitive environment.

The aim of the Quality Mark SK is to highlight local quality products and thus to strengthen their competitiveness at the local market. The Quality Mark SK provides consumers with sufficient information about safe, high-quality local products and supports consumption of local food products.

Any Slovak producer can apply for the Quality Mark SK. In order to grant the quality mark, Slovak producer has to meet the following criteria: (1) products are made from local raw materials, (2) products are in compliance with the declared technological procedure, criteria of food quality and safety; (3) the declaration of raw materials – it means at least 75% of total raw materials have to be of Slovak origin; and (4) all stages of the production process have to take place in the region of the Slovak Republic.

There are two categories of the quality mark (see the fig. 6.4.): (1) the Quality Mark SK, and (2) the Quality Mark SK Gold which awards products with superior quality. The Quality Mark SK Gold enables to distinguish the products of high quality from others and to emphasize their higher quality.



Fig. 6.4. Logos of the Quality Mark SK and the Quality Mark SK Gold

Source: *znackakvality.sk*, 2017

After submitting the application form in which the producer declares certification criteria are met, the product is assessed by the expert commission of the State Veterinary and Food Administration of the Slovak Republic. The Commission appoints the Minister of the Agriculture and Rural Development of the Slovak Republic who awards the Quality Mark SK for a period of three years. The whole process of assessing and awarding of Quality Mark SK is free of charge. Awarded producers also receive a decree with the quality mark logo that authorizes him/her to use the logo for labelling of his/her product.

At present (data from August 2017), the database of awarded quality marks consists of 158 producers and 1264 products; 628 of them (of 116 producers) are awarded Quality Mark SK Gold (ZNACKAKVALITY.SK 2017).

Kvalita z našich regiónov

Kvalita z našich regiónov (in English “Quality from our regions”) is a project coordinated by the civil association “Kvalita z našich regiónov”. The aim of the project is to promote sale of the Slovak products and services. At the same time, it is a social responsibility project focused on educating consumers through communication campaigns in media and consumer competitions. In broader terms, the basis of the project is to explain why to prefer buying domestic products and how this way of thinking can help to increase economic growth. Objectives of the project are (KVALITA Z NAŠICH REGIÓNOV 2017a):

- to educate consumers, why it is necessary to buy domestic products, how the economy works and/or how their buying behaviour can improve the quality of life of the society in which they live, how it affects improvement of education, health, infrastructure, employment;
- to promote sale of the Slovak foods, non-food products and services through communication campaigns and other communication activities;
- to label products and services based on meeting the criteria for the trademark “Kvalita z našich regiónov”;
- to connect all market parties and create synergy effects of cooperation among producers, retailers, wholesale, governmental institutions, media, non-profit organizations, etc.;
- to improve macroeconomic indicators through changes in purchasing behaviour of Slovak citizens (i.e. creation of new jobs, GDP growth);
- to improve relationships between retailers and their suppliers;
- to support domestic tourism through the synergy of communication campaigns;

- to teach about the importance of product quality and its effects on the health of the society;
- to initiate a movement of consumers who care about the future of the country they live in.

Trademark “Kvalita z našich regiónov” is granted by the trademark owner (civil association “Kvalita z našich regiónov”) for a one-year period but it can be extended by one year if the product complies with all requirements. Based on the set criteria, the producer of the food products has two or even four possibilities (KVALITA Z NAŠICH REGIÓNOV 2017b):

- Producer of food product which contains a specified percentage of local raw materials has the option to use two variants of the blue trademark “Kvalita z našich regiónov” (see Fig. 6.5.): (1) products have to be produced in Slovakia; (2) x % raw material – the products have to contain specified percentage of the raw materials of Slovak origin according to the specific commodities criteria set for the awarding of the trademark “Kvalita z našich regiónov”, excluding the products which main ingredients cannot be produced in Slovakia.



Fig. 6.5. Blue variants of the trademark "Kvalita z našich regiónov"

Source: Kvalita z našich regiónov, 2017b

- Producer of food product which is completely produced in Slovakia and contains 100% of domestic raw materials has the possibility to use two variants of the golden trademark (see Fig. 6.6.).



Fig. 6.6. Golden variants of the trademark "Kvalita z našich regiónov"

Source: *Kvalita z našich regiónov, 2017b*

Vyrobené na Slovensku

Vyrobené na Slovensku (in English “Made in Slovakia”) initiative coordinated by the organization GS1 Slovakia aims to promote sales of products made in Slovakia. The logo labelled next to the EAN barcode clearly, quickly and easily conveys information about the country of origin to the consumer. The “Made in Slovakia” project is available to all Slovak producers. Since the costs of advertising and marketing activities are huge, the GS1 Slovakia which is the owner of the trademark “Made in Slovakia” decided to go in a cheap way. They chose a simple icon from which it is clear to every consumer that the product is of Slovak origin (GS1 SLOVAKIA 2017).

The logo “Vyrobené na Slovensku” (see Fig. 6.7.) is protected and the right to use it is granted by GS1 Slovakia upon request. It can be used only by companies that are members of GS1 Slovakia / EAN Slovakia, s. r.o., and carry out production activities in the Slovak Republic. Once these conditions are met, the right to use the logo is free of charge. The producer receives design manual and graphically processed logos in electronic form.



Fig. 6.7. "Vyrobené na Slovensku" logo

Source: GSI Slovakia, 2017

Slovak Gold

The Slovak Gold is primarily a system for certification of high quality products. The Slovak Gold Foundation awards the Slovak Gold Certificate in three categories: (1) food and non-food products, (2) services, and (3) specific products (i. e. inventions, prototypes, designs, software, and scientific publications). In cooperation with the University of Economics in Bratislava the Slovak Gold Foundation awards the Slovak Gold Exclusive Certificate to the organization which declares good economic results and other socio-related values, for example stability and prosperity, employee care program, environment sustainability, investment in development at a long-term period – at least in the last five years.

The Slovak Gold is registered trademark at the Industrial Property Office of the Slovak Republic. It is represented by the Slovak Gold logo with related certificate number (see fig. 6.8.). This form of reproduction of logo is according to copyright binding for all print applications, for instance promotional prints, labels, self-adhesives and similar visual components, related to the certified product. The Foundation presents the logo in digital form together with certificate and gold medal. The producer can use the logo to label awarded products that become recognizable for consumers. Consumers can trust that the quality of the products is in compliance with legal standards, environmental and

specific cultural and spiritual values. The use of the logo helps producers to distinguish their high quality products from others, to increase sales of their products and to increase the competitiveness at the market (SLOVAK GOLD FOUNDATION 2017b).



Fig. 6.8. Logo of the Slovak Gold

Source: Slovak Gold Foundation, 2017a

Slovenský výrobok

Logo Slovenský výrobok (in English “Slovak product”) was created to help business entities, consumers, producers and other interested parties to easily identify products of Slovak origin which are made in the Slovak Republic. The use of the logo is free of charge and can be applied in all industries, not only in agri-food sector. It serves for labelling of all products made by Slovak producers. Product labelling with the logo “Slovenský výrobok” enables (SIGMAPOINT.SK 2017):

- to demonstrate the commitment to sustainable development and social responsibility;
- to address consumers who are interested in products made in Slovakia;
- to increase consumer awareness and demand for products of Slovak origin;
- to increase interest in sustainable demand and sales of Slovak products;
- to highlight and marketing support of Slovak products in retail.

The logo (see Fig. 6.9.) is official symbol that represents products made in Slovakia by Slovak producers. It can be used exclusively by Slovak producers to label products made in Slovakia.



Fig. 6.9. Logo "Slovenský výrobok"

Source: sigmapoint.sk,2017a

Regional product brands

The aim of regional products is to preserve the traditions, use healthy local raw materials, improve the relationship with the region and transfer experience between generations. At the same time they contribute to the development of rural tourism. For a better identification and promotion of regional products organizations are established to deal with the labelling of regional products typical for the region of their origin with brands.

Brand of regional product is currently used in 8 regions of Slovakia. Local action groups or other non-governmental organizations coordinate regional product labelling. Labelling of regional products was established in Slovakia in 2008 when the Regional Environmental Centre Slovakia created three brands that were also registered as trademarks: (1) regional product Malé Karpaty, (2) regional product Záhorie and (3) regional product Kysuce. According to the available information, we found out that in the region of Záhorie a new brand – regional product Kopanice was created in cooperation with Kopaničiarsky region – local action group, and there are no available information about the brand regional product Malé Karpaty and the brand regional product Kysuce.

In the year 2012 another 2 brands were registered as trademarks: regional product Hont and regional product Ponitrie which are currently active and coordinated on the national level by Národná sieť slovenských miestnych akčných skupín (NSS MAS, in English National Network of Slovak Local Action Groups), or more precisely on the local level by local action groups. In our opinion regional labelling was significantly developed in 2014 when concepts for five brands were prepared (regional product Malodunajsko-Galantsko, regional product Karsticum, regional product Podpolanie, regional product Gemer-Malohont and regional product Kopanice). At present all of the local coordinators/applicants on registration of trademarks are active on their promotion and expansion into practice.



Fig. 6.10. Regional product brands

Source: Industrial Property Office of the Slovak Republic, 2017

NSS MAS selected and created the logo design of regional products and services in Slovakia. In addition NSS MAS prepared guidelines for certification of regional product or service and defined four minimal requirements for product to be certified as regional. It has to be: (1) traditional, (2) made of local sources, (3) handmade and (4) unique, which is reflected in the fact that a certified product meets the set criteria

(NÁRODNÁ SIEŤ SLOVENSKÝCH MIESTNYCH AKČNÝCH SKUPÍN n.d.). Although brands of regional products have uniform logo design (see Fig. 6.10.) and certification criteria, the labelling system is not yet fully coherent (e.g. marketing communication / webpages of individual regional products or regions) (NEMČÍKOVÁ M. et al. 2016).

Brands of regional product can be used for labelling of following product categories: (1) crafts and traditional products, (2) food products, (3) events and experiences; and (4) accommodation and food services.

Specific characteristics of regional product brands are that their owner is a local action group, public-private partnership. Manufacturer, service provider and/or organizer of the event obtain the right to use the regional product brand for product labelling after fulfilling the certification criteria.

Besides the above mentioned brands, consumers can deal with regional brands Regio Danubiana (used in the Danube region), Natura 2000 or “Tradície Bielych Karpát” (Traditions of White Carpathians) (see Fig. 6.11.).



Fig. 6.11. Regio Danubiana and “Tradície Bielych Karpát” logo

Source: Združenie za kultúru a turismus 2017, Tradície Bielych Karpát 2017

6.3. Methodology

Selection of scientific methods depends on the chapter content focus and the chapter aim. To elaborate theoretical knowledge, we primarily used theoretical scientific methods, including method of analysis and

synthesis, method of induction and deduction, abstraction and concretization, but also the comparative method. As a method of collecting primary data we conducted research. We evaluated and interpreted the obtained quantitative data through statistical and graphical methods in the Statgraphics software and MS Excel.

The basis for the analysis of consumer perception of food marks represents the results of primary research that we conducted by the inquiry method through the standardized online questionnaire. Our research was focused on three topics: (1) consumer interest; (2) consumer awareness and (3) consumer knowledge about food labelling. The last part of the research was dedicated to the consumers' perception of the food brands. This chapter aims to analyse importance of food brands in the context of sales promotion of Slovak foods and to find out consumer perception of Slovak food brands. We set the following research questions:

What do consumers think about the campaigns dedicated to the promotion of Slovak foods? or How do consumers react to the sales promotion activities of Slovak foods?

What food marks motivate the Slovak consumer to buy Slovak foods the most?

What is the level of consumer knowledge about the most used Slovak food marks?

The questionnaire consisted of 26 closed-ended and open-ended questions (including 5 classification questions). The respondent's answers were evaluated through frequency tables and cross tabulations, in some cases relevant descriptive statistics (e.g. average, standard deviation) were calculated.

After testing for complexity, accuracy, validity, reliability and consistency, we analysed 139 questionnaires. We can consider our results to be representative. We calculated the sample size of 126 respondents with confidence level 95%, margin of error 7% and standard of deviation (on the basis of pre-research) 0,4.

6.4. Results and discussion

In this part of the chapter, we present partial results of the research which provide us with answers to the research questions and also testify to consumer perception of the Slovak food marks.

A total of 139 consumers participated in the research, of which 83 (59.71%) were women and 56 (40.29%) men. In terms of age structure, there was the largest representation of consumers aged 18-30 years (76, i.e. 54.68%) and 31-40-year-olds (42, i.e. 30.22%). 51-60-year-olds were represented by 9 consumers (i.e. 6.47%), and two age groups (41-50-year- and more than 60 years old) by 6 (i.e. 4.32%).

The research results show us that 87% of consumers in Slovakia are interested in food labelling. But they put more emphasis on food quality and food information than food origin (KRNÁČOVÁ P. 2016).

Regarding the consumer perception of Slovak food marks used to label products made in Slovakia, we focused on the consumers' view of campaigns created by coordinators of the Slovak product brands that help to promote Slovak products and thus to increase their sales. We found out that majority of consumers (71.22%) considers the campaigns to be appropriate and useful. One third of consumers (31.65%) claim that the campaigns help them to simplify buying decision process. It means that based on the previous experience (i. e. consumers have witnessed the media campaign before); it is easier and faster to decide when buying in the store. Only 2 out of 139 consumers did not notice any campaign promoting sales of Slovak products. There are also consumers (15.83%) who are not affected by such campaigns.

Some consumers (3; i. e. 2.16%) expressed their own opinions as follow:

(1) They think that campaigns are abused for political purposes and the real aims (e.g. sales promotion of Slovak foods) are secondary.

(2) On the one hand, they consider campaigns to be useful. On the other hand, they think that the Slovak origin does not always guarantee

high quality of the product. They decide what to buy based on references and previous experience.

(3) Majority of “Slovak foods” is produced by manufacturers that are owned by foreign owners, i.e. it is misleading promotion campaign. We do not agree with this opinion because in accordance with the Act No. 152/1995 Coll. on the foods as amended it is forbidden to share misleading information in any form.

Table 6.1. Consumer’s view of communication campaigns

| Claim | Number of respondents |
|--|------------------------------|
| I consider such campaigns to be appropriate and useful | 99/ 71.22% |
| It helps me to decide better and more quickly when choosing foods in a store | 44/ 31.65% |
| These campaigns do not affect me | 22/ 15.83% |
| Such campaigns do not convince me of the quality of the Slovak products | 5/ 3.60% |
| I consider the campaigns to discriminate products of foreign origin | 3/ 2.16% |
| Other opinion | 3/ 2,16% |
| I did not notice any campaign promoting sales of Slovak products | 2/ 1.44% |

n=139

Source: own results

As the majority of consumers agrees with promotional activities/campaigns of Slovak foods, we were concerned with the consumer motivation to buy Slovak foods. We set the research question “What food marks motivate the Slovak consumer to buy Slovak foods the most?” and selected the most common marks (excluding brands of regional products) which consumers can encounter when buying. At the same time, the logos of the selected marks were available in the questionnaire to the respondents. Results shown in Fig. 6.12. reveal that

“Značka kvality SK” motivates the largest number of consumers (57, i.e. 41.01%). Consumers are also motivated through the brand “Kvalita z našich regiónov” and “Slovenský výrobok” to buy the product.

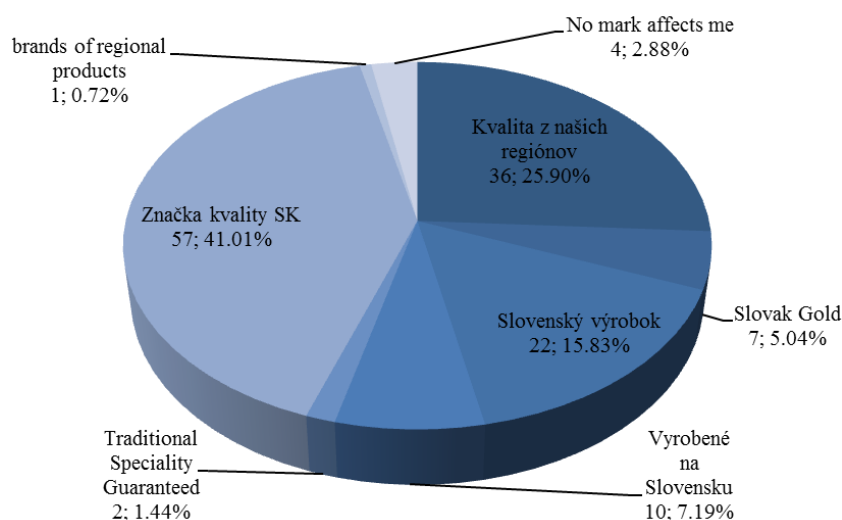


Fig. 6.12. Slovak food marks such as motivation factor

Source: own results

In our opinion the results regarding the consumer motivation through the marks “Vyrobené na Slovensku”, “Slovak Gold” and “Traditional Speciality Guaranteed” are surprising. All of them are coordinated at the national or European level and have been used for a long time. We point out that only 4 consumers (2.88%) are not affected by any brand. That is important information not only for producers, but also marketers or coordinators of initiatives aimed to promote and support sales of the Slovak products.

The research question “What is the level of consumer knowledge about the most used Slovak food marks?” directly relates to consumer perception of Slovak food brands. Through the research we wanted to

find out consumer perception of selected Slovak brands which are the most used or probably the most preferred by producers/retailers. When processing and evaluating the research results, we divided brands into three groups: (1) marks according to the EU Quality Policy; (2) Slovak food brands coordinated by governmental institutions or other private or non-profit organizations; and (3) regional product brands.

Research results in Table 6.2. indicate that almost one half of consumers has never seen the logo PDO (46.76% of consumers) and TSG (49.64%) before. At the same time 23.74% of consumers sometimes buy products labelled with the PDO mark. In the term of brand recognition (excluding consumers who buy or know registered products), 19.42% of consumers know the mark PDO; 10.79% of consumers the mark PGI and 14.39% of consumers the mark TSG but they have not yet encountered products labelled with these marks. Our results confirm previous findings of the research dedicated to the recognition of EU Quality Policy marks (JARROSOVÁ M. A., PAZÚRIKOVÁ V. 2016).

In our opinion we obtained much better results in the field of Slovak food brands that are coordinated by public or private organizations at the national level. The main reason why a larger amount of consumers know these brands or pay more attention to buying the labelled products is intensive communication campaigns which were broadcasted in media, published in newspapers and magazines and promoted sales of Slovak products. According to results in Table 6.3. we can conclude that the brand “Značka kvality SK” (coordinated by the Ministry of Agriculture and Rural Development of the Slovak Republic) is the most successful as 70.51% of consumers buy products labelled with this brand. Another 14.39% of consumers prefer to buy products labelled with this brand when buying foods. We also point to results of brand “Vyrobené na Slovensku”. 68.35% of consumers buy products labelled with this brand and 15.11% of consumers prefer to buy products with the logo “Vyrobené na Slovensku”. We expected better consumer knowledge about the brand “Kvalita z našich regiónov” because over last years, association has implemented many communication activities focused on

educating consumers about importance of local product consumption, on increasing consumer awareness in the field of Slovak food labelling and on sales promotion of Slovak foods, too. We found out that 15.11% of consumers have never seen this mark before.

Table 6.2. Consumer perception of EU Quality Policy marks

| EU Quality Policy Mark Claim | Protected Designation of Origin | Protected Geographical Indication | Traditional Speciality Guaranteed |
|--|--|--|--|
| I regularly buy products labelled with this logo | 8 5.76% | 13 9.35% | 5 3.60% |
| Sometimes I buy products labelled with this logo. | 33 23.74% | 25 17.99% | 25 17.99% |
| When buying foods I prefer products labelled with this logo. | 13 9.35% | 7 5.04% | 6 4.32% |
| I know products labelled with this logo but I do not buy them. | 17 12.23% | 10 7.19% | 10 7.19% |
| I pay no attention to whether product is labelled with the brand. | 7 5.04% | 4 2.88% | 4 2.88% |
| I know the mark but I have not yet seen any product labelled with this logo. | 27 19.42% | 15 10.79% | 20 14.39% |
| I have never seen the mark before. | 34 24.46% | 65 46.76% | 69 49.64% |

n=139

Source: own results

The last part of the research was focused on consumer knowledge of regional product brands. As the promotion and communication activities of the regional labelling coordinators are very poor and availability of regional products in retails is very low, we expected the most negative results in this part of research. We can conclude that the vast majority of consumers do not have any information of regional labelling.

Table 6.3. Consumer perception of Slovak food brands

| Slovak food brand | Slovak Gold | Značka kvality SK | Kvalita z našich regiónov | Vyrobené na Slovensku | Slovenský výrobok |
|---|--------------------|--------------------------|----------------------------------|------------------------------|--------------------------|
| I regularly buy products labelled with this logo. | 16 11.51% | 39 28.06% | 23 16.55% | 42 30.22% | 29 20.86% |
| Sometimes I buy products labelled with this logo. | 39 28.06% | 59 42.45% | 40 28.78% | 53 38.13% | 49 35.25% |
| When buying foods I prefer products labelled with this logo. | 9 6.47% | 20 14.39% | 12 8.63% | 21 15.11% | 20 14.39% |
| I know products labelled with this logo but I do not buy them. | 24 17.27% | 11 7.91% | 20 14.39% | 6 4.32% | 12 8.63% |
| I pay no attention to whether product is labelled with brand. | 3 2.16% | 2 1.44% | 5 3.60% | 2 1.44% | 4 2.88% |
| I know the mark but I have not yet seen any product labelled with this logo | 22 15.83% | 4 2.88% | 18 12.95% | 8 5.76% | 12 8.63% |
| I have never seen this logo before. | 26 18.71% | 4 2.88% | 21 15.11% | 7 5.04% | 13 9.35% |

n=139

Source: own results

Based on the results in Table 6.4., 79.14% of consumers have never encountered the regional product “Malodunajsko-Galantsko”, 70.50% of consumers regional product “Ponitrie”, 76.98% of consumers regional product “Podpoľanie”, 80.58% of consumers regional product “Tradície Bielych Karpát” and 75.54% of consumers “Regio Danubiana”.

Table 6.4. Consumer perception of the selected regional product brands

| Regional product | Malodunajsko-Galanta | Ponitrie | Podpoľanie | Tradičné Bielych Karpát | Slovenský výrobok |
|---|-----------------------------|-----------------|-------------------|--------------------------------|--------------------------|
| I regularly buy products labelled with this logo. | 3 2.16% | 3 2.16% | 3 2.16% | 2 1.44% | 3 2.16% |
| Sometimes I buy products labelled with this logo. | 4 2.88% | 8 5.76% | 5 3.60% | 3 2.16% | 3 2.16% |
| When buying foods I prefer products labelled with this logo. | 1 0.72% | 0 0.00% | 0 0.00% | 0 0.00% | 0 0.00% |
| I know products labelled with this logo but I do not buy them. | 4 2.88% | 8 5.76% | 5 3.60% | 6 4.32% | 7 5.04% |
| I pay no attention to whether product is labelled with the brand. | 5 3.60% | 4 2.88% | 3 2.16% | 4 2.88% | 5 3.60% |
| I know the mark but I have not yet seen any product labelled with this logo | 12 8.63% | 18 12.95% | 16 11.51% | 12 8.63% | 16 11.51% |
| I have never seen the mark before. | 110 79.14% | 98 70.50% | 107 76.98% | 112 80.58% | 105 75.54% |

n=139

Source: own results

6.5. Conclusion

Based on the research results, the aim of the presented chapter was to analyse importance of food brands in the context of sales promotion of Slovak foods and to find out consumer perception of implemented Slovak food brands.

We conclude that in Slovakia we currently have several projects and initiatives that are focused on sales promotion of Slovak products.

Individual projects are coordinated by governmental institutions and/or civil or interest associations. We identified many benefits and aims of food labelling with the brands promoting food origin which can be divided into two groups: (1) aims of producers/retailers (e.g. to address consumers who are interested in products made in Slovakia; to increase demand for products of Slovak origin; to increase sales of Slovak products; to highlight and support marketing of Slovak products; to distinguish their products from others; to increase competitiveness at the market; to improve relationships between retailers and their suppliers, i.e. producers; to educate consumers; to support domestic tourism and development of local agriculture; to obtain marketing advantages and higher economic savings from promotion); and (2) effects for consumers (e.g. increasing awareness of Slovak products; better and easy identification of Slovak products at the point-of-purchase; guarantee of Slovak origin, high product quality or local raw materials; higher level of knowledge about local products).

In terms of research results that we present in this chapter, we consider consumers' perception of Slovak food brands to be insufficient. If we generalize the results, consumers do not know the Slovak food brands, especially regional product brands. Majority of consumers (from 70.50% to 80.58% of consumers - depending on the specific regional product brand) encountered the regional product brands first time when participating in our research. For example, only one third of consumers buy Slovak products registered as PDO in the database DOOR. On the other hand, almost half of consumers have never seen the mark PGI or TSG. We would like to point out that there are only 2 Slovak products registered in the category PDO, but 10 products in category PGI and 5 products in category TSG. We identified better consumer perception of Slovak food brands implemented and coordinated at the national level. The largest amount of consumers knows and buys products labelled with the mark "Značka kvality SK". Regarding the consumers' view of campaigns created by coordinators of the Slovak product brands that help to promote Slovak products and thus to increase their sales, we found out

that majority of consumers (71.22%) considers the campaigns to be appropriate and useful. One third of consumers (31.65%) claim that the campaigns help them to simplify buying decision process.

Based on research results we suggest improving communication activities to increase consumer awareness and knowledge about Slovak food brands and thus to improve opportunities and reach the aims of implemented Slovak food brands.

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FOOD SAFETY FROM THE STANDPOINT OF POLAND AND ITALY: SELECTED FORMAL AND LEGAL ASPECTS

Abstract: Problems of food safety are becoming more and more important. This is especially important if they are considered from the perspective of the food producer-customer relations. It should be noted that customers emphasize the problem of health value of food which is directly connected with food safety. The significant importance attached to food safety is magnified by the respective legal regulations and ensuring adequate supervision of meeting these regulations. Bearing this in mind, the aim of the investigations presented in this chapter of the monograph was to discuss formal guidelines concerning food safety characteristic of Poland and Italy and methods of its supervision.

Key words: food, food safety, nutritional law, management

7.1. Introduction

It is found more and more often in the literature that in order to survive in a turbulent environment, enterprises have to respond to changes through continuous introduction of new solutions, both in production and in the product itself. This should be accompanied by predictably new and emerging needs and expectations of customers (consumers), especially providing them with opportunities for meeting them (LOCK D. 2002). Therefore, the category of customer satisfaction is

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becoming more and more important, especially for the economic outcomes and especially the social effects of the enterprise functioning. This satisfaction is difficult to be measured. This concerns individual needs and expectations of customers which are substantially varied. Therefore, the problem of strategic importance is to recognize these expectations that are conducive to the achievement of the indicated satisfaction.

It should be noted that the consumers are more and more oriented towards care for the responsible consumption and the related activities which are conducive not only to the care for the environment, conditions of production of the products offered but also the consequences of their use. The latter concerns especially the responsible consumption of food products. People tend to think more about their health and, consequently, the products they consume have to meet safety requirements. With these transitions, the category of food safety is becoming increasingly important.

In the literature, the definitions approach food safety in general as conditions that have to be met and the activities that need to be taken at all stages of production and sales of food in order to ensure human health and quality of life. Furthermore, these conditions, as emphasized by scientific papers in this field, should concern especially additional substances and aromas, contaminants, residue pesticides, conditions of food irradiation and organoleptic characteristics (TURLEJESKA H., SZOŁTYSEK K., ŁADOŃSKI W. 2010).

The significant importance attached to food safety is magnified by the respective legal regulations and ensuring adequate supervision of meeting these regulations.

Bearing this in mind, the aim of the investigations presented in this chapter of the monograph was to discuss formal guidelines concerning food safety characteristic of Poland and Italy and methods of its supervision.

7.2. Legal basis of ensuring food safety in the countries of the European Union

According to the provisions of the Green Paper of the European Union, food safety is the non-negotiable requirement and, apart from health, hygiene and nutritional values, is among the most important problems of the EU (KOŁOŻYN-KRAJEWSKA D., SIKORA T. 2010). It should be emphasized that the problems of food safety are related to the issues of public health. Consequently, the area of food safety is not harmonized by the directives but it is unified by regulations (KORZYCKA-IWANOW M. 2005).

The most important ordinances include:

- Regulation (EC) No 178/2002 of the European Parliament and of the Council of 28 January 2002 laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety.
- Regulation (EC) No 852/2004 of the European Parliament and of the Council of 29 April 2004 on the hygiene of foodstuffs.
- Regulation (EC) No 853/2004 of the European Parliament and of the Council of 29 April 2004 laying down specific hygiene rules for food of animal origin.
- Regulation (EC) No 854/2004 of the European Parliament and of the Council of 29 April 2004 laying down specific rules for the organisation of official controls on products of animal origin intended for human consumption.
- Regulation (EC) No 882/2004 of the European Parliament and of the Council of 29 April 2004 on official controls performed to ensure the verification of compliance with feed and food law, animal health and animal welfare rules.
- Regulation (EC) No 1935/2004 of the European Parliament and of the Council of 27 October 2004 on materials and articles intended to come into contact with food (WIŚNIEWSKA M., MALINOWSKA E. 2011).

The above regulations are equivalent and complementary with each other in many areas of food production. It should be also emphasized that many of them were supplemented with implementing regulations.

The framework legal act that regulates food safety is the Act on Food and Nutrition Safety, which focuses on regulations concerning principles of production and sales of foods, termed nutritional law (Act on food and nutritional safety as of 25 August 2006). The definition includes all the stages of production, processing and distribution of food and feed produced for farming animals or used for feeding farming animals.

The act discusses several rules concerning food hygiene in enterprises as specified in the Regulation 852/2004 CE (Journal of Laws L 139, 30/04/2004 P. 0001-0054). The most important include (KOŁOŻYN-KRAJEWSKA D., SIKORA T. 2010; SŁOWIŃSKA E. 2006):

- assigning major responsibility for food safety to enterprises of the food sector,
- ensuring food safety at each stage of the production chain, starting from primary production,
- using procedures based on HACCP principles in combination with good hygiene practices and guidelines concerning these practices,
- necessity of definition of microbiological criteria and requirements of temperature control based on professional risk assessment,
- adoption the same hygiene standards for the transported food as were adopted for the food produced in the EU or equivalent settlements.

It is worth adding that the act refers especially to the above mentioned principles concerning the obligation of implementation and using the HACCP system in production plants or the principles of placing products on the market. This obligation excludes producers at the stage of primary production (with exception of the case of direct supply). Ensuring adequate quality and health and hygiene principles in the latter case is subject to regulations specified in the principles of Good Hygiene Practice (GHP) and Good Manufacturing Practice (GMP). The act

discussed also stipulates criminal liability in the case of non-respecting the principles defined in the EU regulations and the act itself and the respective requirements (KOŁOŻYŃ-KRAJEWSKA D., SIKORA T. 2010; SŁOWIŃSKA E. 2006).

Furthermore, in Italy, the act of 30 April 1962 No. 283 (Legge 30 Aprile 1962, n. 283, Disciplina igienica della produzione e della vendita delle sostanze alimentari e delle bevande) remains to be in force as a legal regulation concerning hygiene and safety of production and sales of foods and beverages. However, it was actually replaced by e.g. community law of the European Union. The act specifies the most important information about production and sales of substances used for consumption and supervision and control over these products in order to protect consumer health. It emphasized the importance of all entities in the food supply chain with their active participation. The problems that have not been regulated are in relations of states - regions and lead to the contradictory regulations which are equally often approached as inconsistent with the EU standards and replaced by other (Ministero della Salute, Direzione generale per l'igiene e la sicurezza degli alimenti e la nutrizione, Dipartimento della sanità pubblica veterinaria, della sicurezza alimentare e degli organi collegiali per la tutela della salute).

7.3. Food safety systems in Poland and Italy: selected aspects

Food safety systems are legal and institutional structures that operate in order to prevent nutritional abnormalities from the macroeconomic perspective. Their components include (KOWALCZYK S. 2016):

- national law, viewed as standards and principles referring to food and general quality standards and safety criteria;
- institutions of official food inspection (State Sanitary Inspection, Veterinary Inspection);
- system infrastructure, composed of information systems that collect data about situations related to food safety, risks and dangers to food safety,

- methods and procedures of control (tools);
- non-governmental programs and initiatives aimed to improve food safety systems.

A direct aim of the system is to ensure food safety which, before entering the market, is subjected to inspection and the parts of foods which do not meet health and economic safety requirements are eliminated. The system represents the complex of individual components, acts in the environment of enterprises and associations of producers, distributors, traders, universities that conduct research on food, non-governmental organizations and consumers (PŁAZA G. 2017).

The following models are used in the systems where supervision is ensured by state institutions (KOWALCZYK S. 2016):

- integrated model, based on one institution with broad authority, e.g. Denmark, Sweden, the UK;
- model with dominant institution, supported by a number of specialized institutions e.g. the USA, France;
- distributed model based on many specialized institutions, where food controls and safety are within competencies of various different institutions, different in terms of institution potential. The examples include Italy and Poland.

The distributed model used in Poland (see Fig. 7.1) is characterized by a specific scope of competencies of individual institutions. Food safety system is formed by six institutions of control and supervision: Commercial Inspection, Main Inspectorate of Plant Health and Seed Inspection, Agricultural and Food Quality Inspection, Veterinary Inspection, State Sanitary Inspection and Customs Service.

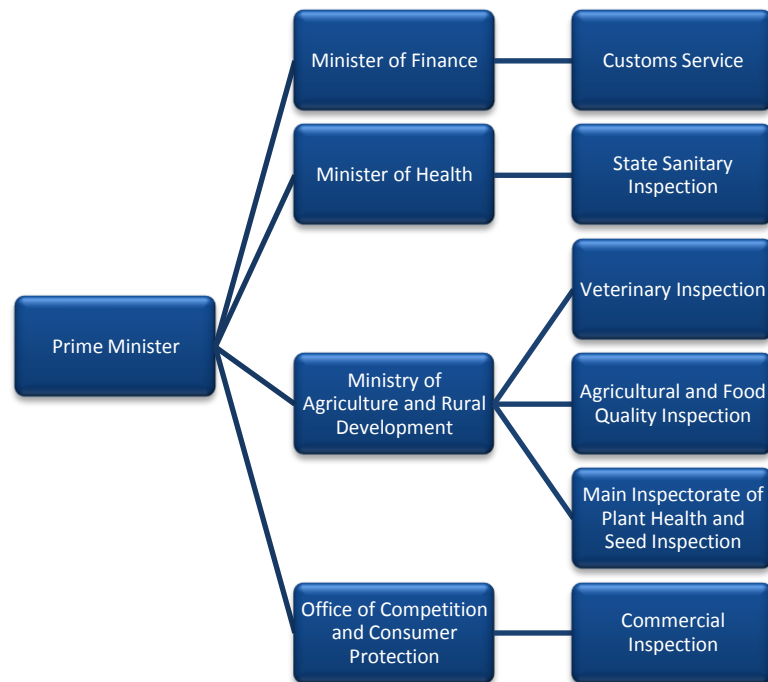


Fig. 7.1. System of official food inspection services in Poland

Source: Author's own study based on: KOWALCZYK S. 2016

Italian law formulates formal problems concerning food safety mainly based on EU directives and regulations. Responsibility for their implementation lies with the respective legislation-administration state bodies (CARLI A. 2014). The European Food Safety Authority (EFSA) was established in 2002 in Parma, Italy, and provides scientific advice on food. One of the pillars of economic activity is production of food which accepts "regulated products" to sales in the EU markets. EFSA is a neutral organization that provides scientific advice and evaluates risks associated with the food chain (EFSA, 2012).

The Italian food safety system has two main authorities: Ministero della Salute (Ministry of Health) and Ministero delle Politiche Agricole

Alimentari e Forestali (Ministry of Agriculture), which subcontract the tasks to the following institutions (KOWALCZYK S. 2016):

- Direzione Generale della Sanità Animale e dei Farmaci Veterinari – DGSAF (Directorate General for Animal Health and Veterinary Products),
- Direzione Generale per l’Igiene e la Sicurezza degli Alimenti e la Nutrizione – DGISAN (Directorate General for Hygiene, Safety of Food and Nutrition),
- Direzione Generale degli Organi Collegiali per la Tutela della Salute – DGOCTS (Directorate General for Health Care Authorities).

The Italian system belongs to especially complex systems that operate within numerous institutional and sectoral forms. Within the Ministry of Health, there are also border control points (Posti di Ispezione Frontaliera – PIF), local control offices (Uffici Sanità Marittima Aerea e di Frontiera – USMAF) and veterinary offices (Uffici Veterinari per gli Adempimenti degli obblighi Comunitari – UVAC), which are located in each region of the Apennine Peninsula and manage food control (KOWALCZYK S. 2016).

State institutions have a direct effect on behaviours of entrepreneurs. Their inspections force entrepreneurs to respect obligatory standards and principles. Directives of the European Union and Codex Alimentarius oblige the member states of the European Union to implement GMP, GHP and standards of the HACCP system in activities of the food sector. World Health Organization (WHO) recommends its implementation. The aim of the EU policy concerning food safety is to protect consumers while ensuring undisturbed operation in the uniform market (<http://eur-lex.europa.eu>).

Food safety systems represent the basis of activities of enterprises and ensure that food products have adequate quality and health characteristics. It is critical that all employees should be adequately prepared and trained and have obligatory permissions. Each employee in Poland needs to have current certificate for sanitary and epidemiological

purposes which certifies e.g. no Salmonella carrier state (the Article 59, Section 2 of the Act on food and nutritional safety as of 25 August 2006).

Italian law requires that employees in the food sector have valid HACCP certificates. Starting the work in this sector is connected with the necessity of starting a special course and obtaining the certificate. This is the basic requirement. HACCP auto-control (autocontrollo) is obligatory for all people employed in the entire food production chain including production, preparation, processing, packaging, transport and distribution of food.

It should also be added that for 4 years, the Economist Intelligence Unit has been developing Global Food Security Index. The index indicates constitutive factors that impact on food safety grouped in four groups (foodsecurityindex.eiu.com):

- food affordability,
- food availability,
- food quality and safety,
- changes in climatic factors.

In the ranking, Poland is at the 27th place (74.1/100), whereas Italy is at the 22nd place (75.9/100) of 113 countries (2017) (foodsecurityindex.eiu.com).

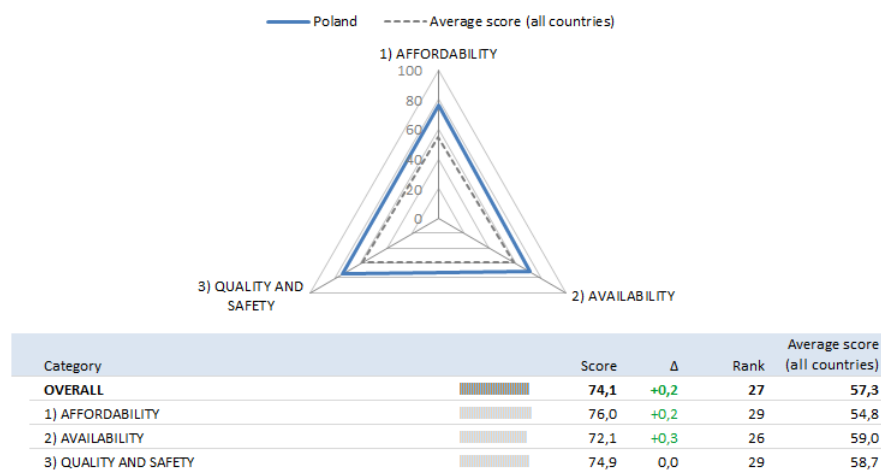
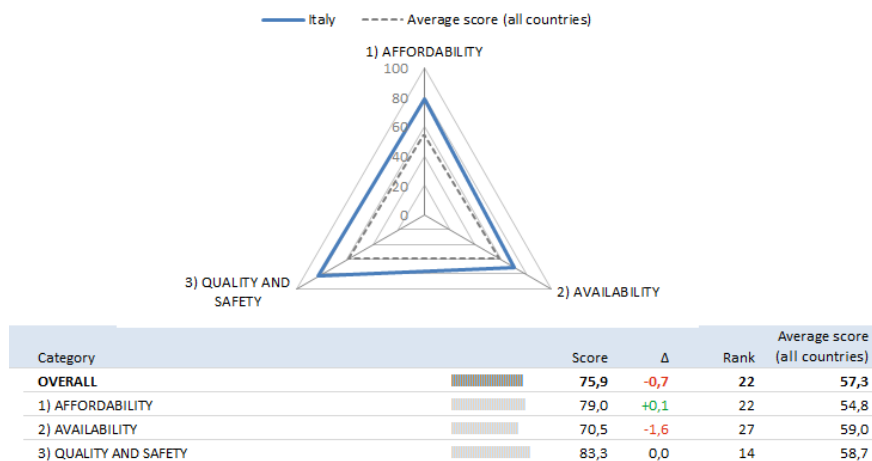


Fig. 7.2. Italy and Poland within three categories of Global Food Security Index compared to the mean for all countries. The first figure presents the results of the examinations performed in Italy, whereas the other presents the results of examinations in Poland

Source: foodsecurityindex.eiu.com [02.03.2018]

The information presented in Fig.7. 2 reveals that both Poland and Italy departed substantially from the mean value for all the countries participating in the ranking. Italy obtained very high place (14th) in terms of food quality and safety (83.3/100), which reflects their highly developed philosophy of food safety. Poland was 29th, with the score of 74.9 points in this area. It is also noticeable that Italy, despite higher place in the Index lost 0.7 points compared to the previous year. Poland improved its status by 0.2 points, maintaining the increasing trend since 2014. A very important fact is that in terms of public expenditure for research and development, the country improved the score by 12.5 points.

The results of the examinations conducted in Poland demonstrated in four areas that the number of points was maximal: these were financing for farmers, presence of the systems of food safety and nutritional standards. Italy scored 100 points in five categories: proportion of population under global poverty line, presence of food safety net programmes, access to financing for farmers, and nutritional standards and food safety.

With this background, the following most important conclusions that result from the Global Food Security Index 2017 should be emphasized (foodsecurityindex.eiu.com):

- A decline in food safety was observed in three fifths of the countries,
- an increase in food production by 50% is expected by 2050 in order to ensure food for 10 billion people all over the world;
- 5/10 countries with the highest food security index are reducing the expenditures on research and development in agriculture,
- the countries with developing economies require implementation of sustainable food production and supply chains.

7.4. Conclusions

Recognizing the foreground role of customers as external stakeholders requires the focus on their interests (expectations), which

should be connected especially with satisfaction, quality and product reliability. Meeting these expectations seems to be most optimally reflected by ensuring food safety.

As demonstrated in this chapter, the category of food safety is subject to formal and legal guidelines and supervision of specific authorities. It is worth emphasizing that unification of legal regulations in this area leads to some problems, thus the differences in approaches to food safety and supervision in the discussed countries i.e. Poland and Italy. Nevertheless, as demonstrated in the paper, one should indicate certain similarities with general character, connected at least with using a distributed model of food safety system.

The indicated similarities and differences concerning formal and legal aspects of food safety in Poland and Italy are becoming important especially in light of free flow of employees in the European Union and more and more frequent establishment and operation of enterprises with Polish capital in Italy and those with Italian capital present in the Polish market.

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