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CORPORATE SOCIAL RESPONSIBILITY AS AN EFFECTIVE SIGNAL OF FOOD SAFETY: THE RESULTS OF ECONOMIC AND MATHEMATICAL MODELLING

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The question of whether the strategy of undertaking corporate social responsibility (CSR) policy is an effective signal of a high level of food safety is considered in this paper. Despite the existence of some state mechanisms aimed at solving the lemon problem, the presence of a great number of fake and adulterated food on Russian food markets show that it has not been solved yet. Specificity of food (its experimental and trusting qualities) makes it impossible to evaluate the qualitative characteristics of food before it is purchased by customers. The analysis was based on Bertrand model with a differentiated product. Theoretic and game modelling resulted in articulation of the conditions for "desired" Nash equilibrium, where CSR policy is implemented by the companies producing safer food. The comparison of possible Nash equilibriums has lead us to the conclusion that the efficiency of CSR strategy as a quality signal is determined by the control and support of the manufacturers provided by the state and by the number of "responsible" health-conscientious customers. "Desired" Nash equilibrium may be reached without "responsible" customers, but with a high level of state support towards "honest" companies with a positive CSR record. This means that the weakness or lack of state mechanisms to support or encourage the manufactures, a small share of health-conscientious customers, their low activity in monitoring safety level when choosing food are among the factors determining the low activity of manufacturers in CSR policy implementation.

Keywords: corporate social responsibility, signalling, food safety, differentiated product, Bertrand model.

Introduction

In the context of information asymmetry, a wide variation in food quality levels and quality measurement costs which are high for consumers the lemon problem at food markets arises - there is a great amount of food leading to health deterioration due to its consumption. This can be proven by a lot of cases of adulterated products found on Russian food markets [4, 5, 6, 7]. Costs to measure the qualitative characteristics of food before it is bought by a consumer are very high due to these characteristics specificities - experimental and trusting qualities. Different mechanisms reduce the quality measurement costs for consumers - these are state mechanisms (for example, licensing, certification, compulsory provision of the information according to the laws of consumer right protection, of food safety provision, etc.) and public mechanisms (for example, reputation, brands, warranties, information advertisements, labelling, etc.) [11]. Consumers' underestimation of risks, a low level of understanding the information about food quality reduce the efficiency of the state measures to solve the lemon problem on food markets. This leads to the situation when some additional mechanisms, possibly public ones, supporting the current state mechanisms are being looked for. Corporate social responsibility (CSR) policy implemented by manufacturers is one of these public mechanisms which are becoming popular in Russia. Its difference from other signalling strategies is

in its positive effects on the society on the whole. This means that the state is encouraged to support the companies with honest CSR policy.

The paper looks at the conditions for CSR policy implementation, which provides a high level of safety for manufactured food. The equilibrium, when the companies with CSR policy produce safe food only, while companies producing less safe food do not have CSR policy, is the best for us. The signal of CSR is effective if it leads to the best equilibrium. The aim of the paper is to identify the conditions, when CSR policy is an effective signal. It is thought that the success in CSR mechanism implementation depends on a number of factors, including the number of responsible consumers, who take care about their health, and state support of manufacturers of safe food, which stick to CSR policy. The analysis was carried out within theoretical and game approach with Bertrand model with a differentiated product as the basis.

Food Sector Specificity

The fact that qualitative characteristics of food are mostly experimental or trusting [14; 25] means that consumers check the qualitative characteristics of food either while consuming it, or relying on the opinion of third parties. The state, the manufacturers themselves or their organizations and independent public organizations or ordinary people may be the third parties. The information presented to consumers may

or may not effectively decrease the risks of consumers' health deterioration due to the consumption of food. Not a very high level of knowledge in evaluating the food safety among consumers is one of the reasons for ineffective information, the majority of consumers do not read the information on the food labels, many do not understand what they have read or they misinterpret it [8].

According to the Federal Law "On food quality and safety", "food safety" presupposes proven certainty that at its normal usage conditions the food is harmless and not dangerous for the health of today's and future generations" [3, Article 1]. Safety is determined by a set of indicators characterizing the raw material, finished products and covering such notions, as food value, biological value and consumers' qualities of the goods.

Let us call food with a high risk level for health deterioration due to its consumption "less safe", and food with a low risk level for health deterioration due to its consumption "safer". Risk is defined as a possibility for a person's health deterioration due to food consumption.

CSR as a mechanism to solve the lemon problem on food markets

Signalling, an action of the informed party to present the information about the qualitative characteristics to the uninformed party, is one of the mechanisms to solve the lemon problem on food product markets.

The paper [33] specifies the strategies of signalling about the quality of goods on food markets. These strategies are the ones based on the signals coming from the third parties, mechanisms of branding and reputation, compensation strategies, strategies of vertical coordination.

In the article the strategy of corporate social responsibility (CSR) policy or social responsibility of business is considered to be the strategy of signalling about the quality of one's goods. ISO 26000 "Guidelines in social responsibility" [2, p.15] defines social responsibility as "responsibility of an organization for the impacts of its decisions and activities on the society and environment, through transparent and ethical behaviour, that

- contributes to sustainable development, including health and wealth of the society;
- takes into account the expectations of stakeholders;
- is in compliance with the applicable law and consistent with international norms of behavior; and
- is integrated throughout and practiced in an organization's relationships".

The question of financial benefits from CSR policy is widely discussed. The conclusions made in several researches (for example, [18; 24; 27; 28]), revealed some positive connection between CSR policy implementation and corporate financial indicators. What is more, this connection depends on the characteristics of the company itself and the industry. For example, a positive influence of CSR policy on the company's figures was revealed in light and food industries, especially in goods with experimental and

trusting qualities, this connection was not seen in other sectors and for other goods[22; 23; 31].

The reaction of consumers to CSR policy implementation was unclear, it depends on a great number of factors [20]. However, consumers could contribute into the solution to the lemon problem on food markets. They may, for example, refuse to buy if they are not quite sure in the adequate safety level of the goods. This opportunity for consumers to influence the situation plays a significant role in the choice of conduct strategy of manufacturers. The authors of the paper [19] studied such mechanism as "boycotts of consumers for the goods of unethical companies" within theoretical and game approach based on Cournot model and came to the conclusion that a company's decision on the strategy of socially responsible behaviour depends on some key economic factors, including a share of consumers, who value qualitative goods and socially responsible behaviour of the company, their readiness "to boycott" the goods of "unethical" firms, their readiness to pay the company's costs on CSR policy implementation. The paper [1] articulates the conditions for the CSR policy to be attractive for the manufacturers on the basis of Cournot model – the level of state support for the manufacturers with CSR policy and a share of consumers, for whom a demand factor is the risk of health deterioration due to food consumption, that is those consumers, who refuse to buy the goods with a high risk level ("boycott" in terms of the paper [19]).

The implementation of different mechanisms aimed at solving the lemon problem on food markets leads to the distribution of risks among different spheres of responsibility. The sphere of state responsibility includes most risks (licensing, standardization, certification, technical rules, laws on quality and safety of food, on consumer right protection, etc.). The sphere of manufacturers' responsibility comprises some risks (the choice of raw materials, the usage and choice of food additives, the execution of state requirements, reliable and the effective presentation of information about the quality of their goods, etc.). However, consumers themselves carry out a major part of responsibility. This is determined by the fact, that the efficiency of Law on consumer right protection and the manufacturers' activities in presenting the information about the qualitative characteristics of the product to consumers depend on the readiness of the consumers to read and to understand this information and to take it into account in their choice of food. This means that the solution to the lemon problem is determined by the actions of three parties –manufacturers-state-consumers.

Consumers

Many researches, for example, papers [12; 13; 15; 21; 32; 36; 37], are devoted to the analysis of studying label information processes of different consumers, its usage and the process of making a decision about a purchase.

Within the framework of institutional approach the strategy of consumers' behavior on a goods market is determined by the structure of quality

measurement costs of the goods bought. Some costs are shifted from the consumers to the manufacturers by presenting the information about the qualitative characteristics of goods on a product's label in accordance with the Law on consumer right protection. Goods labelling gives the information to the consumers, who can make a well-informed decision about a purchase [9; 29]. However, the authors of different empirical studies [30; 34; 35] come to conclusion, that the information availability does not result in consumers' preference to buy safer alternatives. This can be explained by such factors, as the lack of understanding of the terms, the meaning of the information on the label, the lack of trust to products' labels [21].

The scientists differ in their conclusions about the readiness to pay or not to pay a higher price for safer food. Some researchers argue that some consumers are ready to pay more for safer goods (for example, [17; 29]). The papers [10; 26] contain other conclusions – consumers are not ready to overpay for safety. Such a difference can be explained by the difference of goods under study, intercountry differences, technological development, the improvement of customers' enlightenment about their health.

Trust plays an important role in shaping customers' comprehension of the information about a product with experimental and trusting qualities and in evaluating its risk. The papers look at different types of trust to analyze a person's behaviour in food choice, as a rule a person's trust towards a particular institute is considered [16], in the prerequisites of the model below trust to the state is in the centre of attention.

Manufacturers

The degree of health deterioration risk due to the consumption of the food bought on a goods market is defined by a manufacturer, because the manufacturer makes the decision about the execution of state law and recommendations for the goods quality and its safety level.

Despite the existence of the state regulation of food market to provide safety the motives to produce and to sell adulterated food reveal the weakness of the used mechanisms and high control costs of the state. The sampling checks made by Rospotrebnadzor, Trade Chamber of Commerce and the Ministry of Agriculture revealed that the share of defective food and violation of the safety and labelling requirements in the audited lots from 2003 to 2014 reached 30 – 40% [4; 5; 6]. By 2014 the dairy product market had become very unfavourable in the low price segment: "In accordance with National Union of Milk Producers (Soyuzmoloko) adulterated dairy products comprise 10 - 30% of the Russian dairy product market, while for other goods in the low price segment the share of substandard goods is 90%" [7].

The manufacturers, who produce food with a low risk level, typically have higher costs and, as a result, higher prices. They can signal about the safety of their products with CSR as a mechanism to build trust in their consumers. This signal will be effective provided that CSR policy is implemented by the

manufacturers of safer products. The analysis of the manufacturers' strategies towards CSR policy articulates the conditions, when CSR policy may be an effective signal.

Model: prerequisites, players, strategies, equilibriums

Based on Cournot model analysis the paper [1] describes the conditions, when the manufacturers have the motives to implement CSR policy on the markets of uniform products. As most of food sector consists of differentiated products, and the price competitiveness is widely spread on food markets, the present paper is based on Bertrand model with a differentiated product and constant return to scale (constant costs) in analysing the manufacturers' conduct. A two-period interaction of two companies producing alternative goods is analyzed. Let us refer to a more preferable product for each consumer as "their product" and to the other product as "a substitute".

The model prerequisites are as follows:

– demands for the company's products are described by the equations

$$q_1 = a - p_1 + bp_2,$$

$$q_2 = a - p_2 + bp_1,$$

where q_i is the quantity of products of manufacturer i ; p_i is the price of manufacturer i ; a is a numerical coefficient, $a > 0$; numerical coefficient b determines the consumers' sensitivity of the first product to the price of the other product, it is quite natural to assume that a consumer is more sensitive to "their" price than to the price of a substitute, that is $0 < b < 1$.

– the first company produces safer goods, the production costs of a production unit are constant and equal to c_1 ; the second company produces less safe goods, its production costs of a production unit are constant and equal to c_2 , with $c_2 < c_1 < a$.

Other prerequisites are the same as the traditional ones for Bertrand model with a differentiated product: price is a strategical variable; decisions are made simultaneously; profits are maximized; the capacities are unlimited. Each player has two strategies for the policy of corporate social responsibility: CSR - to implement CSR policy, N - not to implement CSR policy.

The studies of food markets resulted in the following suggestions about the manufacturers, consumers and state.

All finished products are marked by the manufacturers in accordance with the chosen level of product safety. The manufacturers of any goods may implement CSR irrespective of safety level of their products. The costs of CSR policy for any company are the same irrespective of production output and equal to C_c . CSR policy implementation does not presuppose to include production technology modernization or to influence the production costs.

The companies use CSR policy to attract more health-conscious customers who do not rely on the information on the food labels and do not understand it. The state controls these companies in terms of meeting food safety standards declared by the company with

labeling the food. If it is proven that a company manufactures safer product, in the second period the state supports¹ the company, with the costs on CSR policy implementation being reduced and equal to λC_c , $0 < \lambda < 1$. Thus, CSR policy costs in the second period are different for the companies with the goods of different safety levels provided the state checks confirm a high safety level of the product. The positive impacts of CSR policy on the society on the whole create motives for the state to support the companies with honest CSR policy. Without state control the CSR policy costs will be the same for the companies that manufacture products with different safety levels, even in the second period.

The consumer structure on the market of each product is the same. There is a group of consumers, for whom product safety is not a demand factor, they consume a product without studying the information about its safety, or they may misunderstand the information about the product quality and make the decision to consume it, even if the product has a low safety level. Also there is a group of probable health-conscientious consumers, for whom the product's safety level is a demand factor, they do not buy a product, unless they are sure in its high safety level. They either do not understand the information on the label and that's why refuse to buy it, or they do not trust it. To make them buy a product the goods must have an additional signal, for example, CSR policy executed by a manufacturer. Let us refer to these consumers as "responsible ones", if the execution of CSR policy is a signal of a low safety level and influences them better than the attractiveness of "their" product. If "their" manufacturer does not execute CSR policy, while the producer of a substitute does, then these consumers will purchase substitutes, they are ready to pay a higher price for the product with a low risk level. In the second period they will consume the goods of the company with CSR policy supported by the state and refuse to buy the goods of the company with CSR policy, but without the state support. Thus, CSR policy implementation may increase the number of the consumers with "potential" responsible health-conscientious individuals by α amount as a minimum. Irresponsible health-conscientious consumers will continue to buy the goods from the manufacturer with CSR policy, even if the state refuses to support the company due to revealed nonconformity with the product's safety level.

All parameters of $a, b, c_1, c_2, C_c, \lambda, \alpha$ model are constant and exogenous.

Desirable is the equilibrium, in which the companies with CSR policy produce safer food, while the companies producing less safe food do not have CSR policy.

In the second period the state may or may not control the manufacturers with CSR policy in order to understand whether to support them or not.

First period

The first manufacturer produces safer food, while the other produces less safe ones. Each of them chooses N or CSR strategy.

There are two periods at play. The companies' profits which depend on the quality of the produced goods and on the decision about the strategy (to have or not to have CSR policy) are at stake.

If both the companies do not implement CSR policy, then their profits maximization results in setting prices

$$p_1 = \frac{a(2+b) + 2c_1 + bc_2}{4-b^2},$$

$$p_2 = \frac{a(2+b) + bc_1 + 2c_2}{4-b^2},$$

Since $c_2 < c_1, p_2 < p_1$.

Therefore, the profits are

$$\pi_1 = \pi_1(N, N) = \left[\frac{a(2+b) - (2-b^2)c_1 + bc_2}{4-b^2} \right]^2,$$

$$\pi_2 = \pi_2(N, N) = \left[\frac{a(2+b) - (2-b^2)c_2 + bc_1}{4-b^2} \right]^2,$$

since $c_2 < c_1, \pi_2 > \pi_1$.

If both the companies implement CSR policy, then each of them attracts α share of health-conscientious consumers, their profits increase by α share, while in the first period each of them incurs expenses C_c .

$$\pi_i(KCO, KCO) = (1 + \alpha)\pi_i - C_c, \quad i = 1, 2.$$

If one company has CSR policy, while the other doesn't, both α shares of health-conscientious consumers will choose to buy products from the CSR-conscientious manufacturer.

$$\pi_1(KCO, N) = (1 + 2\alpha)\pi_1 - C_c,$$

$$\pi_2(KCO, N) = \pi_2,$$

$$\pi_1(N, KCO) = \pi_1,$$

$$\pi_2(N, KCO) = (1 + 2\alpha)\pi_2 - C_c.$$

Equilibrium analysis in the first period helps to draw the following conclusions.

- $\langle KCO; KCO \rangle$ profile is the Nash equilibrium, if $\frac{C_c}{\alpha} < \pi_1 < \pi_2$,
- $\langle N; KCO \rangle$ profile is the Nash equilibrium, if $\pi_1 < \frac{C_c}{2\alpha} < \frac{C_c}{\alpha} < \pi_2$,
- $\langle N; N \rangle$ profile is the Nash equilibrium, if $\pi_1 < \pi_2 < \frac{C_c}{2\alpha}$,
- $\langle KCO; N \rangle$ profile is not the Nash equilibrium, as the condition $\pi_2 < \frac{C_c}{2\alpha} < \frac{C_c}{\alpha} < \pi_1$ contradicts the in equation $\pi_2 > \pi_1$.

Thus, the companies producing goods with any safety level may have the motives to execute CSR policy in the first period. If the CSR costs are

¹ The state may support or encourage the companies by monetary and non-monetary benefits, for example, by providing different privileges, by rating the manufacturers of safe products, etc.

comparatively small, and the profits of both companies are comparatively big, then both firms will implement CSR policy, but then it is not an effective signal of goods safety. If the profit of a company producing safer goods is not big, and the share of health-conscientious consumers is small, this company is not interested in CSR policy - extra profit from extra health-conscientious consumers does not compensate the costs spent on their attraction in the first period. At the same time a company with less safe goods may be encouraged to have (<N; KCO> profile). The desired equilibrium <KCO;N>, when the first company with safer goods implements CSR, while the other does not, is not reached in the first period. In the first period the strategy of CSR policy implementation is not a signal of safe food.

Second period

The second period may have the right conditions for the desired equilibrium depending on the other parties that the manufacturers with CSR policy deal with - responsible or irresponsible health-conscientious consumers; controlling or non-controlling state. Let us consider the three cases:

1. Controlling state; responsible health-conscientious consumers;
2. Controlling state; irresponsible health-conscientious consumers;
3. Non-controlling state; health-conscientious consumers may be both responsible or irresponsible.

1. Let the state control and support an honest manufacturer with CSR policy and a high safety level of produced goods in the second period. Due to this the CSR implementation costs reduce to λC_c . Responsible health-conscientious consumers continue to buy goods from the manufacturer supported by the state. If the checks reveal that the company with less safe food sticks to CSR policy, then the state does not support it, its CSR policy costs do not decrease, rather remain on the same level C_c . In this case the responsible consumers, who are not provided with the approval of a high safety level of food in the form of state support, choose a substitute - a product with a high safety level, which is manufactured by a company with CSR policy and support from the state. And here the manufacturers' profits are:

$$\begin{aligned}\pi_1(KCO, KCO) &= (1 + 2\alpha)\pi_1 - \lambda C_c, \\ \pi_2(KCO, KCO) &= \pi_2 - C_c, \\ \pi_1(KCO, N) &= (1 + 2\alpha)\pi_1 - \lambda C_c, \\ \pi_2(KCO, N) &= \pi_2, \\ \pi_1(N, KCO) &= \pi_1, \\ \pi_2(N, KCO) &= \pi_2 - C_c. \\ \pi_1(N, N) &= \pi_1, \\ \pi_2(N, N) &= \pi_2,\end{aligned}$$

N strategy for the second producer is dominant. <KCO;N> profile is the Nash equilibrium under $\frac{\lambda C_c}{2\alpha} < \pi_1$. This means that the second period may be characterized by formation of the motives to

execute CSR policy, even though there are none in the first period. That is, under $\frac{\lambda C_c}{2\alpha} < \pi_1 < \frac{C_c}{2\alpha} < \frac{C_c}{\alpha} < \pi_2$ the undesired equilibrium <N;KCO> in the first period becomes a desired one <KCO;N> in the second period.

Thus, with control and support from the state and with the health-conscientious consumers we may reach the desired equilibrium, when the manufacturers of safer food only implement CSR policy. Under these conditions CSR policy is an effective signal.

2. The second case, which is possible for the second period, is characterized by the situation, when the controlling state supports an honest manufacturer, that confirms the high safety level of their products, as a result the CSR costs reduce to λC_c , and the state does not support a company with less safe products. However, some health-conscientious consumers are not responsible and continue to buy the goods from the company with CSR policy, regardless state support, i.e. regardless the safety level of goods. In this case the manufacturers' profits are:

$$\begin{aligned}\pi_1(KCO, KCO) &= (1 + \alpha)\pi_1 - \lambda C_c, \\ \pi_2(KCO, KCO) &= (1 + \alpha)\pi_2 - C_c, \\ \pi_1(KCO, N) &= (1 + 2\alpha)\pi_1 - \lambda C_c, \\ \pi_2(KCO, N) &= \pi_2, \\ \pi_1(N, KCO) &= \pi_1, \\ \pi_2(N, KCO) &= (1 + 2\alpha)\pi_2 - C_c. \\ \pi_1(N, N) &= \pi_1, \\ \pi_2(N, N) &= \pi_2.\end{aligned}$$

The following equilibriums are possible here:

- <KCO; KCO> profile in the second period is

the Nash equilibrium, if $\frac{\lambda C_c}{\alpha} < \pi_1 < \frac{C_c}{\alpha} < \pi_2$ or

$\frac{\lambda C_c}{\alpha} < \frac{C_c}{\alpha} < \pi_1 < \pi_2$, $0 < \lambda < 1$. Under these

conditions, even if in the first period <N;KCO> profile is the Nash equilibrium, in the second period the first company producing safer food is not strictly limited due to the state activities, and it may have some motives for CSR policy.

- <KCO;N> profile in the second period is

the Nash equilibrium if $\frac{\lambda C_c}{\alpha} < \pi_1 < \pi_2 < \frac{C_c}{2\alpha}$, $0 < \lambda < 1/2$.

Under these conditions, in the first period CSR policy may not be profitable for neither companies (<N; N> Nash equilibrium), however, in the second period, when the support from the state results in a significant reduction of CSR policy costs (more than a half), the first company may be encouraged to implement CSR policy, its low costs λC_c are covered by extra profit from extra health-conscientious consumers. CSR policy becomes an effective signal.

If the state support is not very extensive

($\lambda > 1/2$), the condition $\pi_2 < \frac{C_c}{2\alpha} < \frac{\lambda C_c}{\alpha} < \pi_1$ for the

desired $\langle KCO; N \rangle$ Nash equilibrium is impossible for it contradicts the inequation $\pi_2 > \pi_1$.

– $\langle N; KCO \rangle$ profile is the Nash equilibrium,

if $\pi_1 < \frac{\lambda C_c}{2\alpha} < \frac{C_c}{\alpha} < \pi_2$ with any support from the

state $0 < \lambda < 1$. And here the first company is interested in CSR policy neither in the first nor in the second periods.

– $\langle N; N \rangle$ profile is the Nash equilibrium if

$\pi_1 < \frac{\lambda C_c}{2\alpha}$; $\pi_2 < \frac{C_c}{2\alpha}$. And here both companies

execute CSR policy neither in the first nor in the second periods.

Thus, with no responsible actions from health-conscientious consumers, but with state control and support of the companies with CSR policy we may see the desired equilibrium, when CSR policy is implemented in a company producing safer food. But the equilibrium may be achieved only with a strong support from the state and with certain "sameness" of both the companies' profits. Control and support from the state with no responsible actions from the health-conscientious consumers, who refuse to buy less safe goods, are not enough for the CSR policy to become an effective signal. The amount of CSR policy costs reduction due to state support and approximately equal profits of the companies, i.e. their expenses, play an important role.

3. In the third case in the second period the state does not control the safety level of the produced goods, but provides the support to all manufacturers with CSR policy. Due to the state support the CSR implementation costs of all manufacturers reduce to λC_c . In this case, the profits are equal to the profits of the first period, but the CSR policy costs of both companies are lower now.

Here both the companies may synchronically become interested in CSR policy implementation at low costs λC_c and big α share. $\langle KCO; N \rangle$ profile is not the Nash equilibrium, as the condition

$\pi_2 < \frac{\lambda C_c}{2\alpha} < \frac{\lambda C_c}{\alpha} < \pi_1$ contradicts the inequation $\pi_2 >$

π_1 .

Thus, the desired equilibrium $\langle KCO; N \rangle$, when the first company with safer goods implements CSR, while the other does not, is not reached in the second period. Strategy to implement CSR policy is not an effective signal of safe food with no state control regardless the type of a consumer.

Conclusion

A strong public interest towards food safety issues can be explained by a close link between a person's health and the quality of the consumed food. Adulterated food brings a wide range in safety levels of the consumed food. The costs of measuring the qualitative characteristics of food for consumers are very high due to those characteristics' specificities - experimental and trusting qualities. The measurement costs for the consumers may be reduced via institutional mechanisms, including CSR policy mechanism considered in this paper.

The paper gives theoretical and game analysis based on Bertrand model with a differentiated product of manufacturers' interactions with controlling or non-controlling supporting state, with responsible and irresponsible consumers. The analysis of a two-period interaction of the companies with different safety levels for the consumers' health results in the conclusions about the conditions of signal efficiency in the form of CSR policy. The model accounts for two factors - control over the manufactured goods' safety level and state support for the companies with safer products and CSR policy and a share of responsible health-conscientious consumers refusing to buy less safe food.

The model analysis illustrates that the first period with responsible consumers thinking of CSR as a signal for a product to be safe, but without state support makes CSR policy ineffective as a signal, the manufacturers of less safe goods may be the first to become interested in CSR policy implementation due to lower costs of food production.

However, the second period may become more attractive for the manufacturers of safer food to implement CSR policy. Possible Nash equilibriums in the second period are compared with the conclusion that CSR policy efficiency as a food safety signal is determined by the state support of the companies with CSR policy, but with monitoring of the companies' "honesty". In this case responsible consumers guarantee the desired equilibrium with a weaker state support. If consumers are irresponsible, the desired equilibrium may be reached only under a strong state support of the companies manufacturing safer food and nearly equal production costs of both companies.

With no control over the companies with CSR policy their state support does not lead to the desired equilibrium regardless health-conscientious consumers' behaviour. This means that the weakness or lack of state mechanisms to support or encourage the manufactures, a small number of health-conscientious customers, their low activity in monitoring a safety level when choosing food are among the factors determining low activity of manufacturers in CSR policy implementation.

The obtained results show that the development of state encouragement measures, support of "honest" companies with CSR policy may give rise to the motives to be engaged in CSR policy. The measures to involve more people into a healthy way of life, to make them more knowledgeable in terms of reading and understanding the obtained information about the qualitative characteristics of food contribute into the improvement of the situation.

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КОРПОРАТИВНАЯ СОЦИАЛЬНАЯ ОТВЕТСТВЕННОСТЬ КАК ЭФФЕКТИВНЫЙ СИГНАЛ БЕЗОПАСНОСТИ ПРОДУКТОВ ПИТАНИЯ: РЕЗУЛЬТАТЫ ЭКОНОМИКО-МАТЕМАТИЧЕСКОГО МОДЕЛИРОВАНИЯ

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Анализируется вопрос о том, может ли стратегия проведения политики корпоративной социальной ответственности (КСО) быть эффективным сигналом высокого уровня безопасности продуктов питания. Несмотря на действующие государственные механизмы по снижению проблемы неблагоприятного отбора, о ее сохранении на российских продуктовых рынках свидетельствует большое количество фальсифицированных и контрафактных продуктов питания. Специфика продуктов питания (наличие у них экспериментальных и доверительных качеств) делает невозможным измерение потребителями качественных характеристик до покупки продукта. В основу анализа положена модель Бертрана с дифференцированным продуктом. В результате теоретико-игрового моделирования получены условия формирования «желательного» равновесия Нэша, в котором политику КСО проводят только фирмы, производящие более безопасные продукты. Сравнение возможных равновесий Нэша приводит к выводу, что эффективность стратегии КСО как сигнала качества определяется наличием контроля и уровнем поддержки производителей со стороны государства, а также долей «ответственных» потребителей, заботящихся о своем здоровье. «Желательное» равновесие Нэша может иметь место и в отсутствие «ответственных» потребителей, но только при высоком уровне государственной поддержки «честных» фирм, проводящих политику КСО. Это означает, что к числу факторов, обуславливающих низкую активность производителей в области проведения политики корпоративной социальной ответственности, можно отнести слабость или отсутствие механизмов поддержки и поощрения производителей со стороны государства, а также невысокую долю потребителей, заботящихся о своем здоровье, их слабую активность в отношении учета уровня безопасности при выборе продуктов питания.

Ключевые слова: корпоративная социальная ответственность, сигнализирование, безопасность продуктов питания, дифференцированный продукт, модель Бертрана.

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