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TRENDS OF EVOLUTION OF FOOD SECURITY: DIGITAL TRANSFORMATION, SOCIAL ENTREPRENEURSHIP AND HUMAN DIGNITY

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This paper examines innovations in the field of ensuring food security for those in need. It is noted that in the modern world, in addition to traditional food supply models (that is, those that set themselves the only goal – to help those in need) innovative methods are emerging (which pursue several goals, one of which is to help those in need). In more detail, this paper discusses innovative methods, to which the authors refer the possibility of creating a public retail network with fixed prices, conducting a markdown procedure, getting food in commercial enterprises for free, obtaining a comprehensive restaurant service at a significantly lower price and self-organization of people in a digital environment. The paper presents a detailed analysis of each of the above methods. The main conclusion of the study is the need to segment the needy depending on their specific needs. The authors propose to distinguish the following groups of people in need: those in need of basic food, those in need of additional food, those in need of socially acceptable practices for obtaining food, the well-off. For each of the selected groups, innovative methods of providing food are proposed, depending on the specifics of the needs of the people in each group. It is noted that considering individual needs while ensuring food security leads to an increase in the quality of life of the population.

Keywords: food security; food sharing; charity; platform economy; poverty; social marketing; dignity; catering

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Обзорная статья

ТЕНДЕНЦИИ ЭВОЛЮЦИИ ПРОДОВОЛЬСТВЕННОЙ БЕЗОПАСНОСТИ: ЦИФРОВАЯ ТРАНСФОРМАЦИЯ, СОЦИАЛЬНОЕ ПРЕДПРИНИМАТЕЛЬСТВО И ЧЕЛОВЕЧЕСКОЕ ДОСТОИНСТВО

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В данной работе рассматриваются инновации в сфере обеспечения продовольственной безопасности нуждающихся. Отмечается, что в современном мире помимо традиционных моделей продовольственного обеспечения (то есть тех, которые ставят перед собой единственную цель – помощь нуждающимся) появляются инновационные методы (которые преследуют несколько целей, одной из которых является помощь нуждающимся). Более подробно в данной работе рассматриваются инновационные методы, к которым авторы относят возможность создания государственной розничной сети с фиксированными ценами, проведение процедуры уценки, получение еды в коммерческих предприятиях бесплатно, получение комплексной ресторанной услуги по значительно более низкой цене и самоорганизацию людей в цифровой среде. В работе представлен подробный анализ каждого из приведенных методов. Основным выводом исследования заключается в необходимости сегментирования нуждающихся в зависимости от их специфических потребностей. Авторами предлагается выделять следующие группы нуждающихся: нуждающиеся в базовых продуктах питания, нуждающиеся в дополнительных продуктах питания, нуждающиеся в социально-приемлемых практиках получения еды, обеспеченные. Для каждой из выделенных групп предложены инновационные методы обеспечения едой в зависимости от особенностей потребностей людей, входящих в каждую группу. Отмечается, что учет индивидуальных потребностей при обеспечении продовольственной безопасности приводит к росту качества жизни населения.

Ключевые слова: продовольственная безопасность; фудшеринг; благотворительность; платформенная экономика; бедность; социальный маркетинг; человеческое достоинство; общественное питание

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Introduction

The ongoing transition to the digital economic and technological paradigm has disrupted many traditional models of economic and social activity [26, 43, 46] including existing approaches towards food security. New technologies help to use novel resources for food production (for example, insects), create new types of food (meat substitutes, milk substitutes etc.), introduce new models of food production (vertical farms) and provide people with a more comfortable access to food (food delivery platforms) [5]. These products have many benefits in comparison with conventional types of food:

- Lower negative ecological effects;
- Higher quality and nutritional value;
- More efficient use of limited land resources;
- Higher level of food security (thanks to shorter supply chains).

These positive effects are analyzed in the existing literature. However, digital transformation is not limited to implementation of new technologies. The key result of digital transformation consists in introducing new business models and changing organization of interactions between economic agents [18, 27, 30, 35]. While these developments are well studied in other fields of economic activity, the organizational transformation of food security models, to the best of our knowledge, remains understudied.

It should also be noted that the existing literature on digital transformation in food industry is mostly dedicated to profit-oriented models [9, 20, 21, 27], while the impact of digital technologies on non-commercial distribution of food has attracted less attention (the only exception are food sharing platforms). It means that the potential of new formats of food provision for people in need is not fully understood. Now, when the current geopolitical trends threaten the sustainable access to food [15, 17, 42] and traditional models of food security may not be sufficient [8, 12, 32, 46], it is important to know how new organizational models can be used for food provision [15, 34].

The present paper will fill in this gap and describe new roles of key stakeholders of food security system (state, customers and retail chains) as well as new models of access to food. As a result, we will demonstrate how the overall concept of food security as well as the system of food security change and adapt to new requirements of people and to transforming economic and technological environment.

Materials and methods

In this work, many theoretical and practical methods of scientific research are used. In order to identify main ways of transformation of roles of stakeholders of food security system we used the method of descriptive literature review. We also implement this method for description of key features of new models of food security. Mini case studies are introduced to demonstrate the key ways of development of models of access to food for people with low income. Changing roles of stakeholders of food security systems are described on the basis of the method of strategic matrices (as this method is often used to demonstrate advantages and disadvantages [2] as well the structure of various models of access to food [36]).

Results

1. Traditional and innovative tools of food security

First of all, it is crucial to make a clear distinction between traditional and innovative tools of food security. By traditional ways of providing food, we mean those projects that have one goal – to provide food to people with low income. By innovative methods we mean projects that, in addition to providing people in need with food, also solve other tasks with providing food to those in need, are also aimed at solving other tasks (see Table 1).

Table 1.

Model of food provision for people in need [28]

Name of the method	Organizer (resource provider)	Characteristic	Innovative/Traditional	Additional goals
Food stamps	State	Issuance of coupons that can be exchanged for food at authorized retail chains	Traditional	None
Food banks	Non-commercial organizations (supported by the state, business and local communities)	Distribution of free food to people in need	Traditional	None
Free canteens	Non-commercial organizations (supported by the state, business and local communities)	Providing ready-to-eat meals for people in need for free	Traditional	None
Free food at commercial retail chains and restaurants	Businesses	Free and unconditional provision of food to customers	Innovative	Marketing
Food sharing	Self-organization and/or non-commercial organizations	Redistribution of food among people	Innovative	Ecology

Traditional models of food security are described in the existing literature. The present paper will analyze innovative tools of food provision to people in need.

2. New concept of food security

Traditionally, from the point of view of models of ensuring food security, the society has been divided into two basic groups:

- People with sufficient income to buy food on market terms. These people normally do not need support.
- People in need (their income is not sufficient to buy food for themselves and for their households). In order to provide these people with food non-market tools have to be used (state support, charity etc).

However, this traditional division is losing relevance in the modern world. People are now paying attention not only to the amount of food they have, but also to its quality and diversity as well as to environment of consumption. They are afraid to be stigmatized if they use non-commercial tools of access to food and feel ashamed when they resort to charities (food banks etc) and state support [33, 36]. They are interested in socially acceptable models of food provision and want not to be separated from people who are able to purchase food on market terms. Taking this consideration into account, we propose to divide people in three groups (Table 2).

Table 2.

Groups of people in need

Segment	Characteristic	Examples
Unsecured (people who need food)	<ul style="list-style-type: none"> - They cannot provide themselves with food. - Need to receive subsidies for food or free food. - Not concerned about the variety and place of food consumption. 	Retired people with low income; homeless people
People who are interested in socially acceptable food consumption practices	<ul style="list-style-type: none"> - Have enough money to buy basic products (or have access to food). - Do not have enough money to go to the places they want to. - Requirements for the place of purchase (or consumption) of meals are to high in comparison with the level of income. - Need public approval. - They want to emphasize (and increase) their social status by visiting fashionable places or buying more expensive products. 	Young people with limited pocket money (for example, non-working students)
Secured	<ul style="list-style-type: none"> - Have enough resources to satisfy their food-related physical, emotional and social needs 	- Regular customers (in different income groups)

Table 2 shows that a new segment of people in need can be identified in modern society. There is a group of people who have enough resource to satisfy their physical needs but are not able to meet their social and emotional requirements (we can describe them as social eaters). These people want to look more successful in society. One of the elements of forming the image of a successful person (along with a well-known brand phone and a beautiful photo on a social media personal page) is visiting fashionable restaurants. (as people with the same level of income and with the same level of food consumption may have different levels of satisfaction of their emotional and social needs).

It leads to two important conclusions:

- Food security models should be redesigned in order to meet the requirements of social eaters. For example, traditional food provision models (based on state support and charities) should be made more respectful and friendly and less stigmatizing;

- This group of social eaters creates demand for a comprehensive restaurant service (including space for food consumption, service and food [2]) at a significantly reduced price. Accordingly, a new niche has appeared in the restaurant market.

It means that not only physical needs, but also human dignity should be taken into account in food security models in order to ensure decent consumption.

We will discuss below how restaurants and food stores try to meet these new requirements.

3. Innovative forms of state support for people in need

In modern Russia, there is a decrease in the real level of income of the population. It will lead to a lower availability of food, especially for people with low income. The state has traditionally provided support to ensure affordability of food for people in need. This support has many indirect effects [47]. But the state normally does not participate in food distribution. The support normally consists in providing people with additional funds (in the form of money or food stamps). The state can also regulate food prices (for example, in 2022 an agreement was reached with the largest Russian retailers to limit the level of margins at 5% for dairy products, bakery products, sugar and some vegetables [URL: <https://www.m24.ru/news/ehkonomika/24032022/443877>]). Unfortunately, the implementation of the agreements reached is invisible to the buyer. For example, the assortment of a small store (an area of about 600 sq.m.) contains about 15 names of milk, while only one product name belongs to the basic ones, the layout of which is not obvious to the client. Because most goods are not subject to the margin restriction, and essential goods make up less than 1% of the

store's assortment, customers cannot notice the positive effect of government intervention. Accordingly, the goal of the agreements reached is not achieved, that is, food products do not become more accessible to the population.

In this regard, the Commissioner for Human Rights in the Republic of Tatarstan proposed to create a state network of grocery stores, where goods will be sold with a zero margin [URL: <https://www.m24.ru/news/ehkonomika/24032022/443877>]. Similar retail chains exist in other countries (the most famous is probably the Public Distribution System in India that provides people with basic food and other items [33, 42]).

It is likely that public-private partnership mechanisms will be used in the organization [11]. Depending on the mechanism used, the State may:

- Leave the amount of revenue to the private partner and pay an additional amount that will cover the costs of circulation and ensure the established rentability rate.

- To organize a mechanism in which the revenues will be transferred by the private partner to the state. In order to carry out the activities of the stores, the state will pay the amounts fixed in the contract, which include the costs of doing business and the profit of the private partner.

Creation of a state food retail chain with fixed margin involves a number of risks. Globally, they can be grouped into three groups. The organizational risk group includes risks associated with the incorrect choice of a private partner and with the organization of such a chain in Russia. It should be noted that determining the optimal number of stores and their product range is a non-trivial task due to the size of the country and the focal type of population settlement in most of its territory. In order to minimize the risks associated with the organization of cooperation with a private partner, digital tools should be used to ensure transparency of the competition. To ensure the activity of the shops of the proposed retail chain in remote settlements, it may make sense to consider options for organizing delivery.

The second group of risks is related to the economic efficiency of the network. Due to the non-standard assortment, there is a risk of increasing logistics costs, as well as a possible shortage of basic goods, which may arise due to the mentality of people.

Marketing risks are associated with the need for correct product range and information support for the opening of chain stores.

Thus, in order to organize the activities of the state grocery chain with fixed margin, it is necessary to take into account and minimize the negative impact of a wide range of risks.

This proposal demonstrates that the state may become an active participant of the food security system. It will change the role that the state has traditionally played within this system and may create important benefits for people in need (better access to food) and businesses (that will be selected as partners for potential public-private partnerships). However, it also can create important risks that should be taken into account.

4. Retail stores in the post-industrial model of food security

Retail trade of food products is characterized by the problem of surplus formation. Surpluses are goods that will expire before they are sold. On the one hand, such a product is a source of losses for the store, on the other hand, store will need to pay extra money for its disposal. To minimize losses, such an approach as markdown was introduced. Markdown consists in promotion of the sale of goods with an approaching expiration date by reducing its price with notification of the buyer about the reduced period of use (it is important that the consumer properties of these goods are lower than those of similar new items, but the consumption of such goods is safe for the customer). Benefits and risks of markdown for key stakeholders are given in table 3. Markdown should not be confused with promotion-driven discounts as in case of markdown retail chains are interested not in promotion of specific products and brands but in faster sales of expiring goods.

Table 3.

Advantages and risks of markdown for key stakeholders

	Advantages	Disadvantages
For business	<ul style="list-style-type: none"> - Cost minimization. - Acceleration of trade turnover. - A promotion tool (in case of informing the public about the possibility of purchasing such goods). - Fulfilling a social mission. 	<ul style="list-style-type: none"> - The risk of selling low-quality goods and subsequent image losses. - Additional organizational tasks (additional printing stickers, changing the layout etc.).
For indigent people	<ul style="list-style-type: none"> - Purchase of food at a significantly lower price. - Obtaining products of satisfactory quality. - The possibility of choice. 	<ul style="list-style-type: none"> - Lower quality of the product. - The need to consume the product quickly. - The need for constant monitoring of discounted goods (increased time costs). - Unstable assortment.

One can easily see that markdown meets the requirements of social eaters as they can increase the diversity of food at a reasonable cost. They also purchase food in conventional food stores without being differentiated from regular customers.

There are commercial enterprises operating in the restaurant, which, in a highly competitive struggle, need to create a marketing concept and strong promotion tools [2, 20]. In the context of the socially oriented orientation of modern society, commercial enterprises are trying to use social marketing in their marketing strategies. The purpose of commercial enterprises using social marketing tools is to increase profits. However, in the process of achieving this goal, commercial enterprises create value for people in need.

The solution proposed by the company “DoggyBag” (URL: <https://doggy-bag.club/>) has some similarities with markdown. “Doggy-Bag” business model is based on social marketing: is a restaurant aggregator operating entirely in a digital environment (represented by a mobile application) with the help of which unclaimed (those that probably will not be sold on time) products are sold.

“DoggyBag” is a platform [10, 27, 29, 35] that hosts information from partner restaurants about products that can be sold at a discount. At the same time, the offer has many distinctive features:

- The product always representing a set of several items that are sold in the restaurant.
- The customer does not know the composition of the set until the order is received.
- The composition of the set is determined by the restaurant independently.
- The set includes the products that most likely will not be sold during the day at the menu price, that is, the set is formed from excess goods (that are a potential source of losses for the restaurant).
- The partner restaurant commits to sell these sets at a better price than purchasing them separately at menu prices.

Thus, the basis of the “DoggyBag” business model is providing information about discounts on food of partner restaurants. The structure of purchase process is given in Figure 1.

As Figure 1 shows, “DoggyBag” is a company that is an information intermediary, on the platform of which partner ads are placed, while “DoggyBag” does not impose requirements on the number of ads placed by partners [13, 16]. Users can choose restaurants by different criteria: concept (restaurant, cafe, fast food, etc.), price, the time when the client needs to pick up a set. There is a possibility to select the desired cafe on the interactive map. When the customer has selected a suitable product for themselves, then they can book it. After booking, they receive a barcode, which must be shown at the restaurant to receive the “DoggyBag” set and to make the payment. “DoggyBag” does not participate in making payments and delivering goods and is acting only as an aggregator of information.

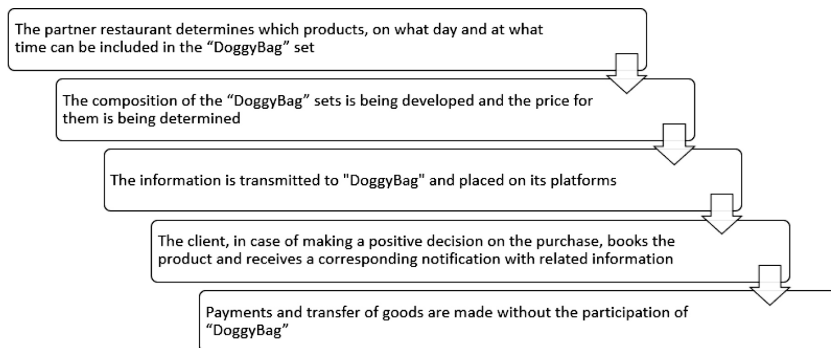


Figure 1. The algorithm of the company "DoggyBag"

At the same time, the partner restaurant independently determines the following:

- The composition of the "DoggyBag" set.
- The number of "DoggyBag" sets that are available on a fixed date.
- The discount level and the price for the "DoggyBag" set.
- The time when it is necessary to pick up the sets.

The principle of operation of "DoggyBag" has some similarities with the markdown procedure. They are both aimed at minimizing the supplier's losses [39], while the buyer receives a product of satisfactory quality at a discount. The difference is that the markdown procedure in food retail stores is applied to goods whose expiration date is ending, and "DoggyBag" operates with goods with a normal expiration date, which most likely will not be sold on time. That is, with the help of "DoggyBag", higher-quality goods are sold. Since the demand for each product can change from day to day, the founders of "DoggyBag" decided to sell sets with unknown content. Thus, the value proposition of this company consists in the sale of a random set of goods at a reduced price (as a rule, the discount percentage is at least 25%, standard discount is 60%). Accordingly, the target audience of "DoggyBag" are people with low income who want to diversify their consumption. Moreover, such people are modern, have a smartphone and are not poor, as they can afford food from a cafe (albeit at discounted prices).

In order to demonstrate the basic principles of the application and its benefits for customers, the authors paid a visit to one of the restaurants participating in "DoggyBag" platform. The "Cinnabon" cafe was chosen for the visit, located on 154 Engels Avenue in St. Petersburg (the visit took place on March 9, 2022).

Cinnabon is a well-known international bakery chain operating in 52 countries. In Russia, 183 establishments operate under this brand, the basis of the assortment of which is unique pastries. Cinnabon offers a “happy hours” discount: in the last hour of the cafe’s work, a 50% discount applies to all pastries every day. Let us compare the benefits of buying food from Cinnabon through “DoggyBag” and the “happy hours” discount (Table 4).

Table 4.

**Analysis of the benefits of different variants of purchase
of food from Sinnabon**

The “DoggyBag” set composition	Menu price (rubles)	The price of the “happy hours» promotion (rubles)	Price via «Doggy-Bag” (rub.)
Cinnabon classic (cinnamon bun)	230	115 (50% discount)	84 (60% discount)
Chokobon (chocolate bun)	240	120 (50% discount)	92 (60% discount)
Box	27	27 (no discount)	10,8 (60% discount)
Package	10	10 (no discount)	4 (60% discount)
Total price	497	272 (44% discount)	190,8 (60% discount)

As Table 4 shows, “DoggyBag” provided a 60% discount on all products included in the set, while the evening discount covers only pastries. The goods included in the set were of high quality, but the employee collected the order for takeaway. During the conversation with the cashier, the authors found that these kits are completed for takeaway, since they always include a box and a package. Moreover, drinks are never included in the “DoggyBag” sets. The cashier explained that the price of “DoggyBag” sets can change throughout the day, as well as their composition. But for a certain time interval (ranging from a few hours to a working day), the price should be fixed. This is due to the technical limitations of the “DoggyBag” application. Moreover, the client cannot book more than one set, and after the booking is completed, the client cannot view other sets (only the page with information about the booked set is available in the application). This is done in order to minimize the number of cases when customers do not come for their orders. Taking into account the collected information, we will compile, in which we will present the elements of decent consumption and discriminatory elements for customers who purchase food through “DoggyBag” in the Table 5.

“DoggyBag” helps people with low income (belonging to the social eaters group) can get a variety of delicious and high quality products (beyond basic food) with significant benefits. At the same time, the discriminatory elements

are minimal and do not create substantial inconveniences for the client: clients can ask employees to shift the order from takeaway to restaurant service and spend time in the cafe. Drinks can be purchased at the cafe (at full price) or purchased by a customer elsewhere.

Table 5.

Elements of decent consumption and discriminatory elements of “DoggyBag”

Elements of decent consumption	Discriminatory elements
<ul style="list-style-type: none"> - Quality food at a much better price. - Food from prestige brands. - Dishes sold through «DoggyBag» are not different from regular dishes. - Sets normally include several products; - An opportunity for the recipient of discounted products not to stand out from commercial consumers. - Products are provided in a fashionable restaurant (not in a charity). 	<ul style="list-style-type: none"> - Drinks are not included in the «Doggy-Bag» set. - There is no choice of meals. - Instability of the offer. - Focus on takeaway orders.

It should be noted that digital tools can be used when conducting mark-downs. Discounted goods can be sold not only in a traditional store, but also via Internet platforms [18]. Now, the most popular of them in Russia is “EatMe”, which exists as a digital platform represented by a mobile application and an Internet site. This platform is an aggregator of discounted goods from partner stores and partner catering establishments. The platform allows broad segments of the population to quickly get full information about promotions and discounts, which simplifies access to food at lower prices, and purchase and book these products through the platforms. Thus, a new model has been created that allows people to buy goods at lower prices via the Internet. This model integrates the traditional policy of retail enterprises to provide discounts on expired products with a platform business model.

The second case is “FreeCompany” (URL: <https://freecompany.org/>). This is a fast food chain that specializes in selling hot dogs and pizza. When this company was first created, its distinctive feature of this network is the provision of one free hot dog to everyone every day [28] subject to several conditions:

- Mandatory registration in the company’s mobile application (required to track the receipt of free products). Digital technologies are used to ensure control over the distribution of free food.

- The main product (a small hot dog) is offered free of charge. All additional products (toppings, drinks, etc.) are not free.

- People who receive free hot dogs should always wait until commercial customers are served.

The main advantage of this model for low-income customers is the opportunity to get food in a trendy cafe, not differing from commercial customers (this approach is important for a group of social eaters). Moreover, no one will stigmatize them for using a free product, because the company is proud of this promotion and actively uses it in advertising. The cost of free product consumption is the waiting time, because the company gives priority to paid products and prepares them faster. Moreover, it is quite difficult to eat fast food without a drink, which forces insolvent customers to buy a drink, but no one prevents them from bringing water or a bottle of soda.

Customers ordering a paid product can also use the mobile app to get it for free. For them, this is a bonus to the main order, which allows you to get a large portion of food for a similar amount of money. Moreover, customers can use the free product for tasting and subsequently order paid products for money.

However, over time, the promotion with a free hot dog was redesigned into a “wheel of fortune”, which works as follows:

- Instead of a hot dog, the customer can randomly get a slice of pizza, a small portion of salad, a small snack, a random cold or hot drink, water or muffin.
- No limit on the minimum order amount.
- A free product is issued 1 time in 7 minutes.

The described change in the loyalty program, in fact, indicates the company's rejection of the initially chosen concept of social marketing – instead of it, the strategy of gamification of the purchase process was chosen. Changing the composition of a free product by adding drinks and desserts allows us to talk about the company's attempts to create additional value for commercial customers (those who pay money for the purchase) due to the chance to save on dessert or drink, rather than the desire to feed those in need. However, the most significant limitation is the issuance of a promotional product once every 7 minutes (taking into account the company's work schedule from 10:00 to 0:00, 120 products are offered per day), that is, in fact, a strict limit of the company's costs for a promotional product is introduced, which was not when distributing free hot dogs.

Thus, the initial version of the company's promotion (giving out a free hot dog to everyone) could be considered as social marketing, despite the presence of discriminatory elements (small product size, long waiting time, lack of choice), the new version of the promotion, unfortunately, is designed to work with commercial customers. The obvious conclusion is the low suitability of commercial enterprises for solving social problems.

Freedog and DoggyBag projects demonstrate that the segment we described above (social eaters interested in access to high-quality food in fashionable restaurants at low price or for free) is attractive for restaurants. Restaurants are offering food to this segment in order to reach the following goals:

- Build up a good social image (equal access to food for everybody);
- Attracting new customers and increasing sales. Even when people get meals at a discounted price, they may wish to buy additional meals (as the products included in the offer are not sufficient to satisfy all food needs);
- Reducing risks of food waste.

These conclusions demonstrate that approach towards food security has changed:

- Commercial businesses participate in ensuring food security;
- Unlike traditional food security agents (charities and the state), businesses use food security tools as a support for their commercial goals;
- Businesses participating in food security provision are mostly oriented towards social eaters;
- Social eaters became an important group whose requirements in the field of food security (food should be not only sufficient, but also socially accepted and fashionable) should be taken into account.

Businesses should find a balance between decent consumption tools and discriminatory elements in order to provide equal access to food for social eaters and ensure rentability.

5. The phenomenon of food sharing: self-organization of customers

The digital transformation of modern society allows for the self-organized distribution of surplus food between owners of these surpluses and people in need. It should be noted that both the people in need and the surplus owners are interested in such self-organization [4]. Environmental (respect for the environment) and social (ensuring equality and a decent life for all) values are becoming increasingly important for the modern society [1, 3, 22, 43]. The emergence of food surpluses hinders the achievement of these values. The disposal of food pollutes the environment, in addition, the disposal of food in a situation where a significant part of the population does not have access to the necessary nutrition can be considered as a manifestation of social injustice. For this reason, the possibility of distributing surplus products allows their owners to comply with important environmental and social values [30, 37, 43]. People with low income are obviously interested in distribution of food surpluses as this tool provides them with access to food. This common interest led to emergence of new models of distribution of food based on self-organization supported by digital technologies.

Specialized groups began to appear on the Internet (in social media and messengers), in which people offer to pick up food or household goods for free. These groups are platforms that act as digital intermediaries between owners of surplus food and people in need [6]. This group can often be local (at the level of a district or a city). This model of product distribution is called food sharing [3, 7, 38, 40, 44]. Because the transaction is conducted between two individuals, this food sharing model can be called C2C food sharing. Let us consider its features:

- Products are transferred free of charge.
- Communication is conducted in a digital environment.
- The products must be suitable for consumption.
- People should not take more food than they can consume.
- Products transferred by food sharing cannot be resold after receipt.
- The person who picks up the products can be of any age and have any income level.

The mechanism of interaction in these food sharing groups is extremely simple. Persons who want to share a product put ads in these groups indicating model of contact (usually through comments to the ad or personal messages). People who would like to pick up this product respond to the ad in a specified way. Then they agree on the time and place of delivery of the product.

Advantages and disadvantages of this self-organized food sharing for both sides are presented in the Table 6.

Table 6.

Stakeholder analysis of C2C food sharing

	Advantages	Disadvantages
For providers	- Reduction of food waste - Assistance to people in need	- Waste of personal time
For receivers	- Free food - Choice of food	- Pick-up (transportation and time cost may be high) - Access to Internet is necessary - The quality of food is not guaranteed - Instability of the offer (information about available products is published irregularly)

As Table 6 shows, food providers do not receive financial benefits from participation in food sharing. This participation is tied to the personal social responsibility of citizens (the desire to help people in need or to protect the environment). Such social communications require additional time, but lead to

personal emotional satisfaction. It should be noted that some people may use food sharing to assert themselves in society (that is, to demonstrate their social and environmental responsibility).

The benefits for the people in need consist in the possibility of obtaining additional and free food. Receivers can also choose these products, which makes it possible to diversify the diet (especially taking into account the fact that sometimes expiring, but suitable for consumption food from shops and restaurants is also distributed in these groups) [1]. It is an important advantage as people in need usually have access to a very limited choice of food. However, the quality of food is not guaranteed. Providers not only distributed the food purchased from stores and restaurants, but also give meals they cooked but had no possibility to eat. Obviously, the quality and the taste of these meals cannot be standardized. Moreover, receivers have to pick up food and the transportation and time cost can be high (it obviously creates limits for access to food). There is no fixed place of meeting for providers and receivers and each transaction is agreed upon separately (including place and time of meeting). Receivers have to go to a new place every time they participate in food sharing. It increases transaction costs for receivers (as well as for providers) in comparison with traditional food banks.

Food sharing is not a widespread practice, however, it demonstrates that people may be active participants of food security system and provide people in need with surplus food. This active participation is based on self-organization which may be an important trend of transformation of food security system. Probably the state should support various forms of self-organization [23] in order to create incentives for more active participation in food sharing and to make interactions within self-organized communities more transparent [14, 19].

Discussion

As we demonstrated, the approach towards food security has substantially changed over the last decades thanks to expansion of digital technologies, emergence of new values (beyond traditional commercial goals and selfish interests) and self-organization. These transformations are presented in the table 7.

We should pay special attention to the transformation of roles of stakeholders of food security system. Examples of this transformation include:

- State-run food retail chains – the state shifts from the role of regulator and provider of financial support to people in need to the role of an active participant of food distribution system (this role is traditionally played by food retail chains);

- Commercial businesses go beyond sales and start providing access to food for free or at discounted prices. It introduces an element of charity into their business models;
- Customers, whose role has traditionally been limited to purchase of food, are becoming active food providers to people in need as they distribute excess food. This transformation is enabled by new ecological and social values as well as by digital technologies.

Table 7.

Evolution of food security

Traditional approach towards food security		New approach towards food security	
Income-based concept of food insecurity	Food support should be provided to people who have no access to food on market terms	Social concept of food insecurity	Social and emotional conditions of access to food should be taken into account
Single goal approach towards food security	The only goal of food security agents (charities, food banks etc) is to provide people with access to food	Multiple goal approach towards food security	Food security agents, along with access to food, should achieve other goals (commercial, environmental etc)
Single stakeholder role	Each stakeholder of the food security system has a single specific role	Complex stakeholder roles	Stakeholders of food security system should perform functions typical for other stakeholders

It means that the system of food security is becoming hybrid. This hybridity helps to increase efficiency of food provision as it helps to combine resources of different stakeholders. While the hybridization is now emerging naturally (as well as other features of the new approach towards food security presented in the table 8), it should be carefully analyzed in order to design a new hybrid system of food security and to develop a strategy of transition towards this new system. It should be noted that this hybridization of the food security system based on hybrid roles of stakeholders corresponds to current trends of evolution of economic organizations where stakeholders can perform various roles [24].

New food security system should also take into account the social concept of food security and multiple goal approach. It would ensure decent consumption for different groups of people in need and contribute to other important values (food waste reduction etc.).

Conclusion

The contribution of the present paper to the literature on food security is twofold. First, we demonstrate that, in addition to physical needs, social and emotional needs related to food consumption should be taken into account. Moreover, a new group of people whose food-related needs are not satisfied is identified. We describe this group as social eaters. These users have enough money to purchase basic food (or have other ways of access to food – for example, students who live with their parents), but cannot consume the food in the way they like. They cannot purchase more expensive or more prestigious food (for example, in restaurants). In other words, their models of food consumption do not correspond to their criteria of social acceptance. We demonstrate that specific needs of these people should be taken into account in food security models and that new business models emerge that are oriented towards these audiences.

Second, the role of digital tools in transformation of food security models should not be overestimated. An important trend of evolution of food security systems consists in transformation of roles of their stakeholders. Digital technologies (which are often considered the key factor of evolution of food security systems) only provide a support for this transformation. It means that these organizational developments should be included into new models of food security in order to more efficiently use limited resources and to provide people with a more equal access to food.

In our opinion, new food security systems should be hybrid. This hybridity includes:

- Hybrid approach towards the concept of food security (access to food should be oriented towards satisfaction of physiological, social and emotional needs);
- Hybrid goals of stakeholders of food security systems (in addition to access to food, they may achieve ecological, commercial etc. goals);
- Hybrid roles of stakeholders of food security systems (stakeholders may solve tasks that have traditionally been performed by other stakeholders).

Stakeholders of food security systems should find an effective balance within these hybrid models in order to ensure their own efficiency and to provide people with a guaranteed access to food. Developing recommendations to find this balance is an important direction of further research.

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