

# Transforming regional infrastructure in food trade and catering as the economy is digitalized

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**Abstract.** One of the goals of sustainable development of the world economy is to reduce per capita food waste in food trade and catering. The transformation of regional infrastructure in food trade and catering should significantly affect the solution for this problem in production and supply chains in Russia as its economy is digitalized. A study of creation and operation of a regional information platform of food trade and catering at the retail and consumer levels, which should be built using end-to-end digital technologies to provide to the consumers information about products with limited sale times from food stores and catering organizations, is becoming particularly important in this process.

## 1 Introduction

Mastering technological, organizational and marketing innovations by the global community opens up more and more opportunities to meet the first human need—the one in food. However, this process is accompanied by growing food consumption, and, respectively, an increase in food waste generation, since the amount of food produced exceeds the amount required. Which is why it is no coincidence that in the Presidential Decree “On the national goals and strategic objectives for the development of the Russian Federation for the period up to 2024” one of the strategic objectives and the factor of ensuring economic growth is “... efficient management of waste from production and consumption” [1].

It should be noted that in terms of danger food waste is the “safest”, classified as a fifth-class hazard. But because of its natural composition, accumulating in dumpsters and then on landfills, it starts releasing landfill gas, which in many ways affects the world's global warming. In addition, food waste in municipal solid waste (further abbreviated as MSW) is mixed with valuable types of waste such as paper, cardboard, plastic, which does not allow for high-quality sorting and further processing of the latter, making it extremely tedious. The amount of food waste generation in Russia is significant. For example, according to A.V. Volkova [2], today in Russia more than 90% of the MSW is located in landfills, not getting to processing, and about 35% of it, or 17 million tons per year, are occupied by food waste.

However, this negative situation due to its acuteness and world trends emerging in this area, in Russia is beginning to change for the better. According to the national project "Ecology", by 2024 the share of MSW arriving for processing (sorting) should grow from 12% in 2019 to 60% by 2024, and for recycling—from 7% to 36% respectively [3].

## 2 Methods

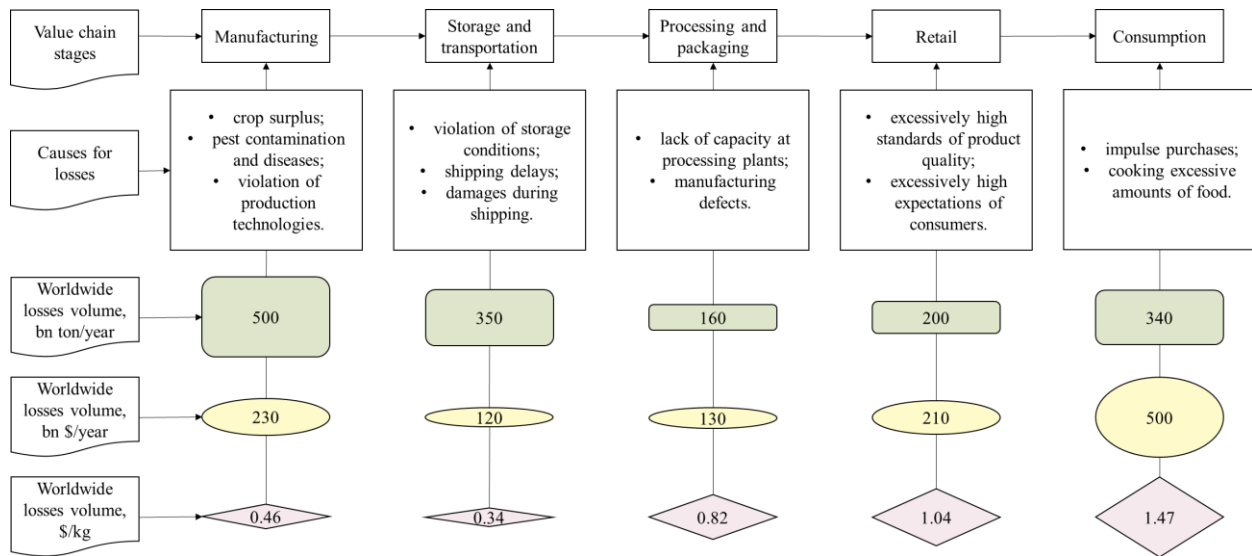
Analysis of the existing practice of fighting environmental pollution in Russia and abroad shows that several directions have been formed to solve the problem set in the national project. Historically, the older one is burning and dumping garbage at landfills. First quasi-state cities were surrounded by similar landfills, and they still accompany modern megacities and small villages.

The second direction, the younger one, formed as the industry developed, was separate collection of unused goods for further processing in order to obtain recycled materials. In the 19th and 20th centuries, the streets of Russian cities were visited by junkmen in their wagons, collecting paper, out of use fabric products, aluminum and copper tableware, utensils and other items in exchange for matches, salt, simple toys and such. In the 80s of the 20th century in our country they were replaced by stationary waste-paper reception points, where it was exchanged for coupons for the purchase of scarce fiction books. In the second half of the 20th century, containers for separate collection of garbage: tin cans, glass, plastic, paper and other for further recycling for secondary raw materials, appeared in European cities.

However, in the 20th century, a third direction is beginning to emerge: the judicious use of food waste. In the USSR, due to the large shortage of food, residents of apartment buildings placed food waste in special containers, and utility workers sent their contents daily to farms or enterprises for fattening livestock. In fact, it was the first and quite effective instance of implementation of “... the productive use of material resources involved in economic turnover,” the essence of which was revealed in more detail in [4].

Today, this practice has been forgotten, and food waste is being formed throughout the food chain: in

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**Fig. 1.** Scheme of food losses in the food value chain. Developed by authors using data from [5].

food-producing enterprises, in the retail chain and in households.

In the Figure 1 authors have systemized data of the Food and Agriculture Organization of the United Nations [5] on losses across the food production and consumption chain in 2015. In general, their annual value in the world was 1,550 million tons worth \$1,190 million. At the same time, the largest share of the annual cost of food losses and food waste in producer prices per kilogram was accounted for the retail and consumption segments. When comparing the volume of losses per 1 ton of food with world wheat prices (according to the source [6] in September 2015, the price of FOB Gulf of Mexico was 163.8 \$/ton), the picture turns out to be depressing. It is no coincidence that one of the UN's sustainable development goals is to halve by 2030 global food waste per capita at retail and consumer levels and to reduce the food losses in production and supply chains [7]. The main reasons for this situation are indicated by the stages of food production and consumption.

### 3 Results

How to balance the production and consumption of food in the market economy, when economic entities are not bound by rigid planning tasks, as was the case in the policy economy?

One of the mechanisms for solving the above problem was the adoption in 2018 of Federal Law No. 446-FZ, under which “trade networks and suppliers are prohibited from forming contracts that contain a condition for returning to the supplier of goods, which have an expiration date of up to 30 days, either to be replaced with the same goods or to recover their value, unless the other is permitted by law. In addition, it is prohibited to impose conditions on the counterparty to return goods for which the expiration date is set for more than 30 days, unless the return of such goods is permitted by law” [8]. Thus, the state has put a serious

barrier aimed to reduce the production of unclaimed products.

Western countries now have a more serious set of effective tools to prevent the formation of food waste, the contents of which are disclosed in the works of such foreign authors as: Buseti Simone—on the redistribution of food after the best before date (BBD) in Italy [9]; Janssens Kim et al.—on the impact of consumer behaviour on daily food production [10]; Schanes Karin, Stagl Sigrid—on the development of the food sharing initiative, which aims to collect food from various suppliers, instead of throwing it away and treating as waste, and then to share food free of charge with different groups of the population [11]; Halloran Afton et al.—on the feasibility of moving from incineration of food waste to using it as raw materials in biogas and compost production [12]. Similar movements are emerging in Russia [13, 14].

It is obvious that in the context of the development of the information society [15], a regional information platform of food trade and catering (RIP FTC) should become another tool for reducing food losses and food waste as one of the structural components of the complex regional digital platform. In [16] as the latter, the authors understand “... a digital resource that enables the interaction and unification of state and municipal governments, high-tech businesses, scientific and educational organizations aimed to harness strategic potential of digital transformation of the territory for its socio-economic development through the exchange of large amounts of data.”

### 4 Discussion

The creation of the RIP FTC will enable the transformation of the relevant segment of regional infrastructure through the use of end-to-end digital technologies to provide to the consumers information about products with limited sale times. The RIP FTC

will collect, process, store and transfer information from retail stores, cafes, restaurants and other catering facilities to further group it and provide it to potential buyers: low-income population; farms that feed livestock; social shelters; animal shelters; zoos and businesses that process expired food products into manufactured goods.

The novelty of the proposed approach, in contrast to the launch of well-known Western mobile applications like Karma, ResQ Club, Too Good To Go and Russian “eatme”, information in which is available only to smartphone owners, is that the information from the RIP FTC platform should be available to every person using the Internet.

The RIP FTC configuration should be structured in the most convenient way for users, both transmitting the information and using it, by clearly systematizing the status of the products on offer through the stages of their beneficial use with an operational change over time of these stages. And this requires the compliance of organizations to certain technical requirements when processing large amounts of information.

Naturally, there is a question of sources of funding for this project. In our opinion, PPP mechanisms should be used to motivate the implementation of the economic and social interests of partners in the formation of the recommended regional information platform in the field of food trade and catering, including with the active support of the territorial authorities and environmentally-oriented social organizations taking up the coordination role.

## 5 Conclusion

The authors' study of the current problems and trends of regional infrastructure transformation in food trade and catering as the economy is digitalized allows to draw the following conclusions.

Firstly, inclusive and sustainable growth in the regional economy requires increased attention to the use of new tools that can reduce food losses and food waste, as well as to address the challenges of digital transformation.

Secondly, as such a tool, the authors' study proposes to use a regional information platform in food trade and catering, which should be built on qualitatively new digital transformations of production, management and marketing business processes, capable of exchanging large amounts of data and bringing to the consumer current information about food products with limited sales times.

Thirdly, the study creates new opportunities for digital transformation of regional infrastructure in order to significantly reduce food losses and food waste and can be used in the development and implementation of environmental projects by the Russian Federation's subjects.

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