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Food Security of Region as Component of Economic Security

Seguridad alimentaria regional como componente de seguridad económica

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Content

ABSTRACT:

The article offers a hypothesis that the problem of food security is common for developed and developing regions, is connected to ineffectiveness of existing model of food security, and can be solved by development of a new model. The purpose of the article is to verify the offered hypothesis, conduct the analysis of the problem of provision of food security of various regions of the world, and search for its solution. In order to achieve this purpose, the authors use the proprietary methodology of evaluation of food security of region. As a result of evaluation of food security of various regions of the world with the help of the developed methodology, it was found that the problem of food security is common for developed and developing countries, and the key causes of this problem and drawbacks of existing model of provision of food security of the region were determined. The main result of the research is development of a new model of provision of food security of the region, based on the mechanism of import substitution. For successful realization of this model, a special algorithm was developed, which is fit for all countries and allows choosing the most optimal type of import substitution and the most effective tools of state support for food production in view of current conditions and risks.
Keywords: socio-economic systems, economic

RESUMEN:

El artículo ofrece una hipótesis de que el problema de la seguridad alimentaria es común en las regiones desarrolladas o en desarrollo y está relacionadao con la ineficacia del modelo existente de seguridad alimentaria, y puede resolverse mediante el desarrollo de un nuevo modelo. El propósito del artículo es verificar la hipótesis ofrecida, realizar el análisis del problema de provisión de la seguridad alimentaria de varias regiones del mundo, y buscar su solución. Para lograr este propósito, los autores utilizan la metodología propietaria de evaluación de la seguridad alimentaria de la región. Como resultado de la evaluación de la seguridad alimentaria de varias regiones del mundo con la ayuda de la metodología desarrollada, se constató que el problema de la seguridad alimentaria es común para los países desarrollados y en desarrollo, y las causas clave de este problema y los inconvenientes de se determinó el modelo existente de suministro de la seguridad alimentaria de la región. El principal resultado de la investigación es el desarrollo de un nuevo modelo de provisión de la seguridad alimentaria de la región, basado en el mecanismo de sustitución de importaciones. Para la realización exitosa de este modelo, se ha desarrollado un algoritmo especial, que es apto para todos los países y permite elegir el tipo más óptimo de sustitución de importaciones y las

herramientas más eficaces de apoyo estatal para la producción de alimentos en vista de la actual condiciones y riesgos.
Palabras clave: sistemas socioeconómicos, seguridad económica, seguridad alimentaria, región, sustitución de importaciones.

1. Introduction

An actual phenomenon of modern global economy is a high level of regionalization of economy. This leads to formation of separate socio-economic systems – regions. Regional systems possess larger flexibility and mobility than national systems, which increases their effectiveness under the conditions of development of the global economy according to market type and allows coping successfully with issues of provision of economic security (Mazaeva and Rogachev, 2012).

Under the influence of the processes of globalization and integration of socio-economic systems, the level of interdependence of various regions grows, which, on the one hand, creates conditions for specialization and division of labor, but, on the other hand, poses a threat for economic security, as excessive dependence on import may lead to loss of sovereignty of region (Rogachev and Shokhnekh, 2015).

One of the most serious problems of economic security is the problem of food security, which is strategic and considered to be one of the key priorities of development of modern economic systems (Rogachev & Fedorova, 2014). This article offers a hypothesis that the problem of food security is common for developed and developing regions, is connected to ineffectiveness of existing model of food security, and can be solved by development of a new model.

The purpose of the article is to verify the offered hypothesis, conduct the analysis of the problem of provision of food security of various regions of the world, and search for its solution. Achievement of the set goal supposes solving the following tasks:

> determination of the problem of food security in economically developed and developing regions;

> analysis of causes of the problem of food security in various regions of the world;

> development of a new model, which allows solving the problem of food security in various regions of the world.

2. Materials and method

Theoretical foundation of the research includes the works of such scientists as (Garthwaite et al., 2015), (He, 2015), (Jacknowit et al., 2015), (Maitra and Rao, 2015), (Skiter et al., 2015), (Bannikova et al., 2015), etc. Analysis of the above research showed that at present, despite a great number of studies of theoretical and methodological character in the sphere of food security, there is no common methodology of evaluation of food security of region (Rogachev, 2013). That's why, the following methodology is offered:

$$FS_{region} = FI_{region} + SF_{region} \qquad (1)$$

where FI_{region} – food independence of region;

SF_{region} – region's capability for self-provision of food.

As is seen from formula (1), food security of the region is a sum of indicator of food security of region and indicator of region's capability for self-provision of food. Indicator of food independence of region is calculated according to the following formula:

$$FI_{region} = S_{food} / I_{food} \tag{2}$$

where S_{food}– volume of food production in region;

I_{food} – volume of food import into the region.

As is seen from formula (2), food independence of the region is determined by ratio of food production in the region to volume of food import into the region. Indicator of region's capability for food self-provision is calculates according to the following formula:

$$SF_{region} = S_{food} / D_{food} \tag{3}$$

where D_{food} – volume of food consumption in the region.

As is seen from formula (3), region's capability for food self-provision is determined by ratio of volume of food consumption in the region to volume of food production in the region. The indicators are evaluated with the help of a special scale (Table 1).

Table 1
Scale for evaluation of indicators of food security of region

Indicators	Indicators values				
	Critical	Bad	Normal	Good	Ideal
FS_{region}	<0.8	0.8-1.6	1.6-1.8	1.8-2.0	>2.0
FI_{region}	<0.4	0.4-0.8	0.8-0.9	0.9-1.0	>1.0
$SF_{pregion}$	<0.4	0.4-0.8	0.8-0.9	0.9-1.0	>1.0

As is seen from Table 1, the scale has five intervals, which are highlighted in color. It should be noted that indicator of region's food security hitting yellow, blue, or green zone should be accompanied by of both indicators of food security of the region and region's capability for self-provision of food hitting one of these zones, as, in opposite case, there would be a threat to economic security of the region.

Within the given methodology, all indicators are calculated for a certain period (year). The developed methodology also allows conducting analysis of the dynamics of changes of indicators over several years or forecasting changes of indicators in future. The methodology also allows comparing the level of food security of various regions.

3. Results

In order to determine the presence and causes of emergence of the problem of food security in various regions of the world, the authors of this research conducted evaluation of food security with the help of the developed methodology in the countries of Europe, America, Africa, and Asia, the results of which are generalized in Table 2.

Table 2
Results of evaluation of indicators of food security in various regions of the world

Regions	Indicators in regions of the world		
	FS_{region}	FI_{region}	FS_{region}
Europe	1.7	0.7	1.0
America	1.7	0.8	0.9
Africa	0.8	0.5	0.3
Asia	1.6	0.9	0.7

As the results of the analysis show, in all studied regions there is a problem of food security, the sources of which lie in the fact that existing model of food security supposes setting the priorities in the favor of economic effectiveness, which is achieved by means of work of mechanism of labor division and international production specialization.
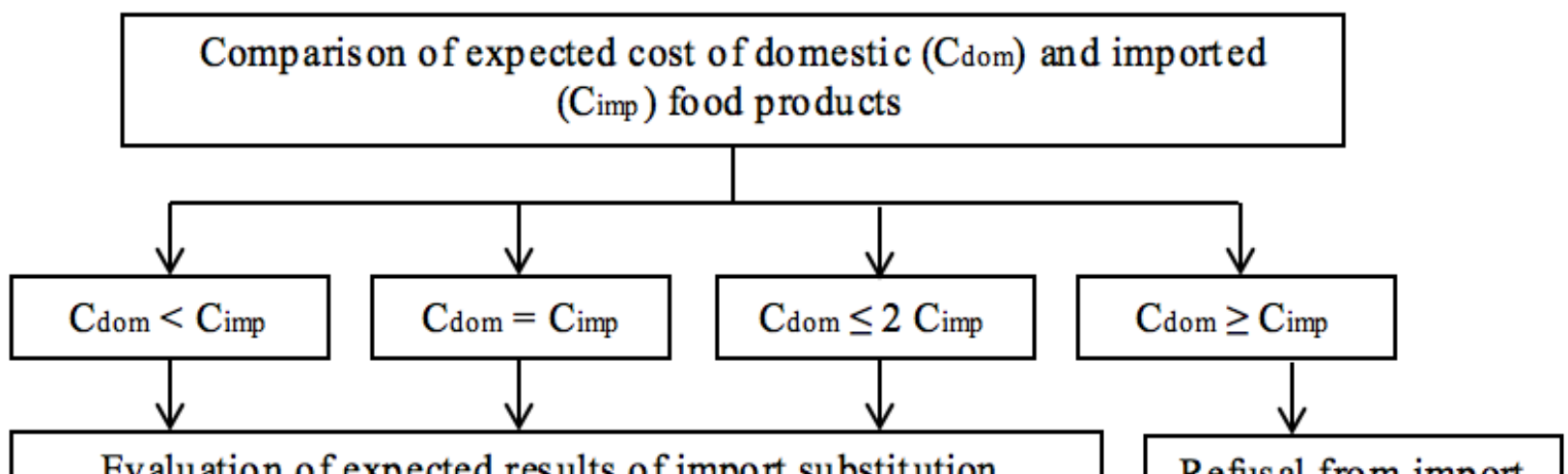
However, an inevitable result of using this model is division of regions of the world into regions that specialize in food and regions that import food, which leads to emergence of the problem of food security in most regions of the world which do not have favorable conditions for manufacture of food and import it (Rogachev, 2009). Key principles of emergence and deepening of the problem of food security are the following:
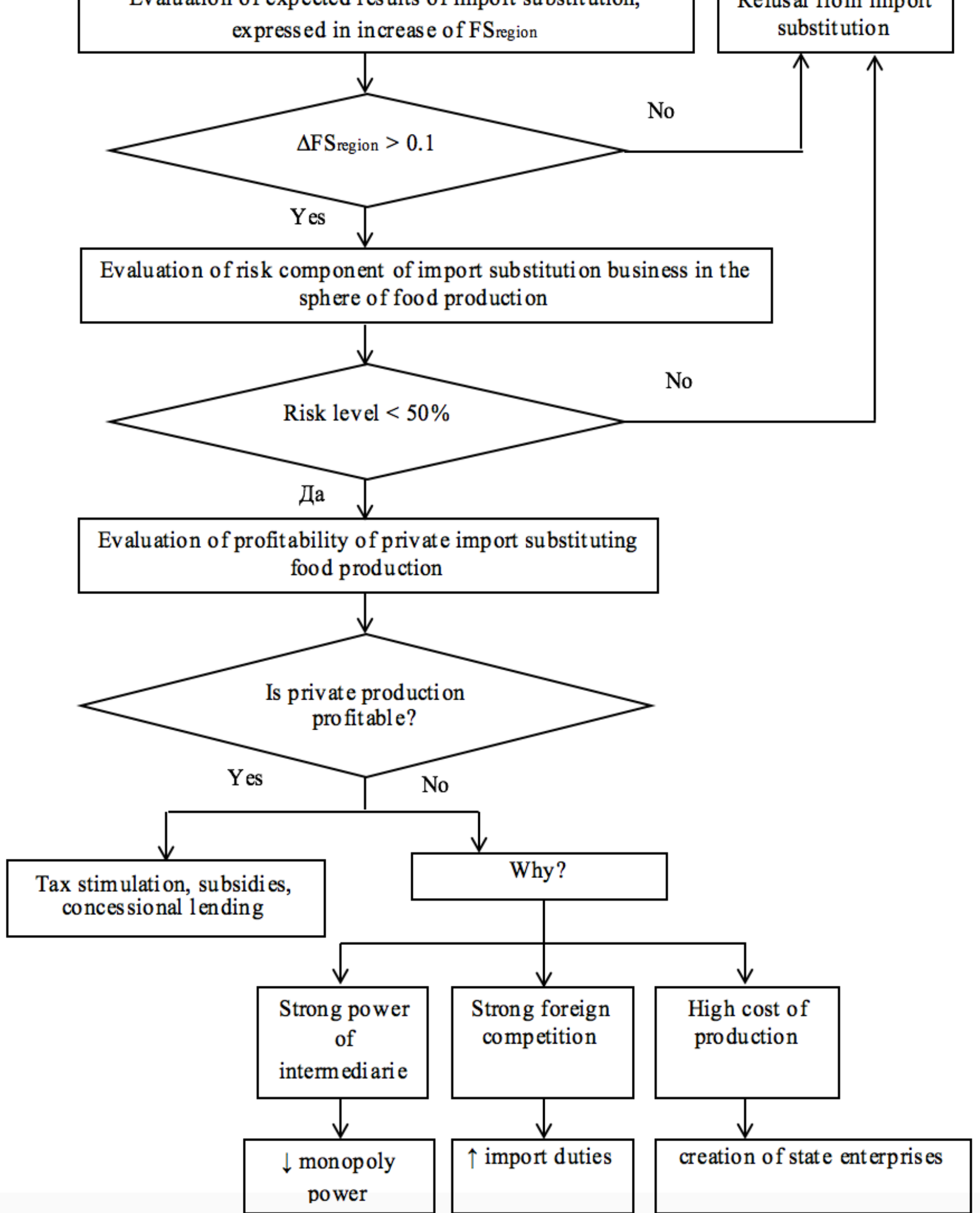
> growth of demand for food – constant growth of the number of population, peculiar for many regions of the world, leads to growth of need for food (Rogachev & Protsyuk, 2013);

> low accessibility of food – low level of life of population in many regions of the world causes high cost of food (Rogachev & Mazaeva, 2015);

> non-conformity of demand growth to possibilities of food offer – in many regions of the world, conditions for food production are unfavorable, which is caused by peculiarities of climate, etc. (Mazaeva & Rogachev, 2015);

> incapability for self-provision of food – in many regions of the world, there is an excess of food demand over its offer (Rogachev, 2015).

In order to solve the above problems, this research offers a new model of food security of region. The offered model is based on the mechanism of import substitution, which allows reducing the dependence of region from food import and develop domestic food production.

The tools for implementation of the given mechanism are creation of state enterprises for food production and state stimulation of food production by private enterprises (Rogachev et a., 2015). Implementation of the offered model of food security of region should be conducted with the help of the following algorithm (Fig. 1)

Figure 1
Algorithm of realization of the model of region's food security

Comparison of expected cost of domestic (C_{dom}) and imported (C_{imp}) food products

$C_{dom} < C_{imp}$	$C_{dom} = C_{imp}$	$C_{dom} \leq 2\, C_{imp}$	$C_{dom} \geq C_{imp}$

Evaluation of expected results of import substitution   Refusal from import

Evaluation of expected results of import substitution, expressed in increase of FS$_{region}$

Refusal from import substitution

$\Delta FS_{region} > 0.1$

No

Yes

Evaluation of risk component of import substitution business in the sphere of food production

Risk level < 50%

No

Да

Evaluation of profitability of private import substituting food production

Is private production profitable?

Yes

No

Tax stimulation, subsidies, concessional lending

Why?

Strong power of intermediarie

Strong foreign competition

High cost of production

↓ monopoly power

↑ import duties

creation of state enterprises

As is seen from Fig. 1, the given algorithm supposes stage-by-stage realization of the model of food security of region. The first stage includes evaluation of economic effectiveness of import substitution. If the expected cost of domestic food products is twice higher than cost of

imported products, it is necessary to refuse from import substitution.

The second stage includes evaluation of effect from import substitution. If import substitution increase the level of region's food security by more than 0.1, it is necessary to pass to the next stage which includes evaluation of import substitution risks. If the risk component of import substituting business activities of food production is lower than 50%, it is necessary to pass to the next stage (Popkova et al., 2015a).

It should be noted that there are many risks of food production, among which are crop failure, mass epidemic of cattle, growth of prices for forage and fertilizers, etc. The next stage includes selection of the import substitution type. If private business in the sphere of food production is profitable, it is advisable to stimulate it with the help of tax subsidies, concessional lending, and subsidies (Popkova et al., 2015b).

If private business is not profitable, it is necessary to either eliminate the reason – increasing the level of intermediaries' competition, reducing their power, and developing sales of food products – or increase import taxes, this reducing foreign competition. If it is impossible, and the reason is high cost of production, it is necessary to create state import substituting enterprises for manufacture of food products.

4. Conclusion

As a result of the research, the offered hypothesis was proved, and it was determined that the problem of food security is common for developed and developing regions, is connected to ineffectiveness of existing model of food security, and can be solved by development of a new model. The following key aspects of food security in economically developed and developing regions were determined: growth of demand for food, low accessibility of food, non-conformity of demand growth to possibilities of food offer, and incapability for self-provision of food.

The developed model, based on import substitution, allows solving the problem of food security in various regions of the world. The developed algorithm of realization of the model of food security of the region allows successively evaluating the expediency of import substitution and choosing its optimal type. As a result of realization of the developed model, there is increase of possibilities and volume of food offer in the region, increases of capability for food self-provision of the region, and reduction of region's dependence on food import, which allows solving the problem of food security of the region and increasing its economic security.

The developed model of food security is based on the mechanism of import substitution, which is unacceptable for certain regions, which is a certain limitation of this research. That's why development of new and universal mechanisms of the increase of food security of the region is a perspective direction for further research.

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