

Saparbayev A.D.

# T RANSPORT LOGISTICS IN THE GRAIN PROCESSING INDUSTRY



Monograph

**TRANSPORT LOGISTICS IN THE  
GRAIN PROCESSING INDUSTRY**

**SAPARBAYEV A.D.**

*(monograph)*

Almaty 2020

**3**

**..5**

**1  
..7**

**..7**

**14  
20**

**29**

**35**

**39**

**39**

**52**

**64**

**74**

**74**

**77**

**82**

**88**

**92**

**97**

**10**

**15**

**15**

**27**

UDC 656:633.1  
LLC 39.18:42.11  
S 21

Recommended for publication by the Academic Council of the Academy Kainar.  
(Minutes № 1 dated 03.09.2019)

S 21 **Saparbayev A.D. Transport logistics in the grain processing industry.** – Almaty:  
LTD Fortuna Polygraph, 2020. – 218 p.

ISBN 978-601-329-139-0

The scientific monograph sets out the main problems of a systematic approach to the problem of the development of transport logistics in the grain processing complex. Attention is focused on the development of a scientific basis for the formation of transport logistics flows based on the development of grain production in the integrated interconnected field-harvesting-process-market system. The article presents complex dynamic models for yield forecasting, optimization models for the use of transport resources, transportation of grain and grain products, distribution of investments, models of territorial price equilibrium during grain transportation and interactive technology of optimization calculations in the grain product complex.

In general, the monograph is devoted to the problems of the formation of a transport stream of grain and grain products based on the use of complex economic and mathematical models that solve the economic problems of the bread-baking industry and build a toolkit of optimization calculations for individuals applying regional-level solutions.

The monograph is addressed to both theorists and practitioners studying the economic problems of the production infrastructure of the transport logistics of the grain-processing agro-industrial complex.

Reviewers:

Academician of the National Academy of Sciences of the Republic of Kazakhstan,  
Doctor of Economics, Professor **Grigoruk V.V.**

Academician of the National Academy of Sciences of the Republic of Kazakhstan,  
Doctor of Economics, Professor **Iztayev A.I.**

UDC 656:633.1  
LLC 39.18:42.11

ISBN 978-601-329-139-0

© Saparbayev A.D., 2020  
© LTD Fortuna Polygraph, 2020



## CONTENTS

<b>INTRODUCTION.....</b>	<b>5</b>
<b>CHAPTER 1. Problems of formation of an effective transport stream in the integrated system of grain processing industries of the agroindustrial complex .....</b>	<b>7</b>
1.1. Transport as the main branch of the industrial infrastructure of grain processing industries.....	7
1.2. About the system approach to the development of transport in the grain processing industry .....	14
1.3. The current state of grain production and maintenance of its vehicles .....	20
1.4. The role of economic and mathematical methods in improving the efficiency of grain production and increasing the efficiency of their service vehicles .....	29
1.5. The main directions of technology to optimize the development of the use of transport systems in the grain processing industry .....	35
<b>CHAPTER 2. Basics of transportation logistics management at grain processing industries of the agroindustrial complex .....</b>	<b>39</b>
2.1. Features of the formation of the transport and logistics system in the grain processing industries .....	39
2.2. Management of product transportation based on the logistic function in the activities of grain processing enterprises.....	52
2.3. Logistics management as an innovative toolkit for sustainable development of grain processing enterprises.....	64
<b>CHAPTER 3. Scientific basis for the formation of traffic flows based on the development of grain production .....</b>	<b>74</b>
3.1. Development of multifactor regression models for predicting the yield of grain crops .....	74
3.2 Economic and mathematical models of land distribution land for grain crops .....	77
3.3 Mathematical model of optimal distribution fertilizers in grain production.....	82
3.4 Mathematical model for determining the needs of vehicles for servicing work in the system "field-procurement" .....	88
3.5 Models of the use of machine and tractor fleet in the chemicalization of grain crops .....	92
3.6 Agricultural aviation use patterns for chemical work.....	97
3.7 Stochastic model of agricultural aviation use.....	110
<b>CHAPTER 4. Model assessment of the transport and logistics system of grain processing industries .....</b>	<b>115</b>
4.1. Models of grain transportation in the integrated system of grain processing industries.....	115
4.2. Economic and mathematical model of the supply of grain and grain products in a comprehensive system of grain processing industries .....	127

4.3. Stochastic model of investment distribution in the integrated system of grain-processing industries.....	139
4.4. Method of calculating the economic efficiency of the use of vehicles in the system of grain processing industries.....	144
<b>CHAPTER 5. Optimization models of regional price equilibrium in the transportation of grain and grain products .....</b>	<b>157</b>
5.1. Models of price equilibrium during transportation of grain in grain processing industries.....	157
5.2 Mathematical model of price equilibrium in the supply of grain products.....	169
5.3 Optimization models of territorial price equilibrium during the transportation of grain and grain products in the system of grain processing industries.....	174
<b>CHAPTER 6. Digital technology for optimization calculations of transport and logistics systems in grain processing .....</b>	<b>182</b>
6.1 Principles of construction and software implementation capabilities .....	182
6.2 Specialized dialogue complex for solving the problem of optimal use of transport and logistics systems in the grain processing industry .....	195
6.3 The effectiveness of the use of the dialogue complex in the optimization calculations .....	205
<b>CONCLUSION .....</b>	<b>210</b>
<b>IBLIOGRAPHY.....</b>	<b>212</b>

**Saparbayev A.D.**

**TRANSPORT LOGISTICS IN THE GRAIN  
PROCESSING INDUSTRY**

*(monograph)*

*Computer imposing: Akylova A.T.*

*Design: Akylova A.T.*

Passed for the press 03.01.2020. Format 70x100 $\frac{1}{8}$ .  
Volume is printed pages 27,2. Circulation is 500 copies.  
LTD "Publishing House Fortuna Polygraph"  
Almaty, Saina street,81

*Tel: 8(727) 276 02 75, 8 701 787 32 92*