

# Research on the Problem of Urban and Rural Overall Development in Yanzhou District Based on Nonlinear Dynamic System

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**Abstract:** Based on the theoretical knowledge of differential equation, this paper constructs a model of urban and rural overall development of nonlinear dynamic system, and combines the theoretical research and empirical application with the actual situation of Yanzhou district. Build the system flow chart of talent and resource flow. On this basis, the system dynamics simulation analysis is carried out. With the help of the model and analysis results, the development process and current situation of urban-rural integration in Yanzhou district are further analyzed, the problems in the process of integration in Yanzhou district are solved, and the scientific development of urban-rural relationship in Yanzhou district is promoted..

**Keywords:** *Differential Equation, Nonlinear Dynamic System, Urban And Rural Overall Development Model*

## I. INTRODUCTION

The long-term urban-rural dual system has led to the unbalanced development of urban and rural economy, and the gap between urban and rural development is obvious, which is in the trend of further expansion. At present, human society is gradually transiting from the era of industrialization to the era of information technology. As the hub of the global economic development system, cities are playing a very important role. The integrated development of urban and rural industries is helpful to eliminate the dual structure of urban and rural areas and realize the integrated development of urban and rural areas.

Based on the theoretical knowledge of differential equation, this paper constructs a model of urban and rural overall development of nonlinear dynamic system, and combines the theoretical research and empirical application with the actual situation of Yanzhou district. Build the system flow chart of talent and resource flow. On this basis, the system dynamics simulation analysis is carried out. With the help of the model and analysis results, the development process and current situation of urban-rural integration in Yanzhou district are further analyzed, the problems in the process of integration in Yanzhou district are solved, and the scientific development of urban-rural relationship in Yanzhou district is promoted..

## II. MAIN CONTENTS

### 1. Project research objectives and main contents

Research objectives: to build a model of urban-rural integration of nonlinear dynamic system, focusing on the interaction and two-way communication between urban and rural areas, which provides a new development idea for the study of urban-rural relationship.

Main content: using the knowledge of differential equation, combining with the actual situation of Yanzhou City, the

nonlinear dynamic system is constructed. Combining the research of theoretical norms with practical application, this paper tries to make some innovative work for the theoretical and practical research of urban-rural integration in Yanzhou district.

### 2. Overview of Project Innovation Features

With the help of system dynamics simulation analysis and differential equation knowledge, and with the help of model analysis results, the project makes certain contribution to the development of urban-rural integration in Yanzhou district.

### 3. Technical Route of Project Research

Through literature search, field research, investigation and study, this paper focuses on the main economic factors in the process of urban-rural integration in Yanzhou District, including capital factor, technology factor and human resource factor, and constructs the system flow chart of its flow according to its different flow characteristics, carries out the simulation analysis of system dynamics, and uses the results of model analysis in the process of urban-rural integration. According to the different characteristics of capital factor, technology factor and human resource factor in the flow between the city and the countryside, the paper puts forward the countermeasures and methods to promote the flow between the city and the countryside. The design is suitable for the realization of unified society.

## III. EXPECTED RESULTS

Build a model of urban-rural integration of non-linear dynamic system, coordinate the development of urban and rural industries, establish a reasonable mechanism for the flow of urban and rural economic factors, formulate the overall plan of urban and rural development of Yanzhou District, put forward the Countermeasures for the development of urban-rural integration of Yanzhou District, accelerate the integration of infrastructure, and realize the integration of urban and rural infrastructure.

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