



RISUS - Journal on Innovation and Sustainability  
volume 10, número 2 - 2019  
ISSN: 2179-3565

Editor Científico: Arnaldo José de Hoyos Guevara  
Editora Assistente: Lívia Lopes Aguiar  
Avaliação: Melhores práticas editoriais da ANPAD

## RESEARCH ON INNOVATION-DRIVEN DEVELOPMENT STRATEGY, COMPARATIVE ADVANTAGE AND INDUSTRIAL TRANSFORMATION AND UPGRADING

*Investigação sobre a estratégia de desenvolvimento induzida e a vantagem comparativa e a transformação e a atualização industriais*

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**ABSTRACT:** China is in the midst of a momentous economic transition from one of high-speed to high-quality growth. The industrial transformation and upgrading supported by extensive growth model that focused on —quantity— has encountered bottlenecks. It's urgent to find a new model to promote new round of industrial transformation and upgrading. This paper, based on the current unbalanced industrial structure in China, analyzes the development strategy China has implemented since reform and opening up and its influence on industries. Conclusions are as follows: China has implemented an extensive forging ahead growth strategy that transcends comparative advantage. This has generated industrial structure deviations, longstanding factor price distortion, overcapacity and wave phenomenon and constrained industrial transformation and upgrading. Therefore, China should choose an innovation-driven development strategy that could unleash the potential of comparative advantage and drive industrial transformation and upgrading.

**KEY WORDS:** Innovation-driven development; Comparative advantage; Industrial transformation and upgrading

**ACEITO EM: 01/07/2019**

<https://doi.org/10.23925/2179-3565.2019v10i2p146-152>



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## INVESTIGAÇÃO SOBRE A ESTRATÉGIA DE DESENVOLVIMENTO INDUZIDA E A VANTAGEM COMPARATIVA E A TRANSFORMAÇÃO E A ATUALIZAÇÃO INDUSTRIAIS

*Research on innovation-driven development strategy, comparative advantage and industrial transformation and upgrading*

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**RESUMO:** A China está no meio de uma importante transição econômica de crescimento de alta velocidade para alta qualidade. A transformação e modernização industrial, apoiada por um extenso modelo de crescimento que se concentrava em “quantidade”, encontrou gargalos. É urgente encontrar um novo modelo para promover uma nova rodada de transformação e modernização industrial. Este documento, baseado na atual estrutura industrial desequilibrada na China, analisa a estratégia de desenvolvimento que a China implementou desde a reforma e abertura e sua influência nas indústrias. As conclusões são as seguintes: a China implementou uma extensa estratégia de crescimento que transcende a vantagem comparativa. Isso gerou desvios na estrutura industrial, distorção de longo prazo do fator de preço, excesso de capacidade e fenômeno de onda, e transformação e modernização industrial restritas. Portanto, a China deve escolher uma estratégia de desenvolvimento orientada para a inovação que possa liberar o potencial da vantagem comparativa e impulsionar a transformação e a modernização industrial.

**PALAVRAS-CHAVE:** Desenvolvimento impulsionado pela inovação; Vantagem comparativa; Transformação industrial e modernização

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### INTRODUCTION

Industry is the bedrock of economic growth and industrial structure holds the key to sustained economic growth. Since the outbreak of the global financial crisis in 2007, China's central and local governments have pressed ahead with industrial structural reform at a higher speed. However, problems such as extensive industrial structure, low-level industries and high degree of government-owned businesses remain outstanding. As the longstanding obstacle in China's economic growth, we must seek radical policies from the institutional level to ensure the quality of China's industrial and economic development and thus

achieve sustainable industrial growth (Li Keqiang, 2018). The academic circle has conducted considerable researches on the above issue from diversified perspectives and with abundant literature (Li Jianbo, 2014, Liu Yang, 2015, Li Yining, 2015, Ren Zeping, 2016, Wei Feng, 2014), whereas little literature analyzes the mechanism from the perspective of systems and development strategies. Therefore, this paper attempts to study industrial transformation and upgrading from the perspective of development strategies.

### MECHANISM ANALYSIS OF THE INFLUENCE OF DEVELOPMENT STRATEGIES ON INDUSTRIAL TRANSFORMATION AND UPGRADING

The government itself is the most significant institution in the economy whose economic policies can usually be summarized as development strategies (Lin Yifu, 2017). It is quite natural and reasonable, considering the historical context, for the Chinese government to implement a top-down extensive growth strategy to catch up with others since the People’s Republic of China was founded. Undeniably, such a strategy as based on the expansion of the quantity of inputs, and especially on massive investment, creates a remarkable Chinese miracle (Wu Jinglian, 2013). At the same time, however, problems such as perennial dependence of industrial upgrading on investment, relatively insufficient consumer demand and overcapacity are becoming increasingly prominent. All these have impaired the quality of industries and their sustainable growth capacity.

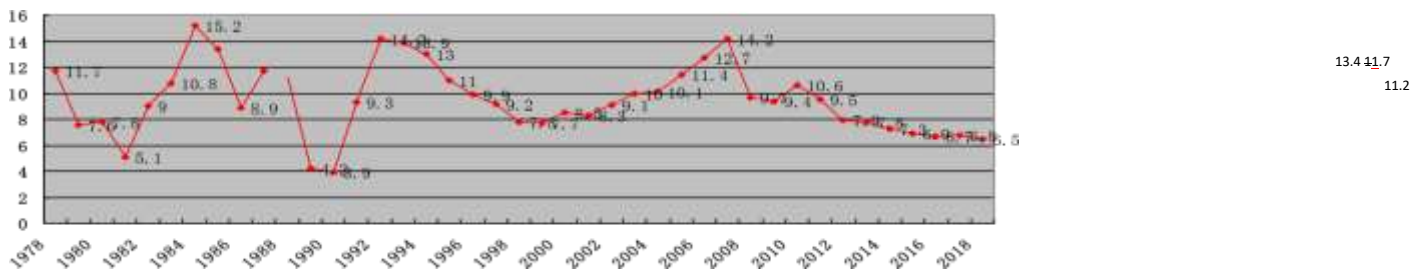


Figure 1 China's economic growth rate each year (%) source: website of National Bureau of Statistics

How does the extensive growth strategy cause an unbalanced industrial structure, in other words, what’s the mechanism behind it? First of all, from the perspective of unbalanced structure of domestic demand--the most superficial issue--the most direct reason why investment far exceeds consumption is that the investing entity’s (government departments and enterprises) income far exceeds the consuming entity’s (residents). It’s true that government and enterprises control more national income while residents’ income has been decreasing in the past few decades. The uneven distribution of national income directly leads to unbalanced structure of China’s domestic demand (Xu Xiaonian, 2010). In addition, the production part lies before the distribution part in large-scale socialized production. Therefore an unbalanced distribution of national income is directly led by an unbalanced productive structure. If there are more capital-intensive industries, the distribution of income will be more conducive to capital rather than labor. Last but not least, the extent to which China’s industrial structure inclines towards capital-intensive industries far exceeds the abundance of capital. Apparently, government’s improper policies featuring forging ahead such as large-scale investment on infrastructure, facilitating financing for capital-intensive companies, lowering capital prices through interest rate regulation will distort the macro incentive mechanism for companies and generate more capital-intensive enterprises.

**Table 1 Uneven National Income Distribution** Government real income (% of GDP, in 100 million)

Year	Tax	Land-Transferring Fees	Social Security Fund	State-Owned Enterprises	Lottery Sales	Extra-Budgetary and Non-Tax Revenue	Excluded from the Budget	Real Income of the Government	Total Size of GDP	Proportion of Government's Revenue on GDP
1995	6038		87			938	80	843	9810	6.45
2000	12581	22	006		81	919	476	0685	8000	1.10
2005	28778	505	645		11	608	582	8529	83617	6.43
2010	73211	8198	9276	40	662	6693	316	44796	99759	6.22
2011	89738	1140	5153	00	216	4136	016	69099	68562	6.09
2012	100614	6652	0739	154	6158	6639	290	85703	18214	5.84
2013	110497	9073	5253	288	093	8645	828	16677	66130	8.27
2014	1119158	3606	9592	211	824	1192	0682	39265	36483	7.59
2015	124892	2547	6012	560	679	7325	2818	49833	76708	6.92

source: Hengda Research Center

In summary, China's economic structural imbalance is not simply a structural imbalance of domestic demand but rather a systematical imbalance. The perennial extensive growth mode is the fundamental factor which has distorted the macro incentive structure for enterprises. It first directly leads to an unbalanced productive structure (deep structural imbalance) and then the imbalance will be transmitted to the distribution of national income (middle level structural imbalance) and ultimately, will cause the unbalanced structure of domestic demand (the most prominent structural imbalance).

China's industrial policies since 1949 has facilitated industries that surpass our comparative advantages, such as capital and technology-intensive industries. Li Yifu (2017) described it as a forging ahead strategy. With profound changes in the political and economical environment at home and abroad, its unsustainability is becoming more and more conspicuous and it will constrain the industrial upgrading and economical transformation in the foreseeable future:

### Deviations in china's industrial structure

On the one hand, China's industrialization grew rapidly amid low levels of per capita GDP, surpassing its own factor endowment and the stage of economic development, resulting in a productive structure that is not adapt to the demand structure determined by average income (Huang Qunhui, 2014). On the other hand, the extensive development strategy has led to a deviation in comparative share among labor-intensive, capital-intensive and technology-intensive industries. Large-scale, long-term loans flow to capital and technology-intensive industries. According to the data provided by the official website of the People's Bank of China, from 2000 to 2007, the proportion of medium and long-term loans grew from 26.7% to 70%.

### **Long-term distortion of factor prices**

China's capital accumulation has outpaced GDP growth because of capital preference of the forging ahead strategy. This development model used to be the driving force of China's skyrocketing economic growth while effectuated systematical distortion of factor prices at the same time (Lu Ming, 2014). Intentionally depressed prices of capital, land and energy have prompted government departments to increase subsidies towards enterprises, causing severe consequences such as low productivity, investment-driven growth, environmental pollution and inappropriate industrial structure.

### **Overcapacity and waving phenomenon**

The emerging industries supported by the government are always advanced ones. The waving phenomenon happens when, affected by the policies, countless companies and investors are highly consistent in the assessment of one industry (Fu Caihui, 2016). Most of government-supported industries don't meet the requirements of comparative advantage and are more likely to suffer from overcapacity and waving phenomenon, such as steel, cement and petrochemical industries.

## **SUGGESTIONS FOR NEW POLICIES**

Based on the current stage of Chinese industry, systematical improvement of innovation and stimulation of innovative vitality should be concentrated on the following aspects:

### **Strengthening the establishment, reform and improvement of the institutional cost of industrial innovation**

Institutional cost is the premise of industrial innovation and the institutional cost of China's industrial innovation is still relatively high. First, laws and regulations on rewards, equity, options, taxation, room for trial and error and other aspects must be improved. Secondly, reducing financing cost, especially for small and medium sized private enterprises is significant. The third suggestion is to establish and improve the risk control mechanism for industrial innovation. The government must set up funds and subsidies for risky projects.

### **Accelerating talent fostering**

To begin with, by fostering respect for science, government departments should create a conducive atmosphere for scientific innovation and consolidate talent sources. In addition, the government needs to unlock the scientists' creativity and entrepreneurial passion, fully support enterprises to attract more innovative talents and encourage talents to work for enterprises. What's more, we should master the laws of innovative talents fostering and expand the recruitment pool.

### **Removing institutional barriers that hamper population movement and migration of workers**

Initially, barriers that hinder talent flow such as household registration, restrictions on gender and age should be eliminated. Additionally, based on the two-child policy and the act of raising the retirement age, the government must deepen reform of population policy, slow down the aging population and mitigate its negative effect on innovation. Furthermore, government service models and grassroots governance also require innovation. More attention should be paid to public service and policies pertinent to migrants. Finally, the government should expand exchanges of talents abroad and proactively guide the inflow of overseas talents.

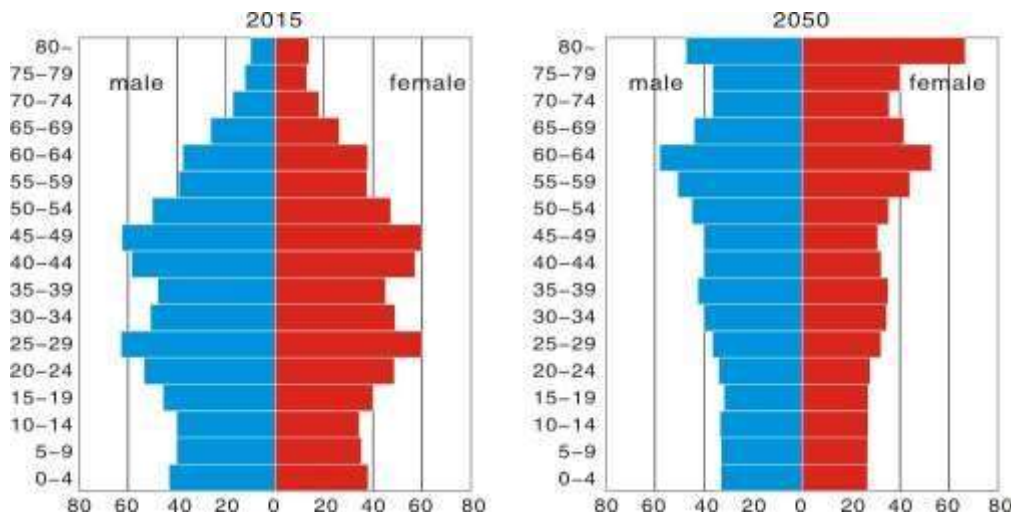


Figure 2 Population in China in 2015 and 2050, by Age and Gender (In Million Inhabitants) source: website of National Bureau of Statistics

### **More governmental investment in infrastructure such as science, education, culture and health**

During the past four decades, the government has paid disproportionate attention to infrastructure and achieved an infrastructure miracle. Meanwhile, we should bolster points of weakness or soft environment, so that the coordinated development of hard and soft environment can better attract, serve and facilitate talents.

#### **Establishing and improving talent incentive system**

First of all, it's pivotal to make flexible use of wages, performance, benefits, employee stock ownership and other compensation mechanisms to mobilize their passion for innovation. Meanwhile, enterprises can attract and keep talents with people-oriented cooperate culture, formulate a blueprint for their future career to maintain a prolonged incentive. Furthermore, enterprises should provide sound working conditions and channels for enhancing personal value.

#### **Enhancing exchanges and cooperation with other countries and regions, expanding the scale of opening up, strengthening exchanges, absorbing talents and providing an effective way for enrollment**

To start with, we need to create a sound living and working environment to attract high-level overseas returnees and foreign. In addition, we can improve the political and commercial environment to facilitate international trade and acquire knowledge from trade. What's more, we spur foreign direct investment so that we can enjoy their knowledge and technological spillover effect. Last but not least, the international licensing system proves to be an effective way for developing countries to obtain certain new proprietary technology and its cost benefit is even more feasible than the enterprises' own development.

To sum up, at the backdrop of complex international situation and economic downturn in China, industrial transformation and upgrading, together with innovation, are what China must do now in avoiding a middle-income trap and pursuing development and prosperity. At present, we need to deepen our understanding of the urgency, necessity and importance of industrial transformation and upgrading and innovation. Further discussion and research on the national development strategy, strategic support and guidance for industrial upgrading and innovation are paramount.

## **CONCLUSION**

The extensive forging ahead development strategy since 1978 has profoundly stimulated industrial progress and industrialization. Meanwhile it has left numerous structural problems, for example, it has directly led to deviations in China's industrial structure, long distorted factor prices and overcapacity and waving phenomenon. Admittedly, the strategy has its historical inevitability and rationality. However, the Chinese economy is undergoing a major transition to a post industrial economy nowadays. The past forty years have witnessed China's unprecedented economic growth-- in fact, China has shifted gear from the

previous high speed to a medium-to-high speed growth--for example, affluent capital accumulation, major changes in factor endowment structure , and many companies that used to be lack of viability now can survive the fierce competitiveness and even go global to provide foreign companies with technologies and services. The major economic changes make it imperative for the government to keep abreast of the changing times and seize opportunities to readjust its economic structure, adopt a development structure that is more responsive to comparative advantage, that is, the innovation-driven development strategy.

At present, we need to deepen our understanding of the urgency, necessity and importance of industrial transformation and upgrading and innovation. Further discussion and research on the national development strategy, strategic support and guidance for industrial upgrading and innovation are paramount. The first three aspects of this paper are particularly important in the six aspects of industrial transformation and upgrading. It is necessary to deepen and broaden the research, and to study in an international perspective. At the same time, it is necessary to combine the current complex and ever-changing international situation, carry out comparative research, and propose more targeted and practical measures for China's industrial transformation and upgrading!

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