

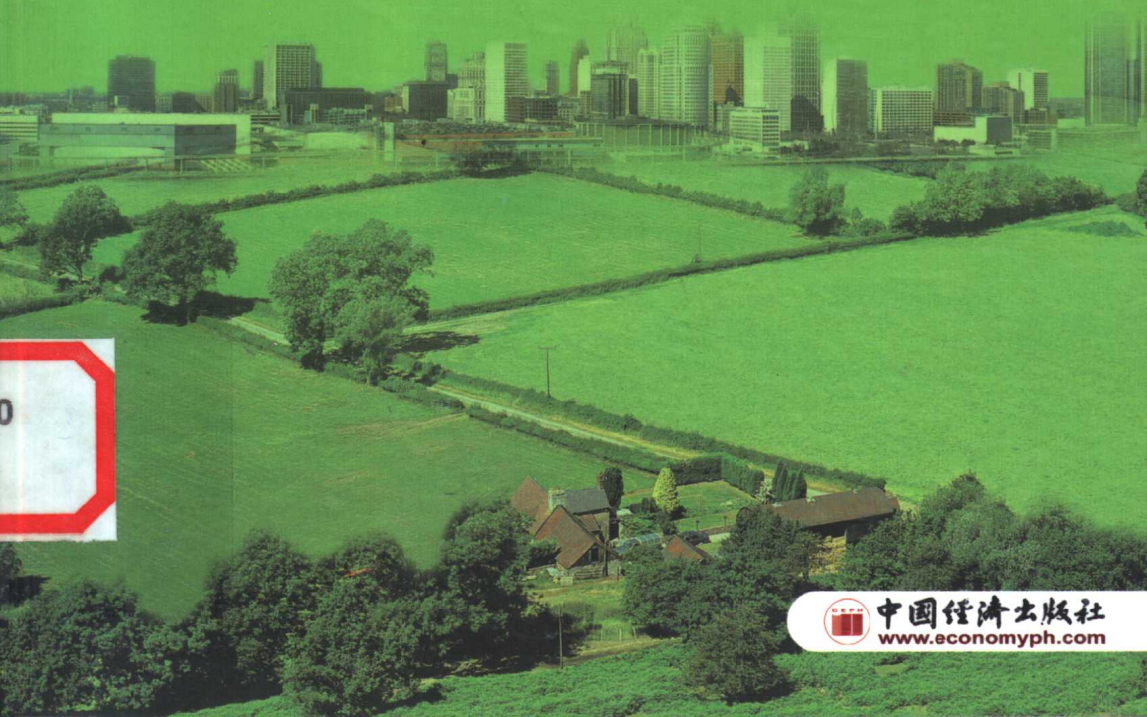
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走向现代

杨戈 著

农业

——农业现代化与创新



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前 言

世界一般农业发展趋势是从传统农业经由混合农业转向现代农业。发达国家走了这样一条农业发展道路，包括中国在内的发展中国家也将走这样一条农业发展道路。在走向现代农业的历程中，充满了农业技术创新和制度创新，这是一个技术变迁和制度变迁的过程。古典学派（包括重农学派）以来的西方经济学家，很多人把农业问题作为其经济理论研究的一个重要方面，关注农业的发展和 innovation，每个时代的经济学家都为农业的发展和 innovation 研究做出了自己的重大贡献。特别是当代的经济学家，他们关于农业发展和 innovation 的卓有成效的理论研究，他们在研究方法上的创新，是特别引人注目的。当代经济学家对于农业发展与 innovation 的理论研究也是一个不断的理论推陈出新的过程，从刘易斯的“二元结构”论，到舒尔茨的“改造传统农业”论，再到速水佑次郎和弗农·拉坦的“诱致性农业变迁理论”，对于农业发展和 innovation 的认识不断深化。与此同时，也出现了许多支持这种关于农业发展和 innovation 研究的新理论，包括新增长理论、新制度经济学、新国际经济学和政府职能理论（公共经济学）等等，这些新的理论既构成了农业发展和 innovation 理论的基础。

本内容，又为农业发展和创新研究提供了新的研究方法。

对于农业发展和创新的研究涉及到了当代经济理论新发展的各个方面。本书对于农业发展和创新的研究，一方面系统地阐释了西方经济学家对于农业发展和创新研究的新成果，另一方面又针对农业发展和创新中的现实问题，运用西方经济学家提供的新的理论、新的研究方法，对于农业发展和创新的实践从理论上进行了探讨和分析，特别是对我国农村经济体制改革以来的农业创新，包括制度创新和技术创新，进行了深入的理论探讨和分析，并在理论分析的基础上，对其政策含义做了深入地分析和探讨。在研究中力求提出自己的具有创新性的见解。

下面，按照本书的章节结构较为具体地阐述一下所研究的基本内容：

第1章，导论，共3节：农业创新的理论与实践；从“二元经济结构模型”到农业创新理论；农业创新分析的支柱理论。首先阐述了古典学派以来的一些经济学家关于技术进步和创新对农业发展作用的理论观点，并以近200年来发达国家和发展中国家所走过的形成不同农业类型的不同的农业发展道路的实例，论证了技术进步在农业发展中的重要作用。然后论述了战后发展经济学家关于农业发展和创新理论的演变，涉及了刘易斯的“二元经济结构”理论，舒尔茨的“改造传统农业”理论，速水佑次郎和弗农·拉坦的“诱致性农业变迁”理论，对各种关于农业发展理论做了比较分析，揭示了不

同理论之间的逻辑演进和历史演进的关系。本章还以一定的篇幅论述了作为农业创新分析支柱理论的一些新的理论，主要是新增长理论，新制度理论，并简要地阐释了它们在农业创新分析中的应用。

第2章，农业发展的技术创新，共5节：农业技术创新的作用、类型及其测量；农业技术创新的经济学分析；农业增长模型：新增长理论与农业技术创新；农业技术的国际转移；农业科技开发的成本—收益分析与开发投资。本章首先分析了农业科技创新对农业增长的贡献，探讨了不同类型的农业科技创新，并尝试测量其对农业增长的贡献。然后，从经济学的层次上分析了农业科技创新的形成和路径依赖，并对两种主要技术创新的途径，即诱致性技术创新和强制性技术创新，做了比较分析。分析表明，随着向现代农业转变进程的加快，对农业技术创新的要求有日益加强的趋势。接着，本章应用新增长理论方法和有关知识构造了农业增长模型，通过模型说明技术创新对于形成农业中间产品、最终消费品创新的作用。随后分析了农业技术的国际转移对于促进各国农业发展的作用，强调探讨适合于本地条件应用国外先进农业技术的意义。最后，进行了农业科技研究开发的成本—收益分析，并根据不同的农业科技研究开发同私人农业企业的利益关系（排他性或外部性与“搭便车”），确定了农业科技开发投资的公共和私人范畴。

第3章，农业发展的制度创新，共3节：农业发展的制度创新；改造传统农业：农业制度创新的实践；制

度变迁绩效的评价。为使传统农业发展成为现代农业，除了进行技术创新，还要进行制度创新。换言之，从传统农业走向现代农业也是一个制度创新的过程。农业制度创新，说到底是以绩效高的农业制度代替绩效低的农业制度，而且还有一个制度变迁的路径依赖问题。发展中国家在长期农业发展中经历了诸如土地制度改革、农业的市场化、农业经营制度的演变、农业社会化服务体系的形成与发展等重大的农业制度的变迁或变革，积累了许多丰富的制度变迁的经验。本章对农业制度变迁的理论与实践做了较为深入的分析。

第4章，人力资本形成与农业的发展，共2节：农业中的资本形成：物质资本和人力资本；发展中国家人力资源开发分析。本章所论述的内容可以看做是对第2章关于农业发展中的技术创新分析的引申。同科学技术在农业发展中的较大贡献相联系，相应地，要求有人力资本形成。相对于物质资本形成，人力资本形成在农业发展中具有更大的作用。但在包括中国在内的发展中国家，农业的物质资本形成还很薄弱，为农业发展所需要的农业基础设施普遍落后，不适应新的、先进的农业技术的要求，也需要大力促进农业的物质资本形成。如何处理物质资本形成和人力资本形成的关系，是包括中国在内的发展中国家农业资本形成中的一个重要问题。因此，本章联系农业物质资本形成探讨了人力资本形成问题。本章关于人力资源开发的分析强调要坚持围绕农业发展进行人力资源开发，要具有前瞻性，要贯彻效率与

公平兼顾的原则。最后，分析了人力资本形成绩效。

第5章，农业的可持续发展，共3节：现代农业发展的目标模式；农业的可持续发展；发展可持续农业也是一个农业创新过程；农业可持续发展的绩效分析。本章的分析表明，农业可持续发展代表现代农业发展的更高层次的要求。虽然农业可持续发展在较大程度上具有生态平衡和保护环境的意义，但更应该把它看做是现代农发展的一个目标模式。而且，实现农业的可持续发展目标也是一个农业创新过程。农业的可持续发展具有较高的经济绩效。并按照可持续发展农业的兼顾当前和长远利益的要求，从资源配置、农业生产力、农民收入和生态系统的持续性等方面，分析了可持续发展农业的绩效。

第6章，中国的农业发展与创新，共3节：技术创新；制度创新；可持续发展农业。本章强调，中国农业发展的动力和源泉是农业创新，主要包括技术创新和制度创新。比较准确地描述了改革开放以来中国农业创新的轮廓，分析农业创新与中国农业发展的关系，从而较为准确地理解和把握了中国农业发展的原因和规律。本章还探讨了中国可持续农业发展的问。本章认为，研究中国农业发展中的包括技术创新和制度创新的农业创新是一项有意义的工作，不但对农业经济学研究具有重要的理论意义，而且具有引导中国农业按照健康的轨道进一步发展的实践意义。

本书的理论价值在于系统地梳理了现代农业发展理

论，对于不同经济学家提出的理论进行了比较研究，并从中理出了理论发展的线索，把西方经济学界最新理论研究成果应用于农业创新的理论研究，从而形成了比较完整的农业创新理论体系。本书在理论分析中也力求对西方经济学家提出的有关概念加以引申发挥，争取有所创新。例如本书把诱致性制度变迁的概念引入技术变迁的分析，提出强制性技术变迁的概念，根据诱致性技术变迁的概念引申出了诱致性人力资本形成概念。在关于可持续发展农业的讨论中，把可持续发展农业看做是现代农的目标模式，并从实现现代农业目标模式的角度分析了可持续发展农业的绩效。这也是一点创新的尝试。

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杨 戈

2003年3月20日

Preface

Evolution from peasant agriculture to the mixed farming, in the end to modern agriculture, is general trend of development of agriculture in the world . It is the path that developed countries came through, and developing countries are in. In the process of modernization of agricultural sector, technical and institutional innovations are the most prominent factors. In so much, we can conclude that it is a process of technical and institutional innovations. Agriculture development and innovation are the important fields of Economics which infinite economists concentrate on. This is tradition that can be ascended at least to the Classical School (including Physiocracy). Along the historical line, inheriting the Contribution of Precursors, modern economists have achieved great progress in theoretical research of agriculture development and innovation. In the meanwhile, they brought forward many new methods that gave us indelible impression. Furthermore, all the works done by modern economists on the field of agriculture development and innovation are in an uninterrupted course, from Lewis' two sector model, Schultz' s theory about reconstruction of traditional agriculture to Yujiro Hayami and Vernon W . Ruttan' s induced technological innovation hypothhheses . Their great contributions help us to get more and more insights on the problem, In the meanwhile, the other branches of economics has been in a state of flux, including new growth theory , new institutionalism, theory of cross - industries conjunction, government - function theory (public economics), new international economics, etc, These exciting new theories provide both new research

tools and new materials for studying the agriculture development and innovation. Once we prepare to consider any problems concerning rural development, it is natural step that we will come down to all aspects of modern economics.

This thesis concentrates on the study of agriculture development and innovation in the developing countries. Our first aim is to survey the new research results by western economists on the field. The second aim is to deeply study the practical developing process of agriculture development and innovation in the developing countries in terms of the new tools and methods from modern economics. The rural innovation on institution and technology since China started to rebuild the economic system will be put into special consideration, then we give policy implication detailed analyses with respect to the various abstract theories and models. Through the thesis, we try to get some original opinions about the concerned field.

The structure of the thesis is as the followed:

The first chapter is *Introduction*. There are three section: theories and practice of agriculture development, from the two sector model to the theory of agriculture innovation, and support theory used in analyzing agriculture innovation. In the beginning, we deal with the views from some economists on the effect of technical development and innovation on the development of agriculture, and try to conclude the important role of technical development by the historical fact about the different paths between developing countries and developed countries in the last 200 years. Then we stress on the evolution of various theories about agriculture development and innovation since Second World War, including Lewis' two sector model, Schultz' s theory about reconstruction of traditional agriculture and Yujiro Hayami and Vernon W. Ruttan' s induced technological innovation hypothhheses. By the compare with different theories, we aim at finding

the relationship between logic and development of these theories. In the last of this chapter, we use some lengths to analyze some supporting theories, mainly new growth theory and new institutional theory, where we can see their applications in the analysis of agriculture development and innovation agriculture innovation.

The second chapter is *Technical innovation and agriculture development*. There are five sections: the role, type and measure of agriculture technical innovation, economic analysis of agriculture technical innovation, agriculture growth model in term of new growth theory, international transfer of agriculture technology, costbenefit analysis of investment in agriculture technology and development. Beginning with contribution of agriculture technical innovation to agriculture growth, we consider different types of agriculture technical innovation and try to measure their contribution in the agriculture growth. Then from the point of pure economic theory, we analyze the formation and dependent path of agriculture technical innovation and compare two main way, induced technical innovation and forced technical innovation. We prove a basic fact: faster the conversion to modern agriculture, stronger the requirement for agriculture technical innovation will be. We build a agriculture growth model in the foundation of new growth theory that shows the roles of technical innovation to the formation of agriculture middle product and final consumer goods. After analyzing accelerating effect of international transfer of agriculture technology on most of developing countries, we emphasize that all the countries should use the foreign advanced that are apt to the levels of their productivity. In the last, we make the cost - benefit analysis of investment in agriculture technology and development and indict the public and private properties of different types of investment in agriculture technology and development (exclusion and free rider) in term of distribution of benefits.

The third chapter is *Institutional innovation and agriculture development in the developing countries*. There are three sections: institutional innovation in the process of agriculture development, reconstruction of traditional agriculture: the practice of agriculture system, evaluation of system evolution. In order to effectively develop the agriculture in developing countries, besides technical innovation, we should know the important role of institutional innovation. In other words, the process of development of agriculture development in the developing countries is a process of institutional innovation. The innovation of agriculture system turns out to adapt the high efficient system to replace the low efficient system. We can see there is an important problem about the dependent path of institutional innovation. From the history, we can get abundant experience about soil system change, market formation of agriculture, management system of agriculture, formation and development about social service of agriculture. This chapter deeply considers the theory and practice of institutional innovation and agriculture development in the developing countries.

The fourth chapter is *Human - capital formation and agriculture development*. There are two sections: capital formation in agriculture - physical capital and human - capital, analysis of development on the human capital in the developing countries. This chapter is the extension of the analysis on the effect of technical agriculture development in the second chapter. The condition that science and technology can play role in agriculture development is the formation of human capital in the same process. Compared with physical capital, human capital has the far more important effect. But in the developing countries, the amount of formation of physical capital in the agricultural sector is also poor. At large, the fundamental establishments for meeting the need of development are dropped behind

the new and advanced agricultural technology. It is a natural step that developing countries have to accelerate the formation of physical capital. How to balance the amount of physical capital and human capital is an important topic in developing countries. This chapter concludes that there should be foresights on the development of human capital and the principle of equally treating fairness and efficiency.

The fifth chapter is *Self - sustaining growth of agricultural sector*. There are three sections: the target model of modern agriculture development—self - sustaining growth, self - sustaining growth of agricultural sector is a process of agricultural innovation, effect of self - sustaining growth of agricultural sector. We will show in this chapter that self - sustaining growth of agricultural sector is a high stage that characterizes modern agriculture. Although it seems to have obvious effect on the zoology balance and protection of the environment, we should consider self - sustaining growth of agricultural sector as a target model. Moreover, in this process there will be large scale of innovation in the agricultural sector. The self - sustaining growth of agricultural sector will increase the economic benefit in any country, According to the balance between the short - run benefit and long - run benefit, we discuss many problems, including resource allocation, developing agricultural productivity, rural income and zoological system.

The sixth chapter is *Agriculture innovation and agriculture development in China*. There are three sections: technological innovation, institutional innovation, formation of human capital. Our conclusion is that agriculture innovation is the power and source of agriculture development in China. We should make great progress in the technological innovation and institutional innovation. In this chapter, we depict the outline of the history of innovations in agricultural sector of China, then survey the

economic rule and causality for the China agricultural changes. Such studies on the technological innovation and institutional innovation in agricultural sector of China belong to an important field of economics and will help us get some appropriate implication of economic policy.

The theoretical value of the thesis lies on the following work we have done: expound the theories of modern agriculture development, compare various theories and exploit the evolution path for them. We set up an integrated theoretical system about agricultural innovation in terms of the new theories of modern western economics. In the meanwhile, we explicate some fundamental economic principles and concepts from the other fields of economics. For example, we introduce a new concept of forced technological innovation that comes from another concept about induced institutional changes, and another new concept of induced formation of human capital that comes from the concept about induced technological changes. In the discussion about sustainable agricultural development, we originally show that it should be the target model in China, and from the view, consider the effect of sustainable agricultural development. When we present some new concepts and theories on this field, this thesis gives all aspects detailed arguments, both theoretical and practical.

Much thanks to editors Liu Yi ling and Lu wen xia for their effort to publish my book.

Yang Ge
2003. 3. 20

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