

CITY UNIVERSITY OF HONG KONG
香港城市大學

**A Study on Supply Chain Contract in
Traditional Chinese Medicine**
中藥供應鏈中的合約研究

Submitted to
College of Business
商學院
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Business Administration
工商管理博士學位

by

Chen Xin
陈鑫

March 2019
二零一九年三月

摘要

中醫的發展和中藥的發展相輔相成，對中國人民的健康和文化的發展起著重要作用。然而，在科技經濟迅速發展的今天，傳統中藥行業面臨著各種危機和挑戰。中藥行業涉及種植、製藥、銷售等多個環節，如何協調中藥產業各環節至關重要。隨著經濟的發展，規模化種植以及合約模式，在中藥行業被越來越廣泛的採用。因此，研究中藥供應鏈種植環節的合約形式，對中醫和中藥的發展具有重要作用。

訂單農業在農業供應鏈文獻中被廣泛研究，普遍認為訂單農業能提升整個供應鏈的效率。但中藥行業具有一些自己典型的特徵，尤其是中藥材種植和採購環節：產量波動大、價格波動大、不可替代等，這些特徵顯示了其與農業、製造業等行業的不同。

本文基於中藥供應鏈的典型特徵，採用實驗研究和理論研究的模式，研究種植戶與藥企之間的多種合約模式。首先設計了實驗，通過對實驗資料的分析，研究了中藥供應鏈中採用多期合約和單期合約對供應鏈的影響，發現多期合約能顯著提升供應鏈的效率和藥材的成交量，並且不會影響第一期的合約成交量。其次，研究了種植戶在不同市場預期、不同產量預期、以及不同種植規模下的簽約行為。研究發現預期市場膨脹和減產時，種植戶的簽約傾向較預期市場緊縮和增產時大，但種植規模對簽約行為的影響卻微乎其微。最後，針對中藥行業的三個典型特徵：產量波動、價格波動、需求波動，對定價權有不同歸屬時的兩種合約模式，進行了理論分析。我們的研究發現，定價權對供應鏈利潤的分配有重要影響，會顯著提高有定價權一方的利潤分配。進而因此會影響種植戶的合約行為，種植戶的簽約面積在其有定價權時候相比無定價權時更大。同時，我們的研究發現，產量不確定性越大，供應鏈上下游效用、種植規模都越小，合約批發價越大；價格不確定性越大，種植基地效用、合約批發價和種植規模都越小，藥企的效用越大。

我們的研究對改善混亂的中藥行業，以及逐漸發展的規模化種植、合約種植，具有很好的啟示和指導作用。

關鍵字：中藥供應鏈；訂單農業；影響因素；合約模式

Abstract

The development of traditional Chinese medicine and Chinese herbal medicine complement each other and they both play an important role in ensuring Chinese people's health and the development of our culture. However, in the booming era of technology-driven economy, traditional Chinese medicine industry is facing various challenges. The Chinese medicine industry involves many segments such as planting, pharmaceuticals, retailing and so on. It's very crucial to know how to coordinate all aspects of the Chinese medicine industry. With the development of Chinese medicine, large-scale planting and contract models have been increasingly adopted in the Chinese medicine industry. Therefore, studying the contracts form in the planting stage of Chinese medicine supply chain plays an important role in the development of Chinese medicine.

Contract farming is widely studied in the agricultural supply chain literature, and it is generally believed that contract farming can improve the efficiency of the entire supply chain. The Chinese medicine industry has its own typical characteristics, especially in cultivation and procurement of Chinese herbal medicines. Chinese herbal medicines have a series of characteristics such as large fluctuations in output and price, irreplaceability. These characteristics show that Chinese herbal medicines industry has differences with industries such as agriculture and manufacturing.

Based on the typical characteristics of the traditional Chinese medicine supply chain, using models of experimental research and theoretical research, we study multiple contracts between growers and pharmaceutical companies. Firstly we design an experiment, through analysis of experimental data we find out the impact of the multi-period contracts and single-phase contracts on the supply chain in the Chinese medicine supply chain. It is found that multi-period contracts can significantly improve the efficiency of the supply chain and the contract volume of the medicinal materials. Then we studied the contracting behavior of the growers in different market expectations, different production expectations, and different planting scales. When the market is expected to expand or yield is expected to decline, the signing tendency of growers is greater than expected when the market is tightening and yield is increasing. But the planting scale was insignificant in affecting the signing tendency of growers. Finally, we focus on three typical characteristics of the Chinese medicine industry: production fluctuations, price fluctuations, and demand fluctuations. Two contract models are used in theoretical analysis, and the ownership of pricing power is also considered in our models. Our analysis finds that pricing power can greatly affect the distribution of supply chain profits, one with pricing power will has a great advantage. Which in turn affects contract

behavior, the growers' contracted planting area is larger when they have pricing power. Besides, we find that the greater the uncertainty of yield, the smaller the supply chain's utility and planting scale of the Chinese herbal medicine, and the greater the wholesale price in the contract. And the greater the price uncertainty, the smaller the utility of the planting base, the wholesale price in the contract and the scale of planting, and the greater the utility of the drug company.

Our research provides a good inspiration and guidance for improving the developing Chinese medicine industry, as well as the development of large-scale planting and contract farming.

Key words : Traditional Chinese medicine; Supply chain; Contract farming; Influential factors; Contract model

目錄

摘要.....	i
Abstract.....	ii
Qualifying Panel and Examination Panel.....	iv
論文回顧及致謝.....	v
第 1 章 緒論.....	1
1.1 概述.....	1
1.2 中藥產業鏈的組成.....	6
1.3 藥材種植產業的現狀與問題.....	8
1.4 飲片加工及流通產業的現狀及問題.....	11
1.5 本文的研究意義與結構.....	13
1.5.1 研究意義.....	13
1.5.2 研究內容和方法.....	16
1.5.3 研究結構.....	18
第 2 章 相關理論綜述.....	20
2.1 農業供應鏈.....	20
2.2 訂單農業.....	23
2.3 中藥材市場的研究.....	28
2.4 其他相關研究.....	29
第 3 章 中藥材供應鏈的特徵與交易模式.....	33
3.1 中藥材供應鏈特徵.....	33
3.1.1 特徵一：產量不確定.....	33
3.1.2 特徵二：價格不確定.....	35
3.1.3 特徵三：需求不確定.....	36
3.1.4 特徵四：種植戶規模小.....	37
3.1.5 特徵五：履約率偏低.....	37

3.1.6 特徵六：不可替代性強.....	37
3.2 中藥材供應鏈交易模式.....	38
3.2.1 農戶+市場.....	38
3.2.2 企業+ 中間商+ 藥農.....	39
3.2.3 龍頭企業+ 基地.....	40
3.3 合約模式.....	40
3.3.1 保底收購，隨行就市.....	40
3.3.2 雙保底價雙優先合約.....	41
3.3.3 其他保底價模式.....	42
3.3.4 PGP 合約模式.....	43
第 4 章 合約模式的實驗研究.....	44
4.1 研究的問題.....	44
4.2 研究的假設.....	45
4.2.1 雙期合約下供應鏈收益及雙方行為的假設.....	45
4.2.2 市場變化對基地行為影響的假設.....	47
4.3 雙期實驗.....	48
4.3.1 實驗設計.....	48
4.3.2 資料分析.....	51
4.4 市場變化實驗.....	53
4.4.1 實驗設計.....	53
4.4.2 資料分析.....	54
4.5 合約實驗補充.....	56
4.6 研究結論.....	56
第 5 章 合約模式的均衡分析.....	59
5.1 價格+需求不確定的批發價合約.....	60
5.1.1 無合約.....	60

5.1.2 藥企有定價權.....	61
5.1.3 基地有定價權.....	63
5.1.4 比較分析.....	64
5.2 產量+價格不確定的 PGP 合約.....	66
5.2.1 藥企有定價權.....	66
5.2.2 種植基地有定價權.....	69
5.2.3 無合約.....	71
5.2.4 比較分析.....	71
5.3 主要貢獻與管理啟示.....	75
第 6 章 結論與討論.....	79
6.1 主要結論與創新.....	79
6.2 實際意義.....	81
6.3 不足與展望.....	82
附錄.....	83
附 1 種植基地實驗第一階段說明材料.....	83
附 2 種植基地實驗第二階段說明材料.....	84
附 3 藥企實驗第一階段說明材料.....	85
附 4 藥企實驗第二階段說明材料.....	87
參考文獻.....	88