Research on Environment Factors of Differential Management System of Tobacco Farmers Based on ISM Model

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Abstract: Fourteen environment factors of differential management system of tobacco farmers are determined and selected from predecessors' research achievements. Relational structure of fourteen environment factors is analyzed by ISM model in this paper. This results show that sales average price, family members participated in the cooperative, yields per acre, production costs per acre and situation of accepting professional service are fundamental factors. The study have important significance for grasping the formation, development and evolution mechanism of differential management system of tobacco farmers.

Introduction

With change of agricultural production and deepening of industry internal reform, the voice of building service brand is increasing. classification management of tobacco farmers is a new thing. Its differential management and service introduce a new guided competition and humane care mechanism between tobacco farmers, which still have some problems that need to explore and improve. According to the demand of modern tobacco agriculture development in southwestern Guizhou, we establish classification of tobacco farmers, differential management and service that are suitable for the production practice, to improve performance consciousness, contract execution and loyalty of tobacco farmers, improve production level, establish a team who have culture, technology and good management, promote sustainable and healthy development of modern tobacco agriculture.

P. J. Taylor (2014) studied the operation of differential management system of tobacco farmers in northeast United States tobacco growing regions^[1]. F. Sager (2014) ,with case study, analyzed differentiated management system and its environment factors of tobacco farmers in London tobacco-producing areas^[2]. E. J. Meijers (2015) analyzed differentiated management system and its environment factors of tobacco farmers in pacific coast of Japan tobacco-producing areas. He considered the planting area, situation of accepting professional service, family members participated in cooperatives, times of professional training, production cost and proprietary large agricultural machinery operation have a significant effect on differentiation management system of tobacco farmers. Times of professional training is the biggest environment factors. By multivariate statistical regression methods, every one percent increasing in the number of professional training will lead to 0.74% increasing in output efficiency^[3].

Environment Factors Determination of Differential Management System of Tobacco Farmers

The literature metrology studies the quantity, quality and application of essence and structure about various types of documents by using the theory and method of mathematics, statistics and logic ^[4]. In this paper, this method is used to determine and select environment factors of differential management system of tobacco farmers from predecessors' research achievements. Chinese journal full-text database did not have papers about environment factors of differential management system of tobacco farmers before 2000. There are 34 papers of which title contains "influence factors of differential management system of tobacco farmers" in Chinese journal full-text database from January 2000 to July 2015.

Relationship Structure Analysis of Environment Factors

Determination of the Relationship between Various Factors

In order to analyze the impact of these factors on differential management system, we establish a interpretation structure model^[5]. we can get correlation matrix R, R is 15order square matrix. Elements of R are defined as

$$r_{ij} = \begin{cases} 1, & S_i \text{ directly impact } S_j \\ 0, & S_i \text{ not directly impact } S_j \end{cases}, \quad (i, j = 1, 2, \dots, 15),$$

$$R = \begin{bmatrix} 0 & 1 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 1 & 0 & 1 & 0 & 0 & 1 & 0 & 0 & 1 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 1 & 0 & 0 & 0 & 0 & 1 \\ 1 & 1 & 1 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 1 & 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 1 & 0 & 0 & 1 & 0 & 0 & 1 & 0 & 1 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 1 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

Relationship Between Different Levels of Various Factors

The reachable matrix $M = (R + I)^4$ is obtained by correlation matrix R, and I is the 15 order unit array, M is calculated by Matlab software.

The data of reachable collection $R(S_i)$, antecedent collection $A(S_i)$ and their Intersection $R(S_i) \cap A(S_i)$ in reachable matrix M are shown in table 1.

Table 1 The First Level of Reachable Collection and Antecedent Collection

S_i	$R(S_i)$	$A(S_i)$	$R(S_i) \cap A$
1	1,2,3,5,7,8,10,11,12,13,15	1,3,7	1,3,7
2	2,15	1,2,3,5,6,7,8,9	2
3	1,2,3,5,7,8,10,11,12,13,15	1,3,7	1,3,7
4	4,15	4	4
5	2,5,15	1,3,5,6,7,9	5
6	2,5,6,8,9,10,11,12,13,15	6	6
7	1,2,3,5,7,8,10,11,12,13,15	1,3,7	1,3,7
8	2,8,15	1,3,6,7,8,9	8
9	2,5, 8,9,10,11,12,13,15	6,9	9
10	10,11,12,13,15	1,3,6,7,9,10	10
11	11,12,13,15	1,3,6,7,9,10, 11,12,13	11,12,13
12	<u>15</u>	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15	<u>15</u>

Conclusion

As shown in figure 2, differential management system of tobacco farmers is a hierarchical structure with 5 levels. The first level of environment factors is differential management system of tobacco farmers (S_{15}). The second level includes output value per acre S_2 , proportion of superior tobacco S_4 , continuous length of tobacco S_{14} , leaf baking and other special skills S_{12} , income share of flue-cured tobacco S_{13} , intensive baking S_{11} . The third level includes times of professional training S_8 , planting area S_5 , proprietary large agricultural machinery operation S_{10} . The fourth level includes average sale price S_3 , family members participated in cooperative S_7 , yield per acre S_1 , production cost per acre S_9 . The fourth level includes Situation of accepting professional service S_6 .

The relationship of environment factors of differential management system of tobacco farmers can clear the structure between various factors, by which we can find out surface direct environment factors, middle and indirect environment factors, fundamental environment factors. Average sale price, family members participated in cooperative, yield per acre production cost per acre, situation of accepting professional service are fundamental environment factors, which produce deep and fundamental impact on the formation, development and evolution of differential management system of tobacco farmers. Distinguishing the function levels and their relationship of each environment factor has important significance for grasping the formation, development and evolution mechanism of differential management system of tobacco farmers.

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