EXPLORATORY SPATIAL DATA ANALYSIS FOR IDENTIFYING INFORMATIONIZATION FACTORS TO FARMERS' ASSOCIATIONS IN TAIWAN

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Outline

1. Introduction
2. Methodology
3. Results
4. Conclusion

1.Introduction

1.1.Background

- Due to rapid advancement in information and communication technology, organizational informationization has become one of prominent developmental trends of industries of all kinds (Cronin, 1994).
- Investments of human resources and apparatus of agricultural extension organizations or Farmers' Associations in informationization are insufficient, leading to a consequence that its whole progress seems lagging far behind.
- The extent of informationization of Farmers' Associations in villages and towns may demonstrate the information services that local farmers can obtain and further reveal the potential digital divide between village or town and country levels.

1.Introduction

1.2. The farmers' associations in Taiwan

- Development of Farmers' Associations in Taiwan.
  - History of farmers' association in Taiwan has been already over 100 years.

- Functions of Farmers' Associations
  - Carries out policy implementation agent of the government.
  - Promoting the development of rural area and the modernization

1.Introduction

1.3. **The indicator and influential factor of informationization**

- Indicators of assessing informationization of enterprises
  - Apparatus of the hardware
  - Electronic intensity
  - Electronization systematic quantity
  - Staff number participated informationization
  - Electronic administrative system of office.
- Influential factors of informationization
  - User and infrastructure
  - Activity way of the industry
  - Capital construction
  - Geographical position
  - Manpower capital
  - Enterprise type attitude
  - Regional economic situation
  - Product

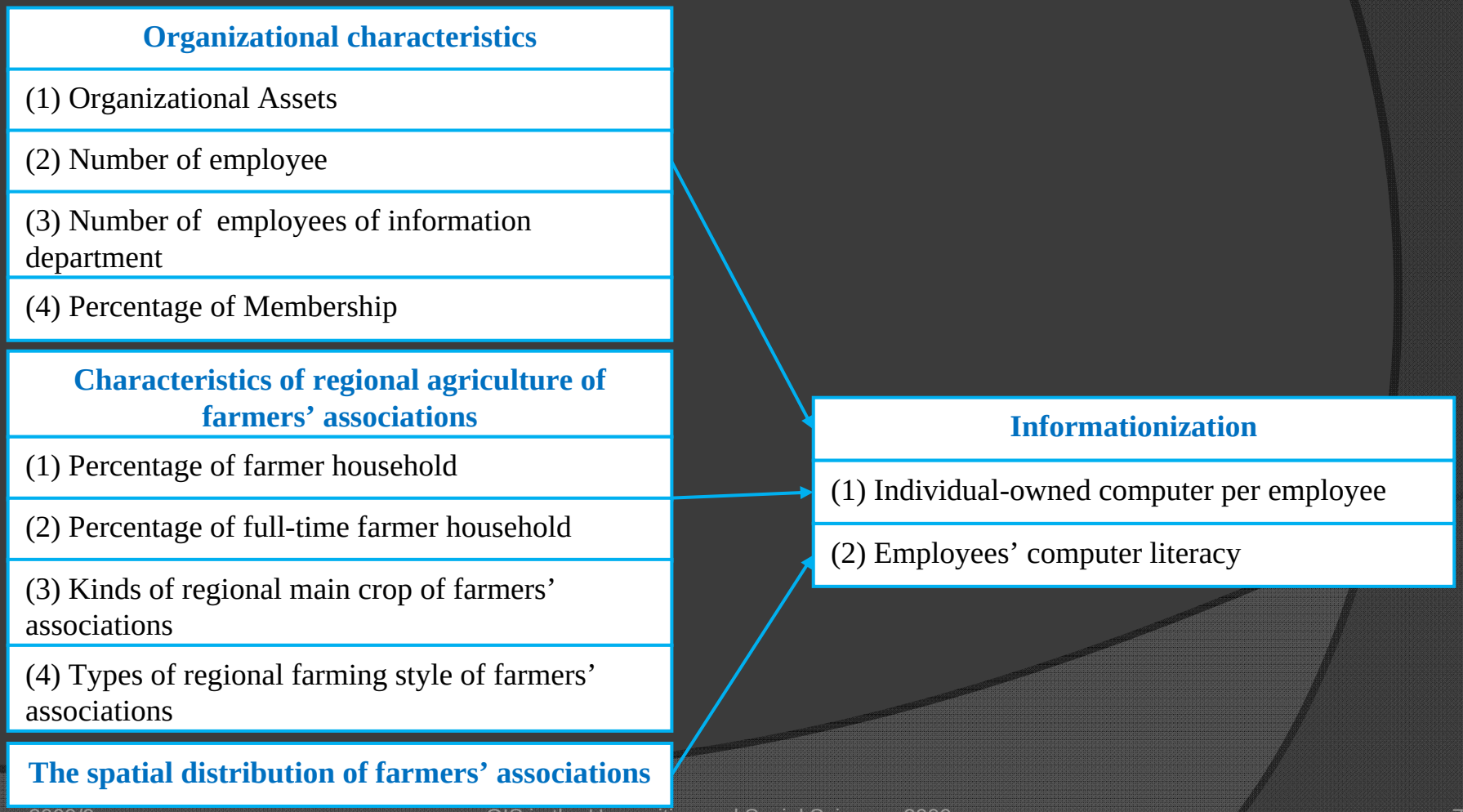
1.Introduction

1.4. Purpose of the research

- The main purpose of this research is to examine how geo-spatial information interacts with organizational informationization and its contributing factors of Farmers' Associations in Taiwan using spatial exploratory analysis.
  - this research is intended to analyze what factors contribute to the informationization of Farmers' Associations.
  - the spatial distribution of informationization and organizational characteristics of Farmers' Associations and characteristics of regional agriculture is plotted
  - this study uses geographic information system to analyze whether both informationization of Farmers' Associations and its influential factors correlate with space.

2.Methodology

2.1.Research framework



2.Methodology

2.2. Research materials

- Organizational characteristics of farmers' associations

This research use 4 variable to represent the Organizational characteristics of farmers' association: (1) Assets; (2) Employees; (3) Employees of information department and (4) Members percentage. The data is cited from "**2005 Yearbook of Taiwan Farmers' Associations**" and "**2005 Survey on NFA Informationization**".

- Characteristics of regional agriculture of farmers' associations

This research use 4 variables to represent the Characteristics of regional agriculture of farmers' association: (1) Farmer household percentage; (2) Professional Farmer household percentage; (3) Kinds of regional main crop of farmers' associations and (4) Types of regional farming style of farmers' associations. The data is cited from "**2005 Agricultural, Forestry, Fishery and Husbandry Census**.

2.Methodology

2.2. Research materials

- The spatial distribution of farmers' associations

This research uses Google earth 4.2 version to get the geographical coordinates of farmers ' associations in Taiwan, and then uses Geoda 0.9.5 version to set 4~7 most close-by farmers' associations having neighborhood relationshsip to proceed with sensitivity analysis. As a result of analysis, it is shown to set 4~7 neighbors does not influence the research. Therefore, this research decides to set **5 neighbors** for compromise.

- Informationization

The data of informationization is cited from "**2005 Survey on NFA Informationization**". The survey is conducted by the Department of Agricultural Extension of National Taiwan University commissioned by the Council of Agriculture in 2005. The purpose is to understand the degree of informationization of farmers' associations in Taiwan , and assess the situation of using shared information system.

3.Results

- Number of FAs in Taiwan:
  There are **304** FAs in Taiwan
- this research is deducted:
  - Taiwan Province farmers' association, Taipei farmers' association, Kaohsiung farmers' association, subsidiary island areas and farmers' associations and county level of farmers' association.
  - Then delete 28 more farmers' associations which do not have complete data.
- Finally keep **256** FAs at the primary FAs, remain 90% of the samples of FAs

Fig.2

- the white dot is the position of each farmers' association.

- The white area shows the materials of local farmers' association are incomplete, so this research deletes it from sample of studying

- the gray area says the materials of local farmers' association are intact.

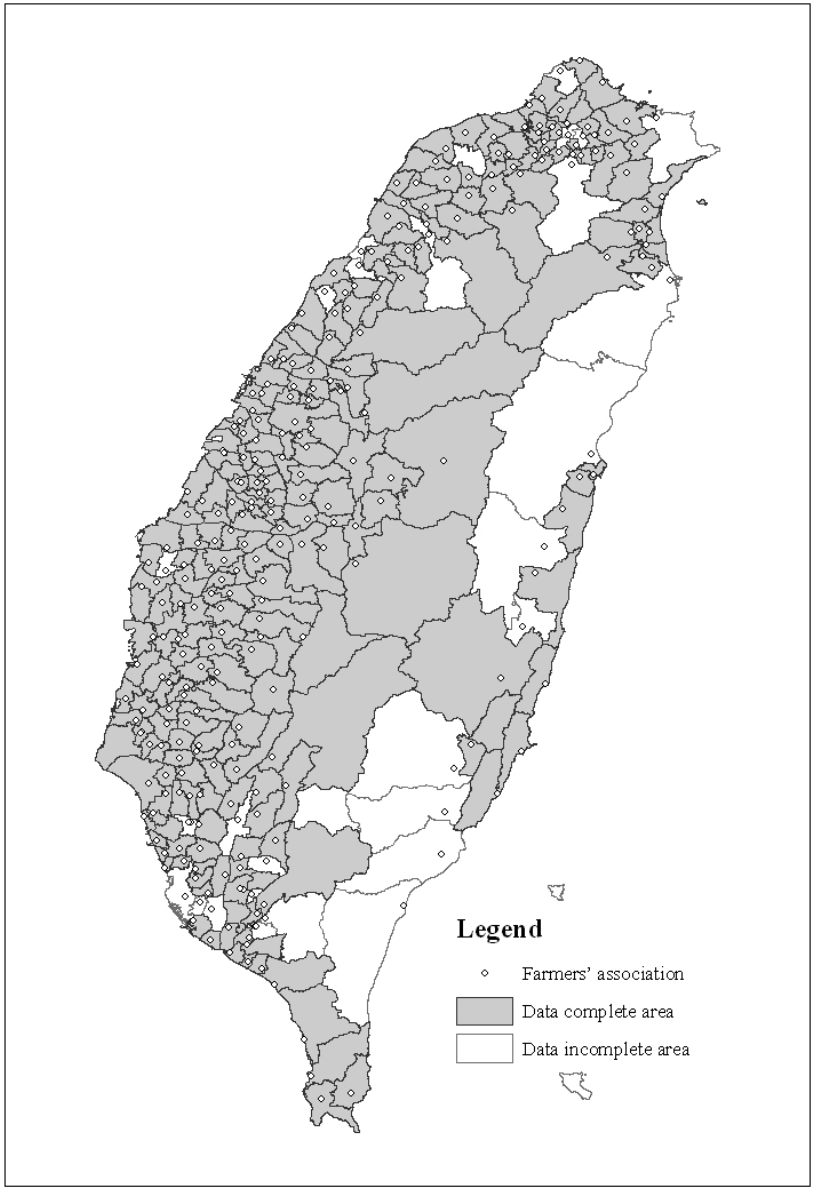


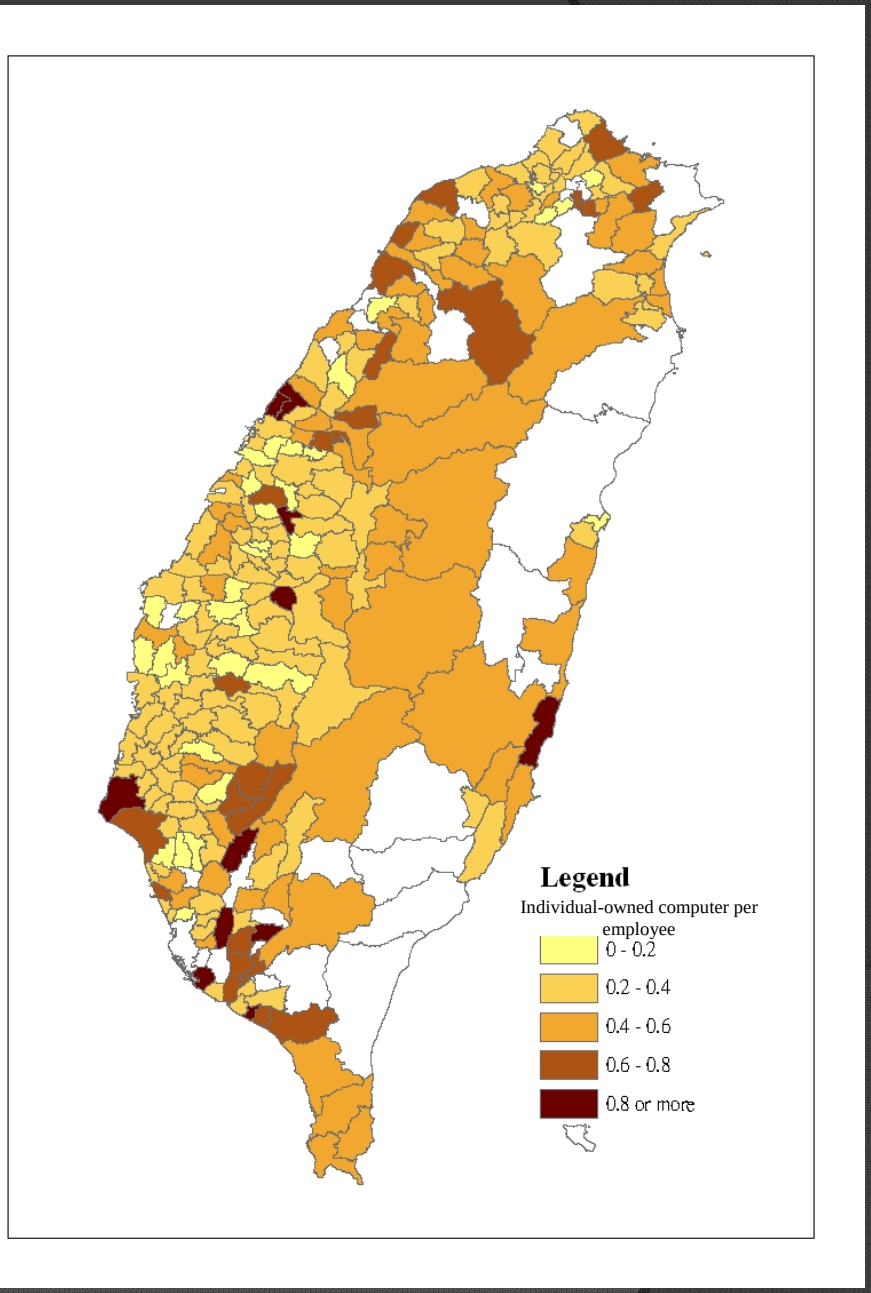
Fig. 2

Informationization
--Individual-owned computer per employee(%)

Distribution: Aggregated

(Moran's I : 0.19)

- Two employee use "one" computer
  (means: 0.40)



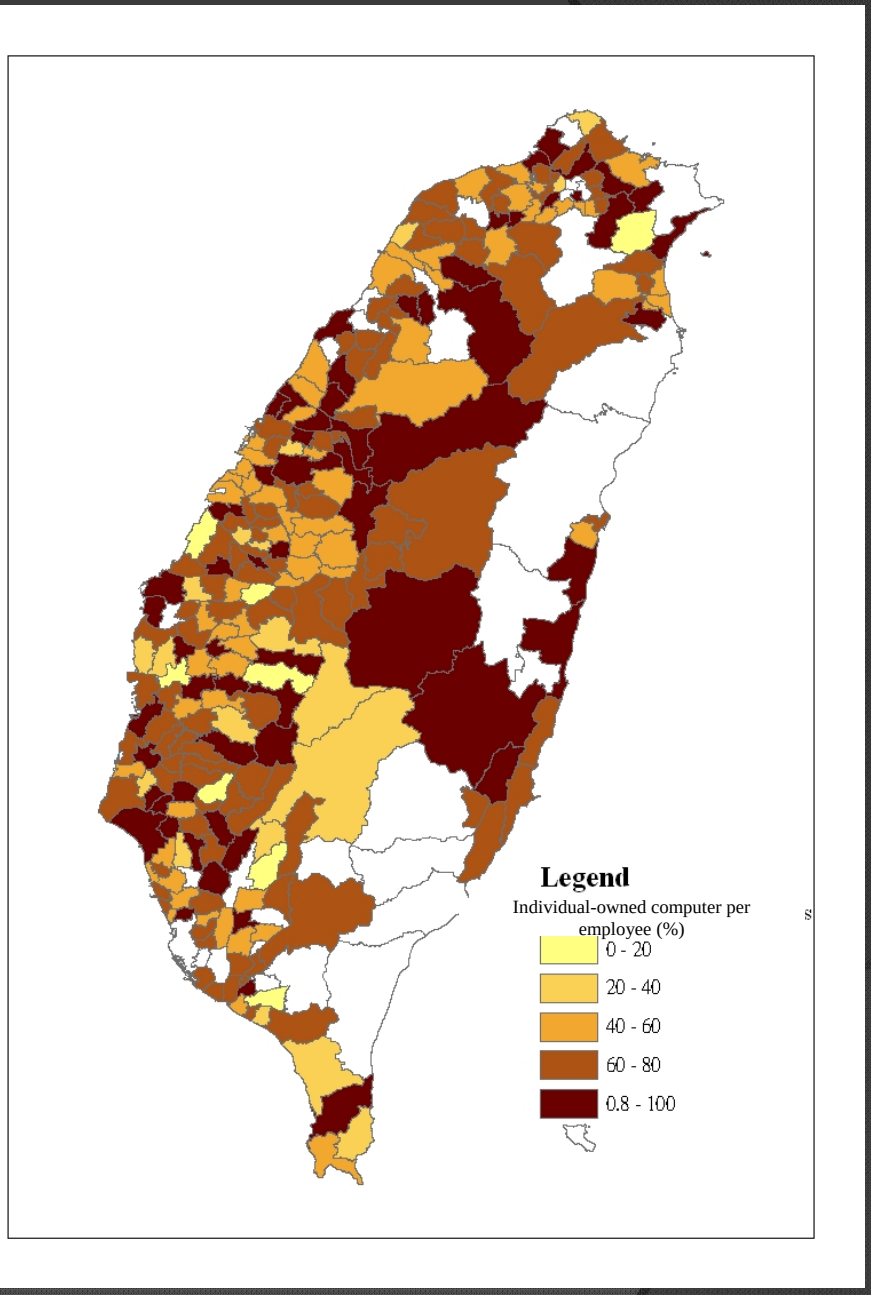
Informationization

--Employees' computer literacy (%)

Distribution: Random

(Moran's I : 0.05)

- employee computer literacy of FAs didn't **influenced** by different geographic position (means: 66.18)



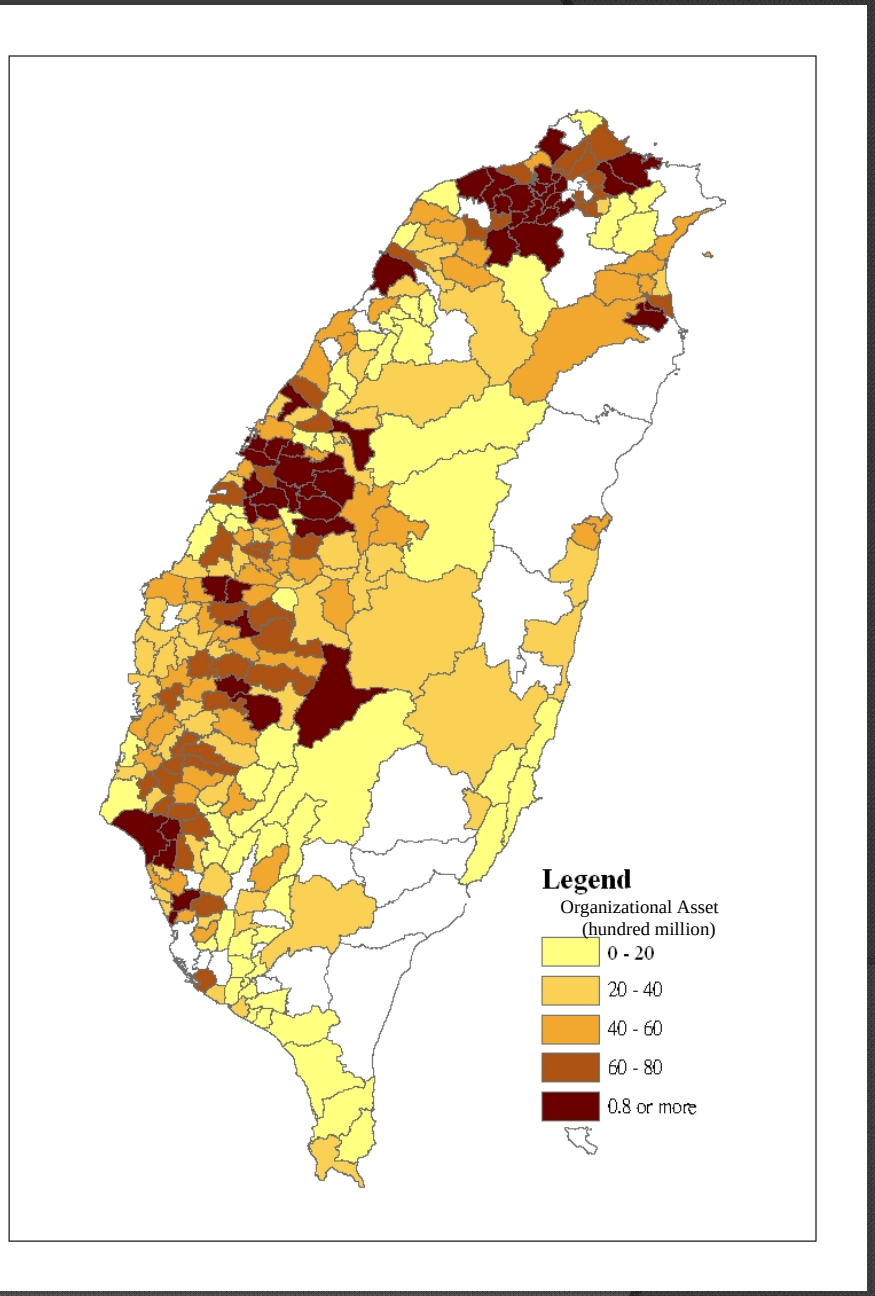
Organizational characteristics

--Organizational Asset (hundred million)

Distribution: Aggregated

(Moran's I : 0.13)

- those FAs which in the northern & central part have **more asset** than other FAs (means: 71.03)

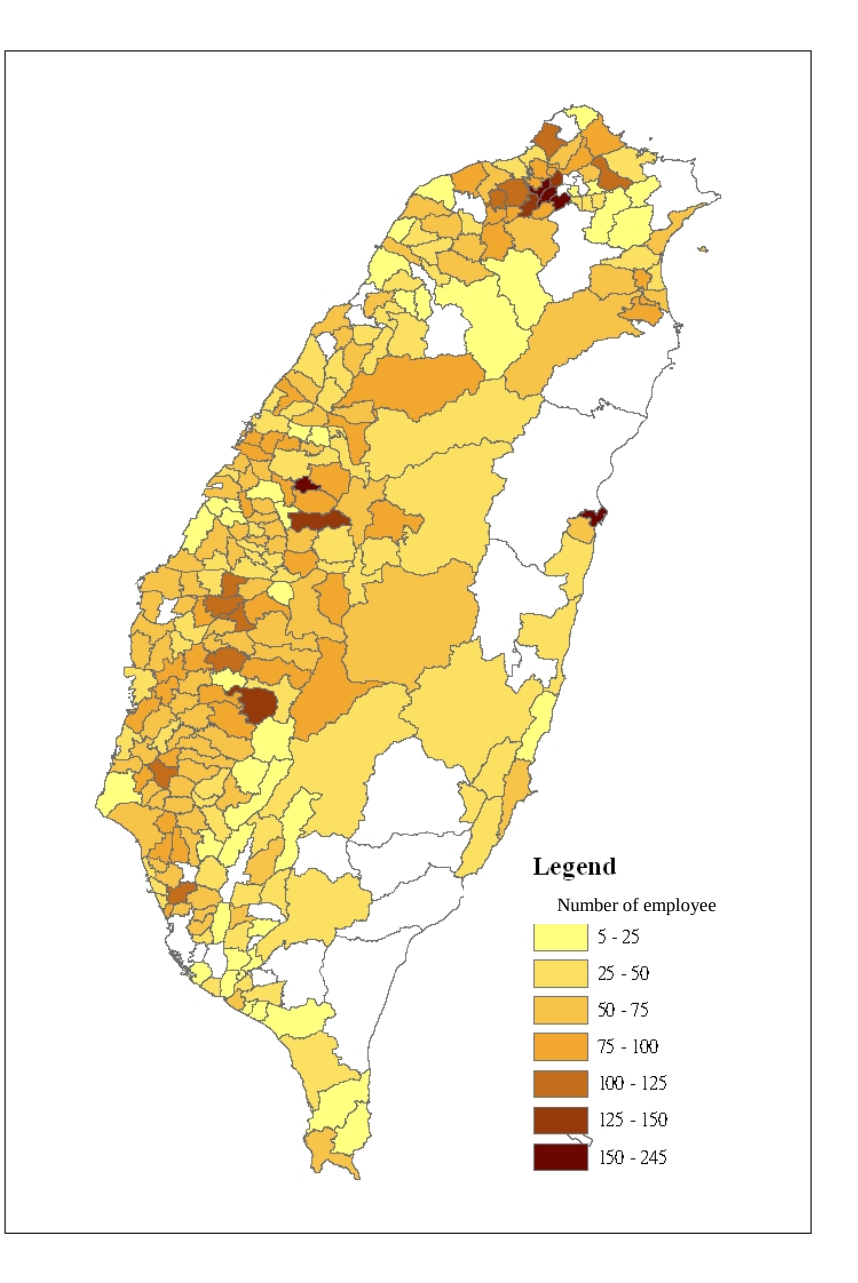


Organizational characteristics
--Number of employee

Distribution: Aggregated

(Moran's I : 0.33)

- FAs in Taiwan are a small or medium enterprise in the majority
  (means : 59)

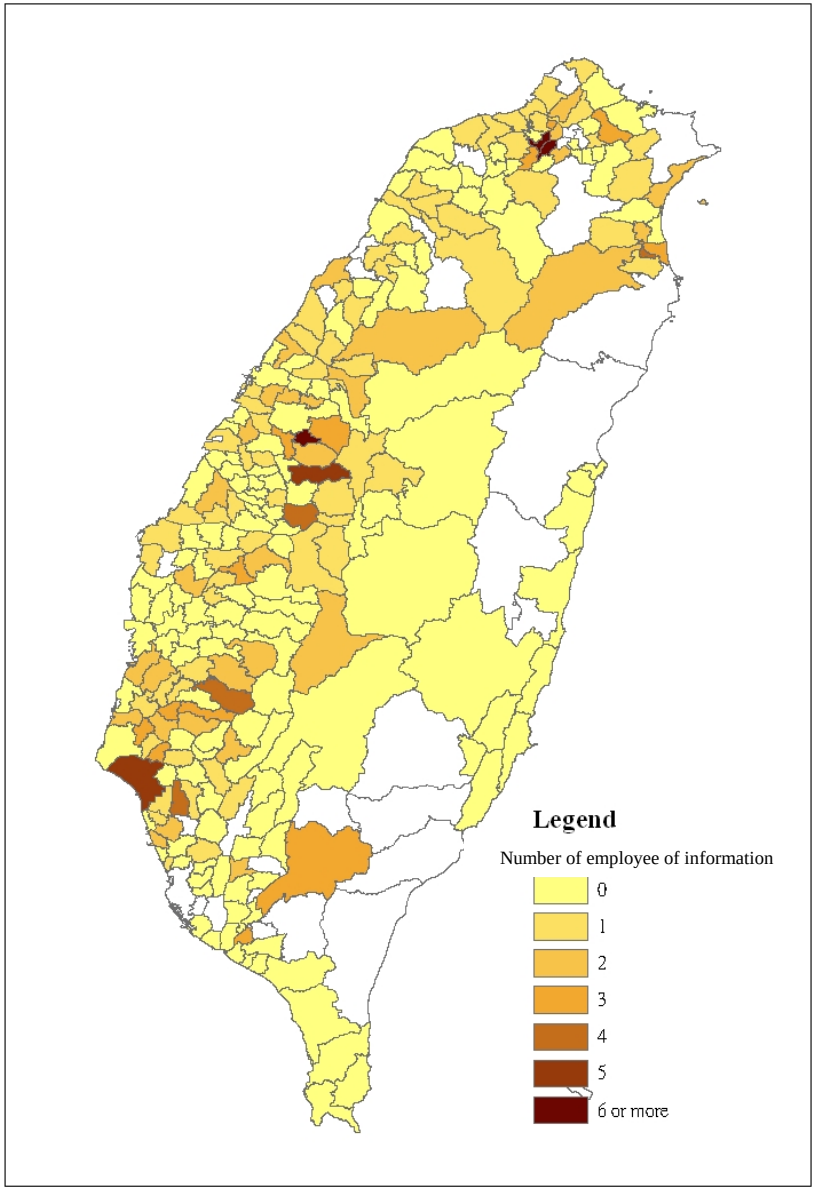


Organizational characteristics
--Number of employee of information department

Distribution: Aggregated

(Moran's I : 0.22)

- FAs don't have information department in the majority (means : 0.95)

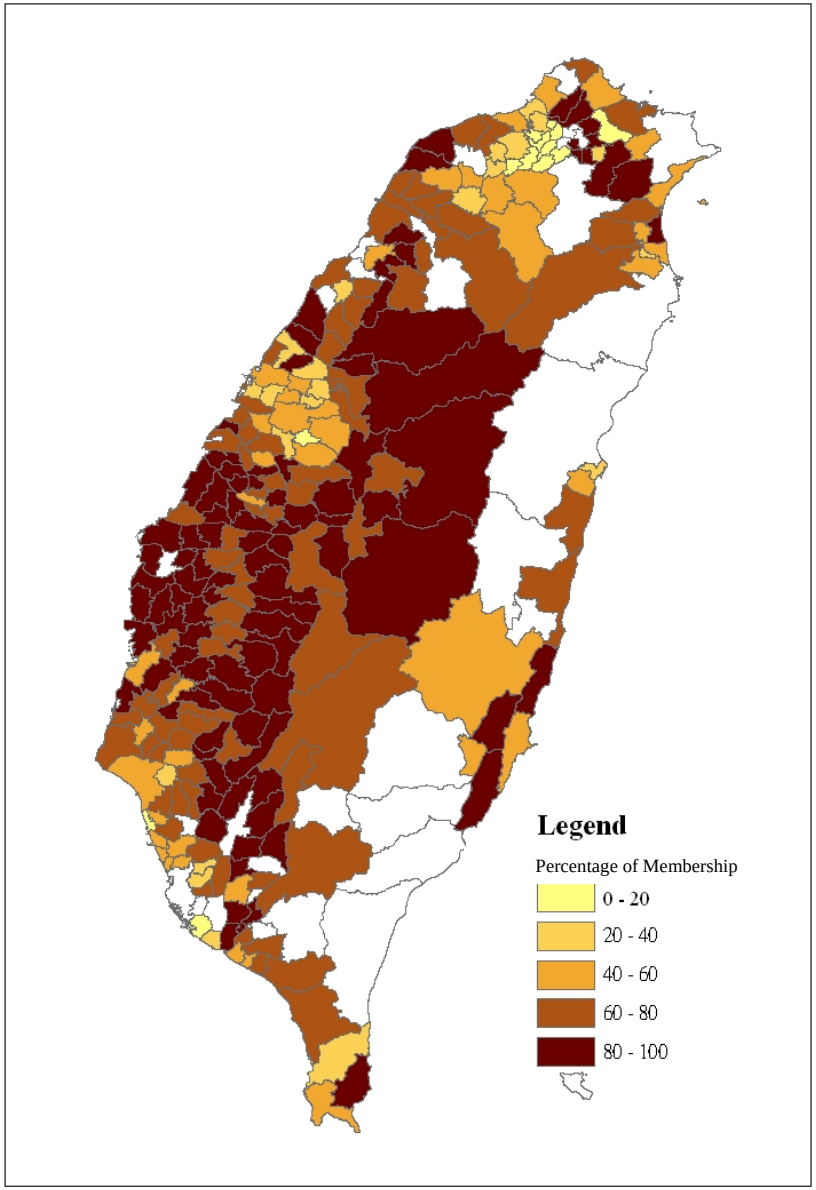


Organizational characteristics
--Percentage of Membership

Distribution: Aggregated

(Moran's I : 0.45)

- In central & southern part, there are more "rural FA" (means: 0.68)



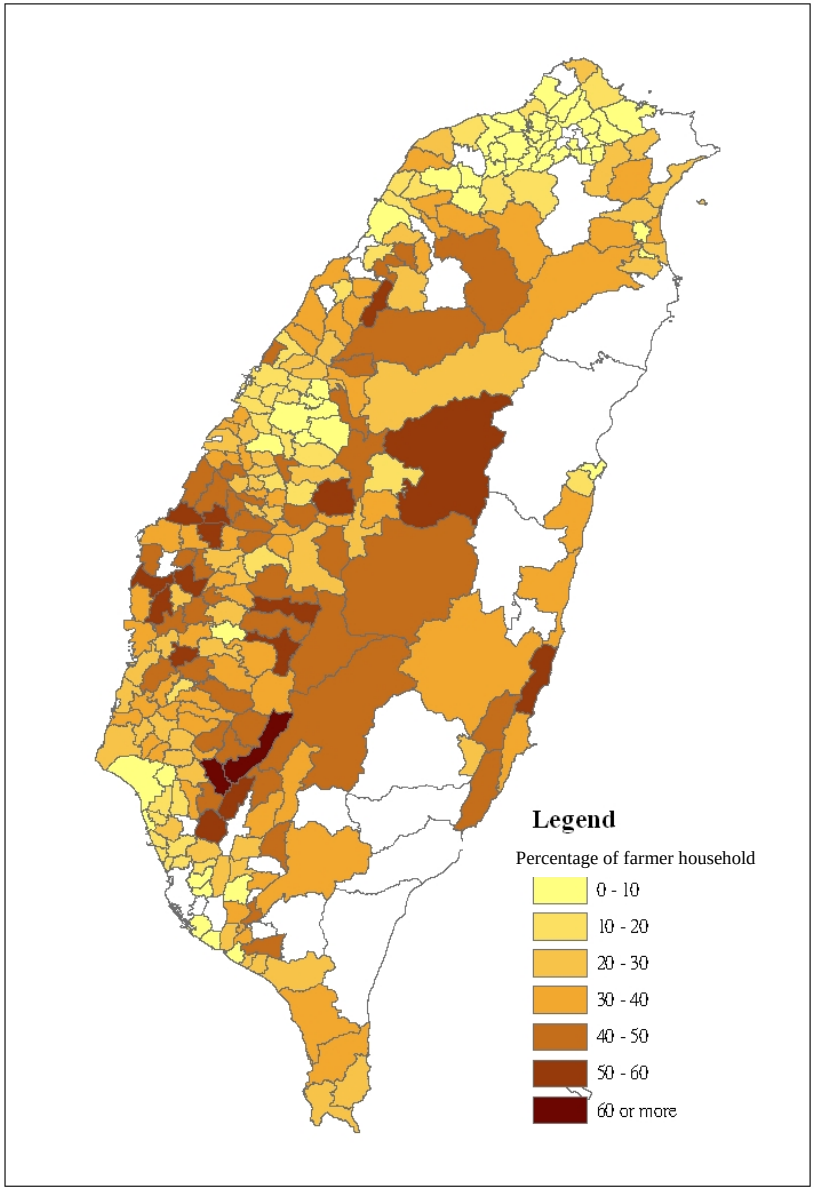
Characteristics of regional agriculture of FA

--Percentage of farmer household

Distribution: Aggregated

(Moran's I : 0.58)

- Higher percentage represents more farmer household, so agriculture is major industry in these area (means: 27.08)



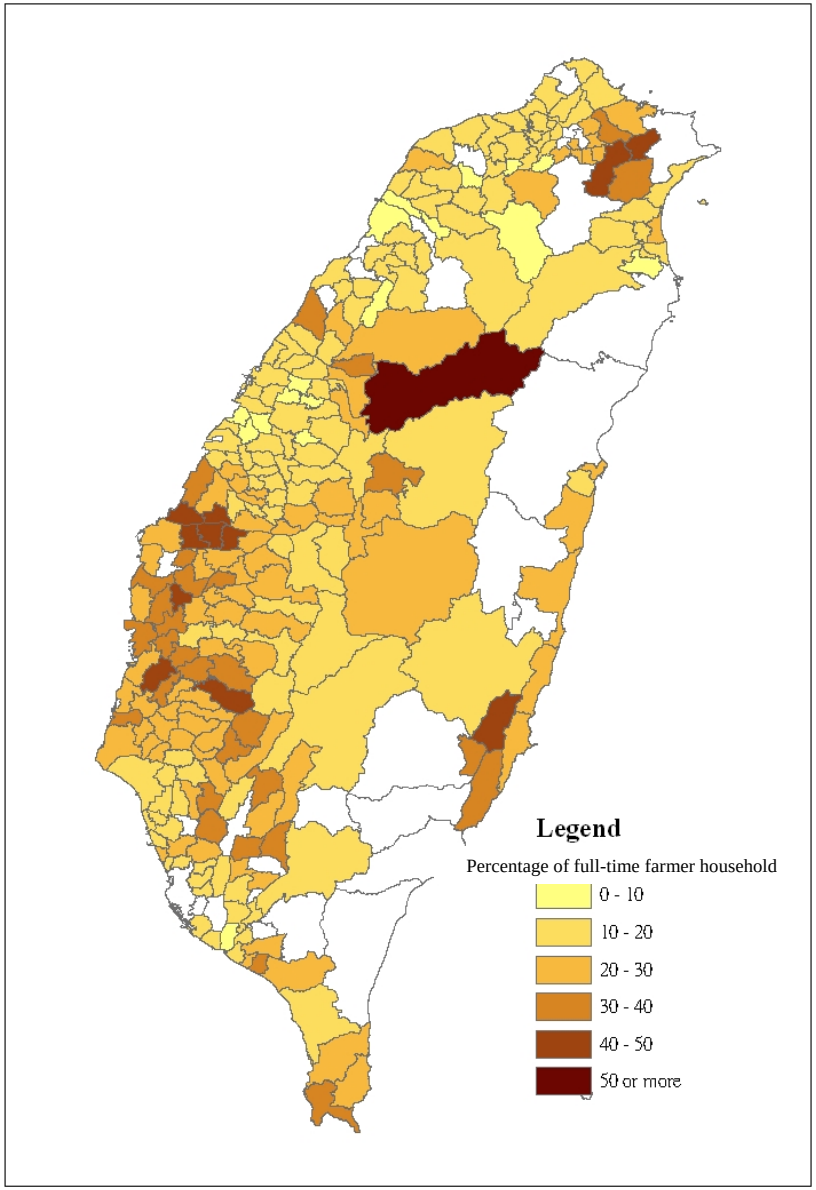
Characteristics of regional agriculture of FA

--Percentage of full-time farmer household

Distribution: Aggregated

(Moran's I : 0.53)

- In central part, there are more full-time farmer household
  (means: 21.52)



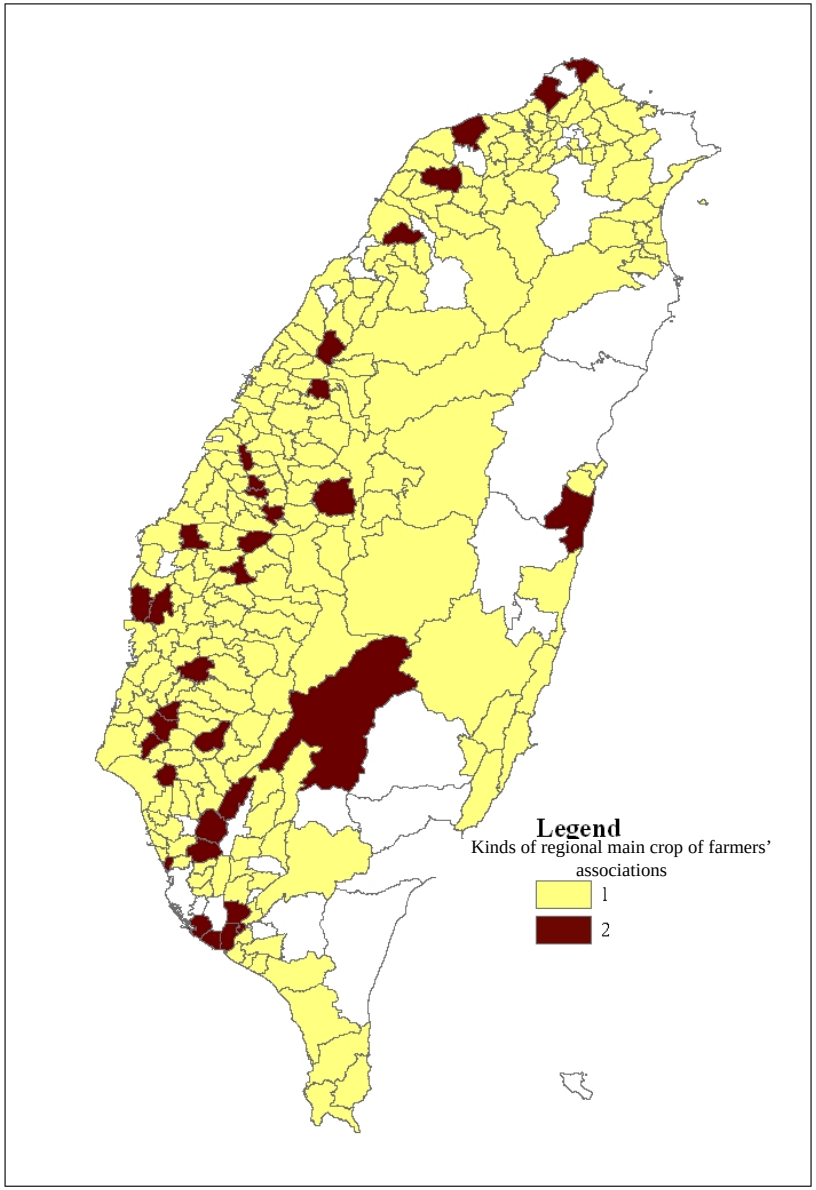
Characteristics of regional agriculture of FA

--Kinds of regional main crop of farmers' associations

Distribution: Random

(Moran's I : 0.02)

- In majority region, there is one kinds of regional main crop
  (means: 1.10)



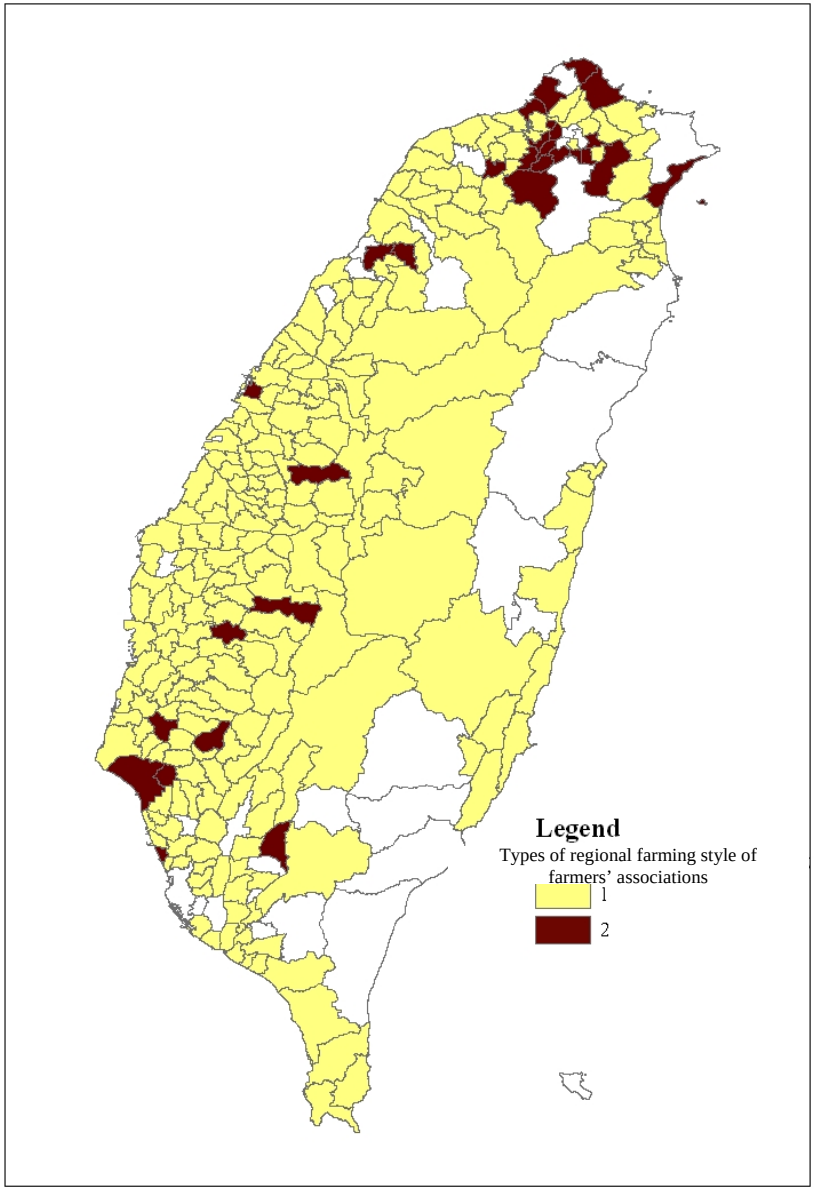
Characteristics of regional agriculture of FA

--Types of regional farming style of farmers' associations

Distribution: Aggregated

(Moran's I : 0.25)

- In majority region, there is one types of farming style (means: 1.12)



Statistic description tables

Variable		Sample	Means	SD	Moran's I	Distribution	Spatial autocorrelation
Informationization of farmers' associations	Individual-owned computer per employee	256	0.40	0.20	0.19*	Aggregated distribution	Low positive correlation
	Employees' computer literacy	256	66.18	20.63	0.05	Random distribution	No correlation
Organizational characteristics	Organizational Assets	256	71.03	132.23	0.13*	Aggregated distribution	Low positive correlation
	Number of employee	256	59.00	34.52	0.33*	Aggregated distribution	Moderate positive correlation
	Number of employees of information department	256	0.95	2.16	0.22**	Aggregated distribution	Low positive correlation
	Percentage of Membership	256	0.68	0.23	0.45*	Aggregated distribution	Moderate positive correlation
Characteristics of regional agriculture of farmers' associations	Percentage of farmer household	256	27.08	15.70	0.58*	Aggregated distribution	Moderate positive correlation
	Percentage of full-time farmer household	256	21.52	9.24	0.53*	Aggregated distribution	Moderate positive correlation
	Kinds of regional main crop of farmers' associations	256	1.10	0.39	0.02	Random distribution	No correlation
	Types of regional farming style of farmers'	256	1.12	0.32	0.25**	Aggregated distribution	Low positive correlation

Dependent variable（Y）：Individual-owned computer per employee			
variable	OLS	SLM	SEM
X1：Organizational Assets (hundred million)	0.0001	0.0002*	0.0002*
X2：Number of employee	- 0.0043**	- 0.0040**	- 0.0040**
X3：Number of employees of information department	0.0267**	0.0254**	0.0259**
X4：Percentage of Membership	- 0.0913	- 0.0788	- 0.0826
X5：Percentage of farmer household	0.0001	0.0004	0.0005
X6：Percentage of full-time farmer household	- 0.0002	- 0.0004	- 0.0006
X7：Kinds of regional main crop of farmers' associations	- 0.0033	0.0007	- 0.0023
X8：Types of regional farming style of farmers' associations	0.0006	0.0050	- 0.0059
R^2	0.3351	0.3685	0.3571
ρ		0.2232**	
λ			0.2060*
F	15.5577		
P	$1.68947e^{-018}$		
N	256	256	256
Moran's I (Residual)	0.0965*	0.0081	0.0273
Akaike info criterion	- 194.385	- 199.623	- 200.697
Schwarz criterion	- 162.478	- 153.536	- 168.790
** p<.01 * p<.05			

Dependent variable（Y）：Employees' computer literacy			
variable	OLS	SLM	SEM
X1：Organizational Assets (hundred million)	0.0036	0.0033	0.0035
X2：Number of employee	- 0.1252**	- 0.1228**	- 0.1184**
X3：Number of employees of information department	1.6664**	1.6338**	1.5485**
X4：Percentage of Membership	- 8.8720	- 8.8390	- 8.4981
X5：Percentage of farmer household	- 0.0036	- 0.0143	- 0.0107
X6：Percentage of full-time farmer household	- 0.0592	- 0.0546	- 0.0434
X7：Kinds of regional main crop of farmers' associations	- 4.0989	- 4.0670	- 4.0607
X8：Types of regional farming style of farmers' associations	1.1487	1.0155	0.8783
R^2	0.0455	0.0537	0.0499
ρ		- 0.1095	
λ			- 0.0818
F	1.4721		
P	0.1679		
N	256	256	256
Moran's I (Residual)	0.0349	0.0003	0.0097
Akaike info criterion	2281.15	2281.54	2280.29
Schwarz criterion	2313.06	2316.99	2312.19
** p<.01 * p<.05			

Result List	
1、The spatial distribution type	
(1) The spatial distribution type about the informationization of farmers' association is aggregated distribution.	Partially support
(2) The spatial distribution type about organizational characteristics of farmers' association is aggregated distribution.	Accept
(3) The spatial distribution type about characteristics of regional agriculture of farmers' associations is aggregated distribution.	Partially support
2、Organizational characteristics	
(1) More the organizational Assets a farmers' association has, it's informationization will be higher.	Partially support
(2) More the number of employee a farmers' association has, it's informationization will be higher.	Accept
(3) More the number of employees of information department a farmers' association has, it's informationization will be higher.	Accept
(4) More percentage of membership a farmers' association has, it's informationization will be higher.	Reject
3、Characteristics of regional agriculture of farmers' associations	
(1) Higher the percentage of farmer household a farmers' association has, it's informationization will be higher.	Reject
(2) Higher the percentage of full-time farmer household a farmers' association has, it's informationization will be higher.	Reject
(3) More kinds of regional main crop of farmers' associationsa farmers' association has, it's informationization will be higher.	Reject
(4) More Types of regional farming style a farmers' association has, it's informationization will be higher.	Reject
4、The influence of Neighbor farmers' association	
The neighbor farmers' associations have higher informationization, and the informationization of the farmers' association is higher.	Partially support

4.Conclusion

- Influential factors contributing to informationization of farmers' associations in Taiwan
  - Organizational Assets
  - Number of employee
  - Number of employees of information department
  - Neighbor farmers' associations will cause influence on the informationization of every farmers' association.
  - Still have some other influence factors that have spatial autocorrelations.

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Q & A

THANK YOU