

Export Diversification of Agricultural Products in Vietnam under French Rule : Reconsideration of the Rice Monoculture*

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Abstract

This study queries the validity of the stereotype 'rice monoculture' about Vietnam from the colonial period to the present and clarifies that Vietnamese agriculture was developed with diversification by local Vietnamese in the colonial period. In addition, we confirm the significance of their market adaptability and entrepreneurship in agricultural development.

We indicate that many materials in the colonial period were unevenly distributed to Cochinchina, which is the present southern Vietnam including the Mekong Delta, the largest breadbasket in Vietnam, as one of the reasons that Vietnam is regarded a 'rice monoculture'. Additionally, we clarify that the concept of monoculture, which focuses only on agricultural products with a large share of exports, obscures various activities of agriculture in a northern and central area called Tonkin, Annam in the colonial period, and the development of natural rubber cultivation and exportation in the southern area. Based on this, we indicate that various agricultural products were cultivated and exported in the northern and central area and evaluate the market adaptability and entrepreneurship of the local Vietnamese who supported them.

The progress of natural rubber cultivation and exportation since the late 1920s in Cochinchina, which was the main rice exporter, is a phenomenon that breaks stereotypes such as the 'rice monoculture'. We confirm the increase of small-scale plantations as an appropriate response by the local Vietnamese to the development of the international rubber market. Considering that the plantation is a new production system introduced from Europe, we can evaluate the entrepreneurship of the local Vietnamese who operated small plantations with a risk-taking attitude.

1. Introduction : Reconsideration of the rice monoculture

The global food crisis that occurred from 2007 to 2008 revealed the presence of Vietnam, which is the world's second largest rice exporter.¹⁾ However, the stereotype of Vietnam as a rice exporter was

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1) According to FAO, *Rice Market Monitor, October 2016*, XIX, (3), Vietnam is the third largest rice exporter with 7.2 million tons after India (10.0 million tons) and Thailand (9.9 million tons).

widespread during the colonial period.²⁾ The problem with this view is that many researchers regarded the economy of French Indochina (*Indochine française* in French), the name of Vietnam during the colonial period (Figure 1), which was one of the major rice exporters to places such as Siam, Burma, as the rice monoculture.³⁾ In particular, colonial Vietnam, defined as the rice monoculture, has been considered a food supply base for the plantations (e.g. rubber and sugar cane) in another area.⁴⁾

Obviously, although we have no objection to the functions of colonial Vietnam as a major rice exporter, we should carefully consider the view that colonial Vietnam was characterised as a rice monoculture, specialised in rice export only. The view of the rice monoculture obscures the fact that various agricultural products were planted in colonial Vietnam and exported from there, and gives a biased evaluation of agricultural development in Vietnam. In fact, as mentioned in this study, various agricultural products were produced in northern, central, and southern Vietnam during the colonial period. Additionally, the export of natural rubber saw dramatic growth in the 1930s in southern Vietnam, which was a base for the export of rice.

Why did colonial Vietnam come to be regarded as a rice monoculture? We consider two main issues related to this view. Most of the existing materials on colonial Vietnam are about Cochinchina. Colonial Vietnam is often considered to be separated into northern, central, and southern regions; traditionally, Cochinchina, which is a southern region, was only a crown colony of France. Therefore, we can use detailed documentation prepared by the colonial authorities, such as the Governor General of Indochina (*Gouvernement général de l'Indochine*).⁵⁾ Additionally, Cochinchina included the Mekong River

2) A detailed discussion of colonial Vietnam as a rice exporter can be found in Takahashi [2006].

3) In this study, we explicitly distinguish between the terms 'colonial Vietnam' and French Indochina. French Indochina refers strictly to Federal Indochina (*L'Union Indochinoise*) established in 1887. It was composed of Cochinchina, centred on Saigon; Tonkin protectorate, centred on Hanoi and corresponding to the northern part of current Vietnam; Annam protectorate, centred on Hue, and corresponding to the central part of current Vietnam; the Cambodia protectorate; Laos protectorate; and the Kwangchowan leased territory (the Laos protectorate and Kwangchowan leased territory were integrated in 1893 and 1900, respectively). Therefore, we regard 'colonial Vietnam' as the combined area of Tonkin, Annam, and Cochinchina.

4) In a study of Vietnam during the colonial period, for example, Kikuchi [1988], Brocheux, and Hémerly [2009: 189] debate using the term 'monoculture of rice' directly. Additionally, Kano [2001] and Sugihara [1996] positioned French Indochina as a specialised economy for rice exportation with the progress of interregional division among the colonial economy in Asia. We consider that this is also a kind of rice monoculture view.

5) Most of the materials published from 1862, when the first treaty of Saigon was signed, by which eastern Cochinchina was ceded to France, to around 1900 are those of Cochinchina, such as *Etat de la Cochinchine Française*. There were little information of Tonkin and Annam compared to Cochinchina in the early 20th century. Therefore, the studies carried out in rural areas in Tonkin and Annam by French geographer P. Gourou and French agricultural economist Y. Henry were very interesting. These findings are summarised as Gourou [1936] and Henry [1932], respectively.

Additionally, there is an issue of whether colonial Vietnam, which was divided into northern, central, and southern parts, can be regarded as a unity, such as a market area. Considering that the Nguyen Dynasty already carried out unified governance of the northern, central, and southern parts, the whole of colonial Vietnam is considered to be a market area consisting of these three parts. Additionally, the fact that workers of Tonkin flowed into the natural rubber plantations in Cochinchina means that the labour markets of Tonkin and Cochinchina were integrated.

Figure 1 Map of Vietnam under French Rule

Tonkin

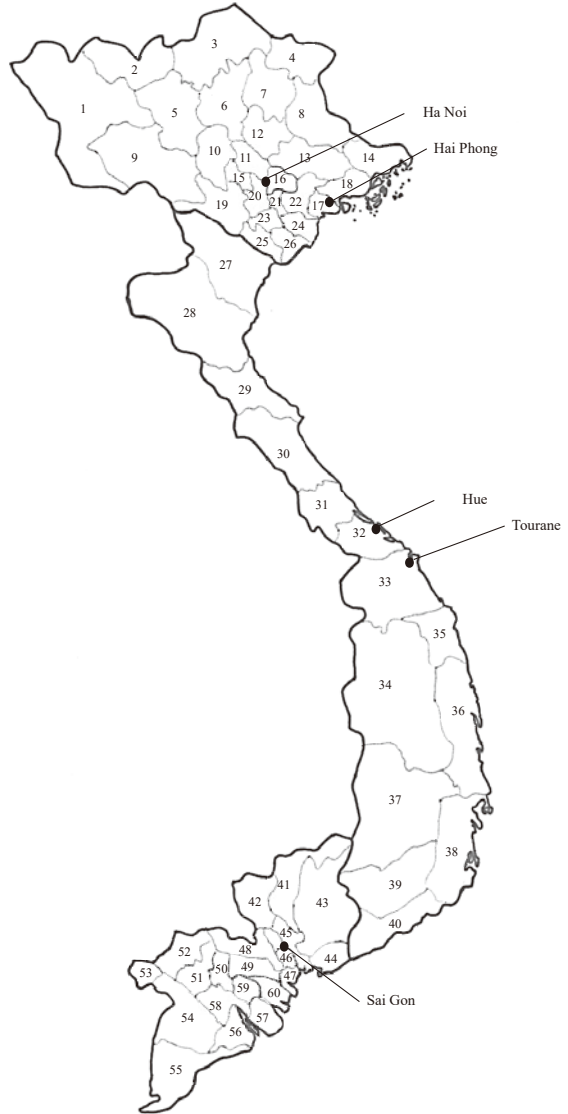
1. Lai Chau
2. Lao Cay
3. Ha Giang
4. Cao Bang
5. Yen Bay
6. Tuyen Quang
7. Bac Kan
8. Lang Son
9. Son La
10. Phu To
11. Vinh Yen
12. Thai Nguyen
13. Bac Giang
14. Hai Ninh
15. Son Tay
16. Bac Ninh
17. Kien An
18. Quang Yen
19. Hoa Binh
20. Ha Dong
21. Hung Yen
22. Hai Duong
23. Ha Nam
24. Thai Binh
25. Ninh Binh
26. Nam Dinh

Annam

27. Thanh Hoa
28. Nghe An
29. Ha Tinh
30. Quang Binh
31. Quang Tri
32. Thua Thien
33. Quang Nam
34. Kontum
35. Quang Ngai
36. Binh Dinh
37. Dar Lac
38. Khanh Hoa
39. Lang Bien
40. Binh Thuan

Cochinchina

- | | |
|-----------------|----------------|
| 41. Thu Dau Mot | 51. Long Xuyen |
| 42. Tay Ninh | 52. Chau Doc |
| 43. Bien Hoa | 53. Ha Tien |
| 44. Ba Ria | 54. Rach Gia |
| 45. Gia Dinh | 55. Bac Lieu |
| 46. Cho Lon | 56. Soc Trang |
| 47. Go Cong | 57. Tra Vinh |
| 48. Tan An | 58. Can Tho |
| 49. Mi Tho | 59. Vinh Long |
| 50. Sa Dec | |



Source : Maspero, G. [1930] *L'Indochine, un empire colonial français*, Tome 2^e : *L'Indochine française, l'Indochine économique, l'Indochine pittoresque*. Paris : G. Van Oest.

- Notes : 1) The numbers in the figure indicate the locations of each province. Although the names of provinces such as Phu To and Mi Tho are possibly misprints, we spell them as described in the source. 'Tourane' is present 'Da Nang (Đà Nẵng)'.
 2) On the map of the source, there is no description of the time point. However, considering that we can confirm Lam Bian (Lam Vien) province which existed from January 1916 to October 1920 (Haut Dongnai or Dong Nai Thuong during the period other than above before January 1941) on the map, the map is considered to show condition in the late 1910s.

Delta, which is famous as a breadbasket, and the rice of the Mekong River Delta is integrated into Cholon and Saigon.⁶⁾ Large amounts of rice, often known as 'Saigon rice', were exported to other Asian areas mainly.⁷⁾ We understand that the analysis of Cochinchina, which is the rice export region, has often been regarded as an analysis of all of Indochina. Furthermore, we have no alternative but to use the data on agricultural exports to analyse the agricultural development of colonial Vietnam, because data on agricultural production of materials during the colonial period is scarce.⁸⁾

Second, the concept of monoculture has the characteristic that it disguises the diversity of agriculture. Arthur Lewis (Lewis, W.A.) defined the concept of monoculture as 'to export a single crop'⁹⁾ (i.e. this concept of monoculture has the possibility of providing misleading evaluations of agricultural development by ignoring the production of agricultural products for the domestic market or export shares that are relatively low). Sufficient attention has not been paid to agricultural products other than rice that were produced in the northern, central, and southern regions of colonial Vietnam, which is considered to be a rice monoculture.

From these points of view, this study raises questions about the view that colonial Vietnam is regarded as a rice monoculture, aiming to examine the following two hypotheses and give our own answers. The first hypothesis is that the agriculture of colonial Vietnam was characterised by a diversity of production and export, as in Tonkin and Annam, which have not been mentioned much in the existing studies. We note the diversification of agricultural exports even in Cochinchina, which was the major rice exporter (i.e. the growth of rubber export was equal to rice in the 1930s).

Second, the agricultural diversity, which is different from the rice monoculture, was created by Vietnamese peasants and plantation farmers who could respond appropriately to market opportunities with the development of the domestic and international market of agricultural products. Therefore, we should pay attention to the natural rubber section in southern Vietnam which increased in exports, provide much information on the materials available, observe the process of rubber export growing in the 1930s, clarify the characteristics of plantations that supported the export of natural rubber, and indicate the adaptation of ethnic Chinese and Vietnamese to the international market. Thus, their entrepreneurship was very important.

In this study, the *Statistical Yearbook of Indochina* (*Annuaire Statistique de l'Indochine* in French) is mainly used for our analysis because it includes time series data on the export of agricultural products for

6) Cholon district corresponds to a part of the fifth and sixth wards of Ho Chi Minh City today. Large canals (*Arroyo Chinois*) were founded around the area called Khanhhoi, many junks came and went, and great quantities of rice were brought and milled.

7) About 97% of the rice exported from French Indochina consisted of 'Saigon rice', which was exported from Saigon. Additionally, nearly 80% of Saigon rice was from Cochinchina, including the Mekong River Delta. For more information, see Takahashi [2006].

8) Generally, the system of trade statistics is established for the purpose of custom collection before the system of production statistics is established at an early stage of economic development.

9) Lewis [1970 : 37] gives the following description : 'Agriculture shows quite a different picture, for this is the era in which 'monoculture' became established. The term is misleading since it implies cultivation of only one crop, whereas what happens is a tendency to export only one crop.'

the northern, central, and southern regions. Additionally, to analyse the second hypothesis, which focuses on the economic agent (i.e. plantations managed by ethnic Chinese and Vietnamese) at the micro level, we use *Annuaire du Syndicat des Planteurs de Caoutchouc de l'Indochine* 1926 and 1937, which include rosters of members of the rubber plantation's union. Attempts to analyse using these micro data have not been carried out so far, and this analysis is a major feature of this study. The reference period is from the late 19th century, when the data on agricultural exports are available, to about 1945, when World War II ended and North Vietnam was established.

Next, we consider the diversification of agricultural exports in colonial Vietnam using the data of Tonkin, Annam, and Cochinchina, and present a point of view that is different from the traditional perspective of the rice monoculture in Section 2. In particular, we note that natural rubber export progressed in Cochinchina, which has been linked closely with the view of the rice monoculture, and provide an overview of the process. In section 3, we conduct an analysis of the adaptation of plantations to the international rubber market and entrepreneurship of the ethnic Chinese and Vietnamese.

2. Diversity of agriculture during the colonial period

2-1. Diversification of export items

In the beginning, we confirm the total exports of Vietnam during the colonial period in Figure 2. Except for the 1930s when rice export diminished under the influence of the Great Depression,¹⁰⁾ the total export increase over roughly the whole period. On the other hand, H index observes that the diversification or specialization of the export (for details, refer to the note to Figure 2) has been increasing steadily although there were fluctuations until the 1920s. Therefore, the H index indicated the specialization of the export until the 1920s. However, the index continued to decrease, and while the value in the 1920s was greater than 0.6, it fell to 0.2 in the second half of 1930s. We knew that export items of French Indochina had been rapidly diversified since the 1920s, behind the growth of total exports.

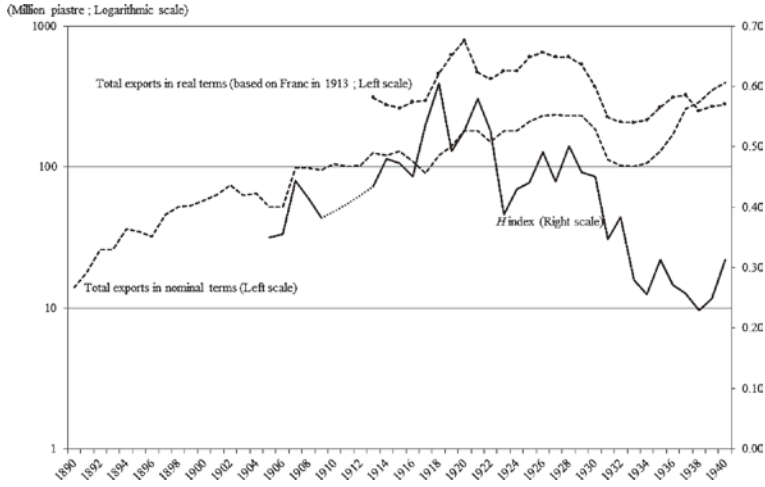
Why did such an export diversification happen? To clarify this, we will confirm trends in export values by region and the change in the composition of the main export items. Figure 3 shows what was observed in the time series data of export values for Cochinchina, Tonkin, Annam, Cambodia, and Laos, which made up French Indochina. According to the figures, export values are highest for Cochinchina, followed in order by Tonkin, Annam, Cambodia, and Laos, and we know that there are no changes for their positional relationship from the end of the 19th century until 1940.

When we check the composition change of major export items in Figure 4, we see that the export share of rice is extremely high in the group that includes rice, maize, coal, smoked and dried fish, natural rubber, cement, leather, pepper, copra, and other items.¹¹⁾ Most of the rice exported was from Cochi-

10) The decline of rice exports in the 1930s seems to have been due to the falling of rice prices related to the Great Depression and the block economy. See also the discussion in Takahashi [2006].

11) In particular, the coalfield Hongai (*Hòn Gai*) at Halong (*Hạ Long*) City (the capital of current Quang Ninh (*Quảng Ninh*) province, also known for Halong Bay, the world heritage site) is very famous. For more information, see Robequain [1939] and a recent study, Brocheux and Hémary [2009 : 124].

Figure 2 Changes and Diversification in Total Exports



Source : *Résumé statistique relatif aux années 1913 a 1940*.

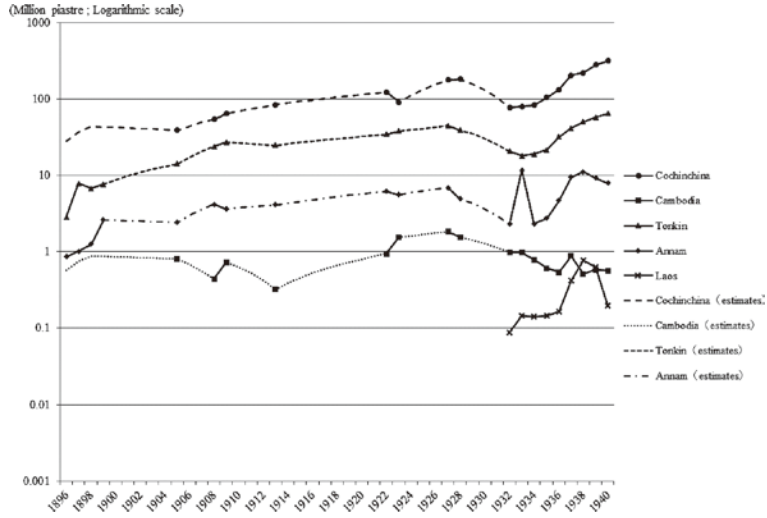
Note : H index is the Hirschman=Herfindahl index calculated as $\sum \alpha_i^2$ when the export share of item i is shown as α_i . This index indicates the concentration of the export component if this value is high (if lower, diversification). We calculated α_i of rice, maize, coal, smoked and dried fish, natural rubber, cement, leather, pepper, copra, and other items. Additionally, the dotted line of the H index indicates that the data were obtained by linear interpolation.

nchina (see Note 7) ; as described above, the view of the rice monoculture was created by the export structure specialised in rice. The export structure that was specialised for rice continued to the mid-1920s ; thereafter, the proportion of exports other than rice, such as natural rubber and maize, expanded rapidly and, because exports diversified due to the collapse of the export structure specialised for rice, it is no longer regarded as a rice monoculture. In particular, natural rubber was often grown in Cochinchina and exported from there, as detailed below. Therefore, it is remarkable that export diversification progressed due to increasing natural rubber in the 1930s, notwithstanding the superiority of exports from Cochinchina confirmed in Figure 3.

On the other hand, maize has been cultivated in all regions of Tonkin, Annam, and Cochinchina as a food of the Vietnamese since ancient times,¹²⁾ and maize export grew rapidly with the development of the international market, especially after the implementation of the protective policy for products of French colonies in 1932 (the tariff hikes for grain from other countries using production quotas) (Robequain [1939]). Importantly, the indigenous peasants were able to adapt to changes in the market, such as the increase of imports from France and the development of the international market. As noted above, not only in Cochinchina, but also in all of Vietnam, including Tonkin and Annam, the adaptation of Vietnamese

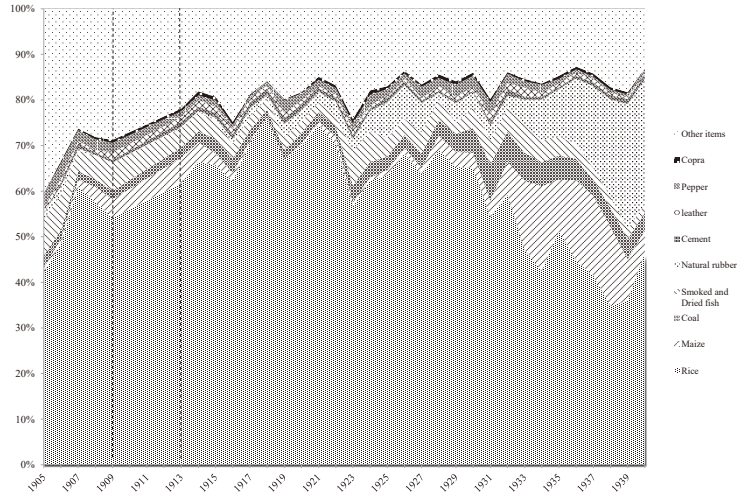
12) Maize had been grown after the harvest of the rice in the tenth lunar month (lúa mùa) in Tonkin, and double or triple cropping of maize was done in Annam and Cochinchina (Henry [1932]). Regarding the situation of maize production in Annam prior to the exportation of maize, see 'La culture du maïs en Annam,' on *Bulletin Economique de l'Indochine*, 40 (October 1, 1901).

Figure 3 Trends in Exports by Region



Source : *British Consular Reports in the British Parliamentary Papers*, various years.
 Note : Linear interpolation was used to estimate trends in exports.

Figure 4 Change the Composition of the Main Export Items



Source : The same as Figure 2.

Note : The dotted line drawn in 1909 and 1913 indicates that the data in that section were obtained by linear interpolation.

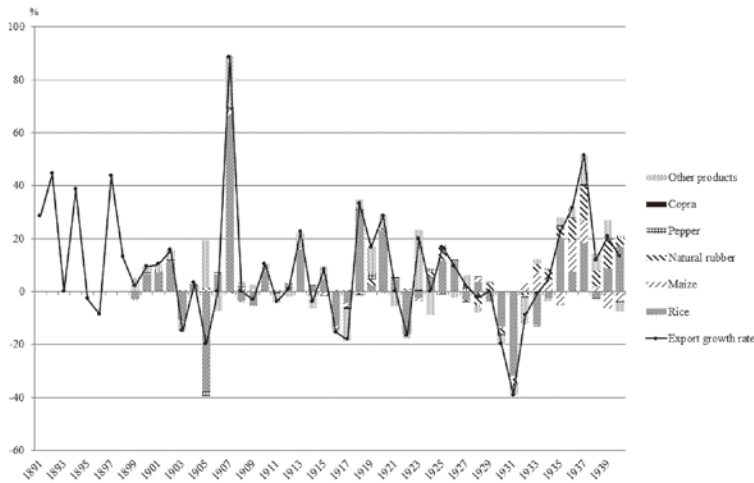
(and ethnic Chinese, who were deeply involved in the export of agricultural products) was confirmed as the expansion of agricultural exports (the diversification of exports of agricultural products) or the development of natural rubber plantations during the colonial period.

2-2. Diversification of agricultural products and export growth of natural rubber

By limiting our consideration to exports of agricultural products, we can understand the importance of agricultural diversity in Tonkin, Annam, and the rubber export of Cochinchina, thereby clarifying the type of agricultural development, unlike the rice monoculture discussed above.

The trends in the contribution ratios of the exports in major agricultural products are given in Figure 5. Until the early 1930s, it was known that most of the year-on-year growth rate of exports could be explained by the export of rice. However, the contribution of rice in agricultural exports is weak for the late 1930s, recovering from the effects of the Great Depression, and the agricultural export growth is explained by the exports of maize and natural rubber described above. It is certain that the role of rice export was great until the early 1930s in the development of agricultural exports, consistent with Figure 4. However, except for the year 1940,¹³⁾ it is clear that the exports of maize and natural rubber had made important contributions to the agricultural exports of French Indochina in the late 1930s. In particular, the contribution of rubber exports gradually increasing to the year 1939 cannot be ignored. As mentioned above, cultivation of natural rubber was carried out mainly in Cochinchina, and we understand that the driving force for the growth of the agricultural export had changed from rice to natural rubber there.

Figure 5 Trends in the Contribution Ratio of the Exports of Major Agricultural Products



Source : The same as Figure 2.

13) Per *Annuaire Statistique de l'Indochine*, exports of rice (total of white rice, brown rice, broken rice, and bran) for Japan increased rapidly, from 7,629 tons in 1939 to 468,280 tons in 1940. We should note that this period overlaps the time when Japan strengthened its involvement with French Indochina, including the Japanese military occupation of French Indochina. Therefore, we understand the increase in rice exports to Japan from French Indochina during this period.

Additionally, we understand the important role of products categorised as ‘Other items’ in Figure 5, especially in 1905 and 1923. The fact that agricultural diversity progressed in Tonkin and Annam is known by confirming the export development of agricultural products, which is summarised in the ‘Other items’ in detail. Table 1 shows the average annual growth rate of exports for 29 items including major export items such as rice, maize, natural rubber, and 26 other items over half a century, from the 1890s to the 1930s. We know the following facts, per Table 1 : 1) although rice exports increased significantly in the late 19th century, such rapid growth was not seen thereafter, 2) exports of maize and natural rubber increased from a relatively early stage, 3) copra, star anise, castor oil, lacquer, benzoin resin, coffee, tea, cardamom-amomum, cotton (seed cotton and ginned cotton), kapok, and buffalo showed positive export growth on average during the entire period. These facts are consistent with our conflicting view about the rice monoculture mentioned repeatedly above, especially observation 3. In other words, the agricultural products mentioned in observation 3 are those that are grown in large volumes in Annam and Tonkin for export, demonstrating that diversified agriculture developed in Tonkin and Annam (Robequain [1939], Henry [1932]).¹⁴⁾ Furthermore, because many crops experienced rapid export growth since the early 20th century, we suggest that indigenous peasants in Tonkin and Annam adapted to the development of export markets early.

As mentioned above, the development of the cultivation and export of various crops in Tonkin and Annam, as well as the expansion in exports of natural rubber, are difficult to reconcile with the conventional rice monoculture view, and the agriculture of Vietnam was characterised by the diversification of agricultural exports during the colonial period. More importantly, the diversification of agricultural exports was supported by indigenous peasants and plantations. In the next section, we focus on the natural rubber sector with many materials, relatively ; because rubber exports supported the export diversification of agricultural products in colonial Vietnam in the 1930s, we analyse the adaptation of rubber plantations to markets.

3. Development of rubber plantations and rubber exportation

3-1. Development of rubber plantations

Against the background of an increase in exports of natural rubber in the 1930s, which also led to the diversification of agricultural exports, there was a development of rubber plantations. The rubber tree (*Hevea brasiliensis*) was introduced into FrenchIndochina for the first time by Raoul, who was a pharmacist of the French Navy, and who sent 2,000 saplings to the botanical garden in Saigon from British Malaya where he worked in 1897 (Robequain [1939]). After many complications, French settlers culti-

14) Per Henry [1932], the production areas of products described above are as follows : copra was produced in Cochinchina and Annam ; star anise in Tonkin ; castor oil in Tonkin ; lacquer and benzoin resin in Tonkin and Annam ; coffee in Tonkin and Annam ; tea in Tonkin, Annam, and Cochinchina ; cardamom-amomum in Tonkin and Annam ; cotton in Tonkin, Annam, and Cochinchina ; kapok in Cochinchina ; and buffalo in Tonkin, Annam, and Cochinchina. There were many agricultural products produced in Tonkin and Annam but not in Cochinchina.

Table 1 Average Annual Growth Rate of Exports of Major Agricultural Products

米	トウモロコシ	インゲン豆	キャッサバ	ゴブラ	ゴマ	ラッカセイ	トウシキミ	トウゴマ	大茴香油
Rice	Maize	Haricot	Cassava	Copra	Sesame	Peanut	Star anise	Castor bean	Star anise essence
Riz	Mais	Haricot	Manioc	Coprah	Sésame	Arachide	Badiane	Ricin	Essence de badiane
Gao	Ngô	Đậu cô ve	Sắn	Com dừa khô	Vừng	Lạc	Đại hồi	Thầu dầu	Tinh dầu hồi
1800-1899	0.047**	—	—	—	—	—	—	—	—
1900-1909	0.695***	—	—	0.043	-0.011	—	-0.001	—	—
1910-1919	-0.419***	0.103	—	-0.192***	-0.195**	-0.086	-0.018	0.173	-0.002
1920-1929	0.214***	0.042	0.531	0.097**	0.105*	0.208	0.089**	0.016	0.048
1930-1939	0.039	0.039	0.746**	0.053	-0.093*	0.483***	0.000	-0.105**	0.037
Total	0.019***	-0.023	0.091	0.037**	0.004	0.046	0.019***	0.000	0.027**
ヒマシ油	天然ゴム	漆	シェラック	安息香	砂糖	コーヒー	茶	コシヨウ	シナモン
Castor oil	Natural rubber	Lacquer	Shellac	Benzoin resin	Sugar	Café bean	Tea	Pepper	Cinnamon
Huile de ricin	Caoutchouc	Laque	Gomme-laque	Benjoin	Sucré	Grain de café, Fève arabique	Thé	Poivrier, Poivre	Cannelle
Dầu thầu dầu	Cao su	Sơn	Nhựa cánh kiến	An tíc hương	Đường	Hạt cà phê	Trà	Hồ tiêu	Quế
—	—	—	—	—	—	—	—	—	—
1800-1899	-0.037	-0.056*	0.008	—	-0.027	0.381**	0.096***	0.095***	0.020
1900-1909	-0.225	0.250***	-0.022	-0.027*	0.032	-0.090	0.094***	-0.037	0.079**
1910-1919	0.036	0.138***	0.024	0.013***	-0.179**	-0.084	0.153**	0.010	0.060***
1920-1929	0.111*	0.221***	-0.048	0.007	0.872***	0.235**	0.182***	0.022	0.078***
1930-1939	0.032**	0.179***	0.004	0.003**	-0.070**	0.052***	0.050***	0.001	0.047***
Total	—	—	—	—	—	—	—	—	—
アモムム属植物	実棉	棉花	カボック	染物芋	蘭草・藤・竹	牛	水牛	豚	家禽
Cardamom ; Amomum	Seed cotton	Ginned cotton	Kapok	Dyeing yam	Rush ; Rattan ; Bamboo	Cattle	Buffalo	Swine	Poultry
Cardamome ; Amome, Amomum	Coton non égrené	Coton égrené	Kapok	Cunau, Faux-gambier	Jonc ; Rotin ; Bambou	Bœuf	Buffle	Porc	Volaille
Bách đầu khấu ; Chi Sa nhai	Bông hạt	Bông xơ	Bông gòn	Củ nâu, Củ lèng	Cỏ bấc dền ; Mây ; Tre	Bò	Trâu	Lợn	Gia cầm
—	—	—	—	—	—	—	—	—	—
1800-1899	0.042	0.140*	0.093***	—	—	—	—	—	—
1900-1909	-0.047	-0.051	0.055	-0.075***	—	0.437***	—	-0.118***	—
1910-1919	0.070*	0.034	0.011	-0.034	-0.082	-0.190**	0.450	0.116	0.003
1920-1929	-0.036	0.034	0.011	-0.153***	-0.038**	-0.286***	0.027	0.135**	0.065
1930-1939	0.063***	-0.115	0.138***	-0.133***	-0.150**	0.158	0.217**	-0.005	0.125**
Total	0.019***	-0.050***	0.079***	-0.020***	-0.040***	-0.029	0.094***	-0.020	0.015

Source : The same as Figure 2.

Notes : 1) Average annual growth rate is an estimate of the slope parameter obtained by linear regression where the dependent variable is the natural log of export volume of agricultural products and the independent variable is the time trend for each period. * indicates statistical significance at the 10% level, ** at the 5% level, and *** at the 1% level.

2) We describe the name of each agricultural product in Japanese, English, French and Vietnamese, beginning at the top.

vated the rubber tree, and natural rubber plantations evolved.¹⁵⁾

As described above, the cultivation of natural rubber in plantations was concentrated in Cochinchina (it is easy to confirm this in Figure 6). The rubber cultivation area in Cochinchina consistently dominated the cultivated area of Indochina from the end of the 19th century to 1940, and rubber was cultivated in Cambodia and Annam. Additionally, the cultivated area increased rapidly in the 1920s.¹⁶⁾ Although the time lag of an increase of cultivated area in the 1920s and rubber export growth in the 1930s seem strange at first glance, it is understandable because the rubber tree is a perennial crop.¹⁷⁾

Why did the cultivation area of the natural rubber increase during the late 1920s and the rubber export expand in the 1930s? It is conceivable that French capital flowed into Indochina because of the rise in the international price for rubber, as mentioned by Takada [1988].¹⁸⁾ However, we must emphasise that local Chinese and Vietnamese, as well as French, adapted to changes in the market, such as the rise of the international price for rubber. Namely, the increase of cultivated area after the late 1920s in Figure 6 included the effect of the increase of small plantations managed by Vietnamese and ethnic Chinese. To confirm this point, we have conducted an analysis using micro data that have not been used much for colonial Vietnam studies. The micro data are required for an analysis of the characteristics of plantations and adaptation to markets because the analysis is difficult using aggregated data only.¹⁹⁾

15) More information about the process of the spread of *Hevea brasiliensis* and the development of the plantation sector can be found in Lan [1911], Crevost [1927], and Groupment Professionnel de la Production Agricole et Forestière de l'Indochine [1942], in addition to Robequain [1939], mentioned above.

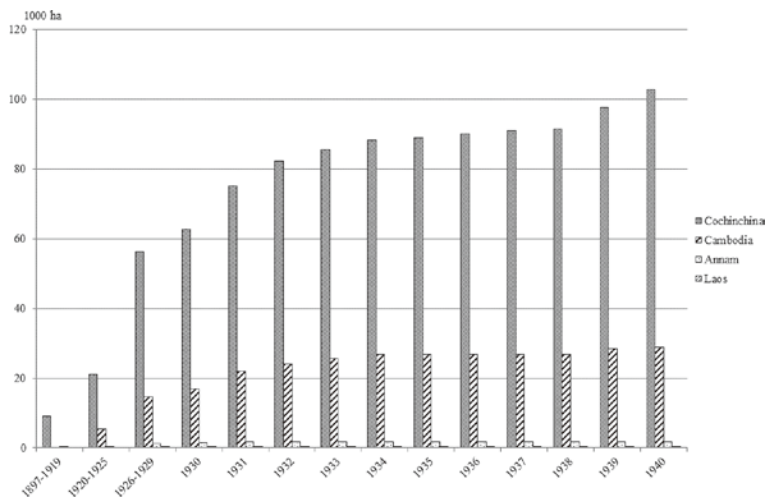
16) Note that the growing area displayed in Figure 6 is the cumulative area planted by the end of that period. Therefore, the differences between the heights of the bins indicate the newly planted area.

17) The plantations, which had planted rubber trees and were established by the rise of rubber prices in the late 1920s, encountered falling international prices thereafter. However, these plantations were supported by the Governor General of Indochina, and contributed to the increase in exports in the 1930s. See also Note 18 below.

18) International prices had fallen due to excess supply and an increase in the production of natural rubber in British Malaya, in the Dutch East Indies during worsening economic conditions after the First World War. Thereafter, the price rose due to the plan for the reduction of international production in 1921 of the Stevenson Committee, appointed by the Government of the United Kingdom. This caused prices to rise in the late 1920s. However, this draft had been abolished in 1928 due to massive increase in production in the Dutch East Indies, due to prices rising (this meant the violation of the Stevenson draft) and regulations of demand in the United States (there were many demands for tires in the automotive industry in the U.S.). After that, prices tumbled again with the Great Depression. Under these circumstances, for the impoverished plantations in French Indochina, the Governor General of Indochina made bailout loans and an export subsidy in the central budget. Obviously, non-competitive plantations could not survive even with this temporary assistance. Additionally, new controls on rubber production were provided by the London Agreement of 1934, and the output ceiling of French Indochina was 30,000 tons (60,000 tons in 1938), which was higher than the others. If a tax on excess production was paid to the International Committee, French Indochina was able to exceed the upper limit of production. Plantations in French Indochina adapted to the changes in international rubber prices and political intervention. For more information, see Robequain [1939], Kano [2001 : Ch.2] (written by Tsukasa Mizushima), and Narusawa [1982].

19) More specifically, our purpose is to analyse the phenomenon of market adaptation of the plantation at the micro level, notwithstanding the phenomenon of an increase in exports and growth of rubber cultivated area at the macro level, with data obtained from official publications such as *Annuaire Statistique de l'Indochine*.

Figure 6 Trends in Natural Rubber Growing Area by Region



Source : *Annuaire Statistique de l'Indochine 1939-1940*.

Note : The areas of 1897-1919, 1920-1925, and 1926-1929 are cumulative areas planted by the end of each period.

We created a panel data set by merging the data of plantations using information like name, location, and owner of each plantation in the 1926 edition and the 1937 edition of *Annuaire du Syndicat des Planteurs de Caoutchouc de l'Indochine*, which is a yearbook of the rubber plantation's union. Table 2 shows the result of matching data of plantations from these materials (with a total sample size of 1062). Per Table 2, 122 plantations were identified in 1937 and also found in 1926, while 245 existed in 1926 but were not identified in 1937. I have also found that 695 plantations were identified in 1937 although they were not in 1926. Rubber plantations greatly increased by the year 1937, if this information can be confirmed.

Next, we will confirm the features of these plantations. Figure 7 indicates the intertemporal comparison of scale distributions of plantations in 1926 and 1937. Per the figure, we know that most of the 695 plantations, which increased from 1926 to 1937, were small plantations, because plantations of less than 1,000 ha increased by the year 1937, the scale distribution converged to a small scale as a whole, and the median value decreased in 1937.²⁰⁾ These facts have not been emphasised in existing characteristics of the data mentioned in Table 2. First, as confirmed in Figure 7, the average cultivation area of natural rubber from 1926 to 1937 is small.²¹⁾ Furthermore, we confirmed the average cultivation areas on

20) The median value is also low in 1926 because there were many small plantations of less than 100 ha. However, a massive increase of small plantations by the year 1937 led to a decrease in the median value in 1937.

21) However, as can be seen from Figure 7, because the scale distributions of plantations are positively skewed in both 1926 and 1937, using the mean of cultivation area shown in Table 3 as the representative value of the plantation scale is normally inappropriate. Hence, we should use a median value that is robust to the skewness as the representative value. In fact, the mean of cultivation area shown in Table 3 makes a large divergence from the median value of the cultivation area shown in Figure 7. Therefore, in the case of using the mean, it is meaningful

Table 2 Changes in the Number of Rubber Plantations

		1937		
		0	1	Total
1926	0	0	695	695
	1	245	122	367
	Total	245	817	1,062

Source : *Annuaire du Syndicat des Planteurs de Caoutchouc de l'Indochine* 1926, 1937.

- Note : 1) '1' in 1926 means the plantations in this category are able to be confirmed in the year 1926 ; '0' means not confirmed. '1' in 1937 means the plantations in this category can be confirmed in the year 1937 ; '0' means not confirmed.
- 2) Both samples in 1926 and 1937 include plantations in Annam, Tonkin, Cambodia, and Laos, other than Cochinchina. However, they are in a minority. We can confirm 19 plantations in Annam, 1 in Tonkin, 34 in Cambodia, and 4 in Laos out of 1,062 sample plantations in 1927 and 1937.

plantations that survived from 1926 to 1937 (plantations confirmed in both the 1926 and 1937 data, hereinafter referred to as 'survivors') and plantations considered to have newly entered in 1937 (plantations confirmed only in 1937, hereinafter referred to as 'new entrants'). The former group is larger than the overall average in 1926 and the latter is smaller in 1937. It can be seen, therefore, that large-scale plantations had been in existence since 1926 and small-scale plantations had been established in 1937.

Based on the above observations, we estimate a probit model to confirm the characteristics of survivors and new entrants. The results are summarised in Table 4 as 'entry model' and 'survival model', respectively. At a glance, we know that plantations which had been in existence from 1926 to 1937 tended to be large in scale. This means that survival probability increases with expansion of the scale, although the effect diminishes.²²⁾

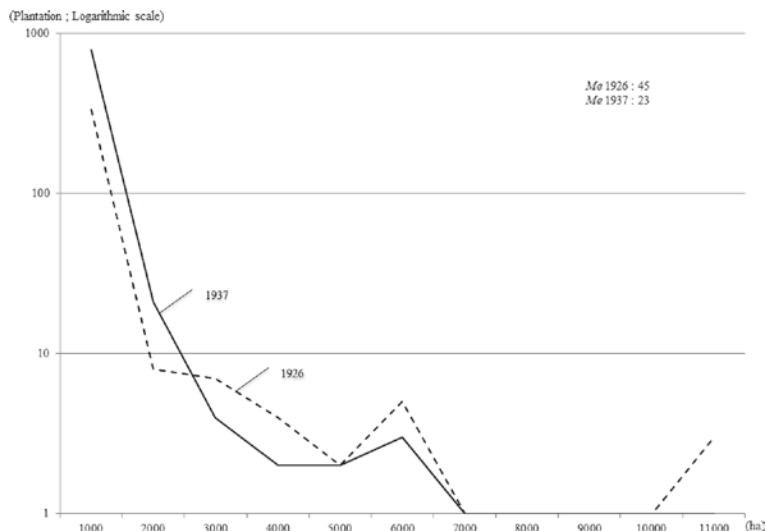
Additionally, although provincial dummies explaining the geographical conditions of plantations excluding soil conditions have no significant effect on survival,²³⁾ the owner dummy is significantly nega-

to discuss the relative positional relationship of the scale distributions of 1926 and 1937 for survivors and new entrants. The median value of survivors and new entrants are 125 ha and 17 ha, respectively.

22) In the survival model (1), the square of cultivation area in 1926 is significantly negative. This indicates that the greater the cultivation area, the higher the probability of survival, although the effect diminishes. With this background, as the scale of a plantation becomes larger, the monitoring cost of employment also becomes larger, which is disadvantageous for large-scale plantations. Although the square of cultivation area in 1926 is not significant in the survival model (2), the *p* value is very close to the boundary of the significance level of 10%.

23) Another variable which measures geographical conditions on the roster in 1926 is 'distance from Saigon'. However, because plantations which reported such information are relatively few, there is an increase in missing values. Additionally, although we conducted an analysis including the 'distance from Saigon', the result was not significant. Hence, the 'distance from Saigon' was not included in the analysis of Table 4. In the 1926 version of *Annuaire du Syndicat des Planteurs de Caoutchouc de l'Indochine*, the information on the plantation called 'Plantation de Phu-

Figure 7 Comparison of Scale Distribution of Rubber Plantations between 1926 and 1937



Source : *Annuaire du Syndicat des Planteurs de Caoutchouc de l'Indochine* 1926, 1937.

Note : *Me* 1926 indicates the median of the scale distribution in 1926, also *Me* 1937 in 1937.

tive in 1926 and plantations with non-indigenous owners (e.g. the French) are likely to survive. This contrasts with the case of 'entry model', and it is also an important issue. Therefore, we discuss it further below.

Because soil dummies are not significant, the survival probability has little relevance to the soil of plantations. This requires a little more explanation. Generally, rubber plantations of French Indochina can be divided into two major types of soil. One is grey soil (*terres grises*) and the other is red soil (*terres rouges*).²⁴⁾ The former was more common in early plantations located near densely populated areas such as Saigon. Additionally, rice cultivation had been carried out by the local Vietnamese in the soil. Although adequate fertilization is essential for fertility of the inferior red soil, the grey soil is easy to reclaim, and land with grey soil therefore needs less initial investment for the establishment of a plantation. Because there are also many villages of Vietnamese near the plantations, workers for the plantations were employed easily from villages in the vicinity (Robequain [1939]). Land with red soil was spread in the densely wooded country of Cambodia, the Mekong Delta, and south of Annam, and required a large initial investment for the establishment of a plantation due to the great difficulties of land

Quoc' is described and the distance from Saigon is shown to be 460 miles. However, it is obviously 460 kilometres rather than 460 miles, because this plantation was in the present Phu Quoc Island (*Đảo Phú Quốc*), which is actually about 460 kilometres from Saigon.

24) For more information on the soil of plantations, see Robequain [1939] and Henry [1932]. They are also referenced in our description of the soil. See also Takada [1988]. The Japanese edition of Robequain [1939] translated by Matsuoka and Okada indicates that the grey soil is called black soil in the translator's note on page 250.

Table 3 Characteristics of Natural Rubber Plantations (Descriptive Statistics)

	Observations	Mean	SD	Min.	Max.
1) All sample plantations in 1926					
Growing area in 1926 (1,000 ha)	363	0.462	1.424	0.0005	10.8
Soil dummy (Gray soil = 1)	364	0.860	0.348	0	1
Owner dummy in 1926 (Local = 1)	360	0.481	0.500	0	1
Province dummy					
Ba Ria	367	0.046	0.210	0	1
Bien Hoa	367	0.147	0.355	0	1
Gia Dinh	367	0.332	0.472	0	1
Tay Ninh	367	0.057	0.233	0	1
Thu Dau Mot	367	0.373	0.484	0	1
2) All sample plantations in 1937					
Growing area in 1937 (1,000 ha)	817	0.176	0.665	0.0002	9.1
Owner dummy in 1937 (Local = 1)	817	0.547	0.498	0	1
Province dummy					
Ba Ria	817	0.035	0.185	0	1
Bien Hoa	817	0.159	0.366	0	1
Gia Dinh	817	0.337	0.473	0	1
Tay Ninh	817	0.108	0.310	0	1
Thu Dau Mot	817	0.288	0.453	0	1
3) Survivor in 1926					
Growing area in 1926 (1,000 ha)	121	0.949	2.036	0.0007	10.8
Soil dummy (Gray soil = 1)	122	0.770	0.422	0	1
Owner dummy in 1926 (Local = 1)	121	0.273	0.447	0	1
Province dummy					
Ba Ria	122	0.074	0.262	0	1
Bien Hoa	122	0.230	0.422	0	1
Gia Dinh	122	0.295	0.458	0	1
Tay Ninh	122	0.074	0.262	0	1
Thu Dau Mot	122	0.270	0.446	0	1
4) New entrants in 1937					
Growing area in 1937 (1,000 ha)	695	0.099	0.303	0.0002	4.02
Owner dummy in 1937 (Local = 1)	695	0.596	0.491	0	1
Province dummy					
Ba Ria	695	0.029	0.167	0	1
Bien Hoa	695	0.147	0.354	0	1
Gia Dinh	695	0.344	0.475	0	1
Tay Ninh	695	0.114	0.318	0	1
Thu Dau Mot	695	0.291	0.454	0	1

Source : *Annuaire du Syndicat des Planteurs de Caoutchouc de l'Indochine 1927 and 1937.*

Note : 1) The soil dummy is based on the information on the soil quality (*Nature du terrain*) of each plantation described in the annual for 1926. However, some plantations do not report the soil quality information, in which case they must be treated as missing values. To minimise the missing values, we have taken the following measures : 1) For plantations which do not report the soil information, we can obtain location information, access information (*Voie d'accès*) and distance from Saigon (*Distance de Saigon*) to the plantation. Therefore, we identify the location of the plantation using such information. 2) By comparing the location information of the plantation and location map of the plantations in Cochinchina, including information on whether the plantation in red soil area or not, obtained from Henry [1932], we confirm the soil of the plantation. We create soil dummies from this operation. 3) If the location obtained in the operation 1) is not described on the map of Henry [1932], we identified the location using Google Maps (<http://maps.google.co.jp/> viewed on July 19, 2014) (in this case, we assume that the location name of the plantation is same as the present). 4) Soil quality information of them can be obtained although plantations located in Annam cannot be identified on the map of Henry [1932]. As we can confirm the descriptions such as *Silico-argileux* (siliceous clay) and *Sablonneux* (sandy land), we create soil dummies referring to Henry [1932 : 549-552] and the result of soil analysis on Bureau of Southern Affairs [1943 : 227], for example the red soil contains a small amount of silicic acid.

2) We created the owner dummy in 1926 and 1937 by confirming whether the owner is local or not for the plantations listed on the annual 1926 and 1937 respectively. If owner dummy is 1, the plantation is owned by local or a joint venture with local capital.

Table 4 Characteristics of Survival Plantations and New Entries

	Survival model		Entry model	
	(1)	(2)	(1)	(2)
Growing area in 1926 (1,000 ha)	0.415 (2.64)***	0.400 (2.46)**		
Square of growing area in 1926	-0.036 (-2.07)**	-0.029 (-1.62)		
Growing area in 1937 (1,000 ha)			-0.527 (-2.72)***	-0.656 (-2.91)***
Square of growing area in 1937			0.017 (0.43)	0.024 (0.46)
Soil dummy (Gray soil = 1)	-0.329 (-1.47)	0.056 (0.18)		
Owner dummy in 1926 (Local = 1)	-0.613 (-3.97)***	-0.607 (-3.82)***		
Owner dummy in 1937 (Local = 1)			0.606 (5.00)***	0.610 (4.81)***
Province dummy				
Ba Ria		0.814 (1.46)		-1.226 (-3.38)***
Bien Hoa		0.593 (1.49)		-0.808 (-2.72)***
Gia Dinh		0.233 (0.61)		-0.787 (-2.66)***
Tay Ninh		0.639 (1.37)		-0.562 (-1.68)*
Thu Dau Mot		0.006 (0.02)		-0.595 (-2.03)**
Intercept	0.023 (0.10)	-0.576 (-1.22)	0.877 (10.29)***	1.590 (5.57)***
Sample size (N)	354	354	817	817
Pseudo R ²	0.109	0.130	0.110	0.132
Log-Likelihood	-201.911	-197.233	-306.687	-299.022

Source : *Annuaire du Syndicat des Planteurs de Caoutchouc de l'Indochine* 1926, 1937.

Notes : 1) 'Survival model' indicates the result of the probit analysis, where we regard the dependent variable=1 as a case of the plantation shown in both 1926 and 1937. Additionally, 'Entry model' indicates the result of a probit analysis, where we regard the dependent variable=1 as a case of the plantation found in 1937 but not in 1926 among all plantations in the 1937 annual.

2) In the table, the coefficients of each probit model are described on the upper line. The values in parentheses are z values. * indicates statistical significance at the 10% level, ** at the 5% level, and *** at the 1% level.

3) 'Soil dummy' is not included in 'Entry model' because the information related to soil cannot be obtained from the 1937 annual. Additionally, we confirm some plantations for which such data could not be obtained in the 1926 annual. We therefore attempted to prevent the missing values using the method mentioned in Table 3.

reclamation ; hence, ethnic minorities were employed for labour-intensive work, such as land clearing.²⁵⁾ It was difficult to ensure a supply of workers for plantations established on population sparse jungle, and many existing studies have noted this problem (Takada [1988], for example). Many workers employed as cultivators or latex harvesters were hired from the Red River Delta of Tonkin, which has a dense population, but labour problems often emerged.²⁶⁾ On the other hand, soil with higher fertility than grey soil was advantageous for natural rubber cultivation (Robequain [1939], Bureau of Southern Affairs [1943 : 226-227]). Plantations in the red soil were established relatively late, grew larger, and developed via high land productivity, as noted by Takada [1988].

Although the advantage of the red soil for natural rubber cultivation is seen in the above studies, our results show that soil conditions had little effect on the survival probability, unlike the referenced views. The reason is that both grey and red soil had advantages and disadvantages. First, because of the introduction of fertiliser, the problem of less fertility in grey soil could be resolved partially.²⁷⁾ Second, the cost to ensure disciplined labour was lower in plantations with grey soil than in those with red soil. As described above, people of Tonkin and ethnic minorities had been hired as workers in plantations with red soil, even though ethnic minority workers were less likely to be disciplined labourers ; employing Vietnamese workers from Tonkin was very expensive due to their migration and recruitment and the provision of food, clothing, and shelter ; and the labour monitoring cost increased with the expanding scale of a plantation. The common belief that red soil is advantageous is not necessarily relevant.²⁸⁾

For plantations established by the year 1937, we found that the smaller scale of the plantation, the higher the probability of its establishment. Province dummies are significantly negative. This means

25) Robequain [1939]. The data of the workers in some plantations are obtained from *Annuaire du Syndicat des Planteurs de Caoutchouc de l'Indochine 1926*. According to that work, the *Moi* (a term that refers to ethnic minorities in today's Central Highlands, but which is rarely used because of its derogatory nature) who were good at life in the jungle were employed to reclaim the land.

26) With the increase of plantations, because the workers supplied from Cochinchina were inadequate for the labour demand, workers were hired from the Tonkin population. In plantations of the French capital, jobs brokers, called *Cai*, were used for the employment of the Vietnamese people. For more information, see International Labour Office [1938], Robequain [1939], and Takada [1988].

27) Bureau of Southern Affairs [1943 : 233] explains that 'Fertiliser are applied only to gray soil and not applied to red soil at all'.

28) The concept of disciplined labour is closely related to labour monitoring problems, as moral hazards raised by S.A. Marglin (Marglin [1974]). As Hayami [2004 : 294] noted, family labour is 'the labour that works without supervision based on strong community relationship', and does not cause monitoring problems. Therefore, the supervision problems and the imposition of discipline are problems for employed labour. Workers from Tonkin were hired in accordance with the system of long-term contracts which also imposed detailed obligations on employers. They were recruited in authorised employment agencies, transported by sea from Haiphong and other locations to Saigon. The employers had to consider the welfare of workers, such as the provision of food, clothing, and shelter, and the prevention of malaria. Additionally, villages of workers had been formed in large-scale plantations. In fact, we can confirm that there are many dwellings of plantation workers in *the Annuaire du Syndicat des Planteurs de Caoutchouc de l'Indochine 1926*, including much data of large-scale plantations. For more information, see International Labour Office [1938] and Robequain [1939].

that many plantations had already existed in these provinces in 1926 ; therefore, the establishments of new plantations there declined. The owner dummy in 1937 shows a positive significant effect on the probability of new entrants. It indicates that the plantations of indigenous owners tended to be established by 1937. This result contrasts with the survival model, and is very important for evaluating local Vietnamese and Chinese entrepreneurship. Therefore, we discuss this issue further in the next section.

3-2. Entrepreneurship and small plantations

From the above analyses, it is found that the large plantations of non-local capital were more likely to survive, and, more importantly, most new entrants were small plantations with local capital. We confirm the reason for the increase in these small plantations.

The first reason is that small plantations require less initial investment. Because the development of rubber plantations in the late stage had progressed in red soil, where initial investments were costly, it was important that the scale of a plantation be small.

The second reason is that it was easy to overcome the problem of the employment of disciplined labour when a plantation was established. Hayami [2004 : 291-295] [2010] noted that plantations were motivated to expand their scale to promote the pursuit of scale economics, and the problem of the monitoring cost for hired labour also emerged.²⁹⁾ In the case of small plantations, such a dilemma was unlikely to occur originally. Figure 8, in which we confirmed the relationship between the amount of labour input per area ($\ln L$) and management scale ($\ln A$) for the data of 1926, indicates the negative correlation ; in other words, the larger the management scale of a plantation, the less intensive the labour input. For a small operation, monitoring problems do not really matter and the plantation tends to become labour extensive as it grows.

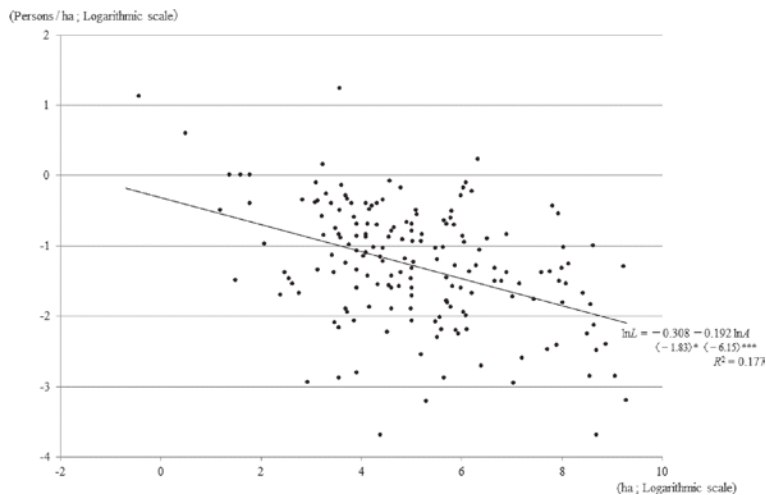
The third reason is the most important. Most of the owners and management of small plantations were local Vietnamese and ethnic Chinese. Their entrepreneurship and ability to adapt to the rubber markets emerged with an increase in the establishments of small-scale plantations. Table 5 displays the small plantations with less than 40 ha, most of which were those of indigenous capital.³⁰⁾ This recon-

29) Using this logic, Hayami [2004 : 291-295] [2010] argues that peasants using family labour, who were free of the monitoring problems of hired labour, contributed to the agricultural development in Asia, referring to Lewis [1970].

30) Per East Asiatic Economic Investigation Bureau [1939 : 157], there were 70 small rubber plantations managed by ethnic Chinese in the suburbs of Saigon. The size of 40 ha is almost the same as the average plantation size in 1926 from the median value (45 ha) in 1926 in Figure 7. However, the size of 40 ha is almost twice as large as the average in 1937. It suggests an increase in small plantations.

Encyclopedia Britannica's first edition, published in 1768-1771, had already provided an article about 'plantation', which 'in the West-Indies, denotes a spot of ground which a planter or person arrived in a new colony, pitches on to cultivate for his own use, or is assigned for that purpose. However, the term plantation is often used in a synonymous sense with colony.' Additionally, the article in the 11th edition published in 1911 states as follows : 'The term was early applied, in a figurative sense, to the settlement of people, and particularly to the colonization of North America in the early part of the 17th century and to the settlement of Scotch and English in the forfeited lands in Ireland.' Hence, it can be understood that originally the term plantation was applied to the British colo-

Figure 8 Relationship between Labour and Management Scale in Rubber Plantations (1926)



Source : *Annuaire du Syndicat des Planteurs de Caoutchouc de l'Indochine* 1926.

- Notes : 1) The horizontal axis of the figure indicates the cultivation area of each rubber plantation in 1926, and the vertical axis indicates workers (i.e. temporary employment + contract workers, divided by cultural area) of each plantation.
- 2) The straight line in the figure is an approximate curve, and the formula is one of the approximate curves. Additionally, the values in parentheses are t statistics. * indicates statistical significance at the 10% level and *** at the 1% level. R^2 is adjusted for the degrees of freedom.

Table 5 Number of Plantations in French Indochina by Nationality of Capital and Growing Area (June 1st, 1934)

Capital (by Nationality)	Growing Area		Total
	under 40 ha	over 40 ha	
European	135	247	382
Local	377	55	432
Total	512	302	814

$\chi^2 = 234.26^{***}$

Source : Author prepared this table based on Bos [1936].

- Notes : 1) Takada [1988] also cited the data on Bos [1936].
- 2) *** indicates statistical significance at the 1% level in chi-square test of independence.
- 3) The definition of 'Local (*indigènes*)' here is not specified in Bos [1936]. However, based on the approximate estimation using the names of plantations described on *Annuaire du Syndicat des Planteurs de Caoutchouc de l'Indochine 1927 and 1937*, most of the indigenous owners are Vietnamese, the rest are a few ethnic Chinese and Indian. See also note 30. A detailed discussion of ethnic Indian in Cochinchina can be found in note 9 of Takahashi [2006] as well.

firms that the analysis of Table 4 is correct, shows that the results of our analyses are robust.

As mentioned above, the increase in cultivation area in the late 1920s occurred due to the rise in international rubber prices. Importantly, the local Vietnamese and ethnic Chinese reacted flexibly to changes in the international market. Namely, we can consider the downscaling plantations during this period as the result of their adaptation to the markets, based on the trends of the international market, the labour cost, and the initial investment for their plantations.

Additionally, the rubber plantation sector was established in Vietnam during the colonial period, and it did not exist previously. The entrepreneurship of the Vietnamese and ethnic Chinese, which achieved a ‘new combination (*neue Kombination*)’ in the form of entry into the rubber market by adopting a European system of plantation, should be greatly appreciated.³¹⁾

4. Conclusions and implications

We have questioned the stereotype of the rice monoculture in colonial Vietnam, and clarified the appearance of agriculture in Vietnam which had not been mentioned much in existing studies. Finally, we summarise the results obtained by our analyses and draw out the implications in view of the agriculture of present-day Vietnam.

Vietnam during the colonial period has been often regarded as a rice monoculture because the concept of monoculture assumes exports and Cochinchina, including the rice belt, from which relatively

nial farm in the West Indies and North America. Because studies on British colonial plantations are inseparable from the history of slavery, there is an enormous body of research related to slavery, among which U. B. Phillips’ research is drawing attention. He set up the hypothesis that ‘slaves in large plantations are inefficient’, which was critically considered in the classic ‘Time on the Cross’ written by R. Fogel and S.L Engerman (Fogel and Engerman [1974]). Phillips [1910] described the plantation system as follows : ‘Its concentration of labor under skilled management made the plantation system, with its overseers, foremen, blacksmiths, carpenters, hostlers, cooks, nurses, plow-hands and hoe-hands, practically the factory system applied to agriculture.’ This means that the plantation was a production system applying the factory production method created by European ideologies for agricultural production. In the present day, plantations are no longer related to slavery. Therefore, Hayami [2010 : 3306] and Jones [1968] define the present plantation as ‘an economic unit that hires a large amount of unskilled labor under strict labor management and produces agricultural products for sale’.

From the above literature survey, ‘plantation’ is a farm where entrepreneurial management is carried out. Therefore, even small plantations, if the word ‘plantation’ is used, are entrepreneurial farms using employment rather than family to manage the farms.

- 31) Recently, the evaluation and measurement of entrepreneurship in developing countries are important issues in the field of development economics, because entrepreneurship is not formed in a short time (McKenzie and Woodruff [2012]).

During the period of the Nguyen dynasty, the trade of Saigon rice by Chinese merchants had been actively conducted in the form of trade permitted by the government or illegal trade (mainly for China), and large rice cultivators emerged by accumulating land simultaneously (Kikuchi [1988]). These facts suggest that local Vietnamese and Chinese already possessed the entrepreneurship seen in the market’s adaptability in response to development of the international rice market and expansion of new distribution networks during the colonial period.

many materials were available, has been regarded as the representative region of French Indochina. Reviewing the agriculture of Vietnam during the colonial period in consideration of these points, we can confirm two important points. First, the share of rice export that is the basis for the rice monoculture greatly declined from the late 1920s to the 1930s. Particularly, the exports of French Indochina were diversified by the increase in exports of natural rubber to replace rice (note that Cochinchina was the largest exporter of natural rubber and rice in French Indochina). Second, in Tonkin and Annam, which had not been mentioned much in the existing research, diversified cultivations and exports had been performed. From these points, we have noted that assigning the view of a rice monoculture uniformly to the agriculture of colonial Vietnam is inappropriate, and that diversified agriculture had been practised (Section 2).

Additionally, we have focused on the increase in natural rubber exports during the 1930s, and analysed the development of plantations using precious micro data. Thus, we see that small plantations significantly increased with the growth of rubber exports, and the Vietnamese and Chinese managed small plantation (Section 3).

The diversity of cultivations and exports of agricultural products in Tonkin and Annam and the spread of small plantations with an expansion in rubber exportation have one thing in common. That is the entrepreneurship and high market adaptability of the Vietnamese and ethnic Chinese. The high market adaptability of indigenous peasants allowed them to supply enough agricultural products, depending on fluctuations in the demand and price in the international market. Additionally, the entrepreneurship of Vietnamese and ethnic Chinese allowed them to build new markets and introduce the plantation system that originated in Europe.

These facts cannot be derived from the perspective of the rice monoculture, and may be evaluated more considering the agricultural development in present Vietnam. As described above, although the present Vietnam also has a strong image as a rice exporter, it actually produces and exports various agricultural products other than rice, and dominates the international market in products such as coffee of Dak Lak (*Đắk Lắk*) province, cashew nuts of Binh Phuoc (*Bình Phước*) province, and tea of Lam Dong (*Lâm Đồng*) province and Thai Nguyen province. As in the colonial period, the entrepreneurship and market adaptability of indigenous peasants allow them to export various agricultural products.³²⁾ The Government of Vietnam has also encouraged peasants to diversify agricultural production in recent years; this may be a sign that local Vietnamese ability has been properly evaluated. It is not an exaggeration to say that the competitiveness of agriculture in present-day Vietnam is supported by the market adaptability and entrepreneurship of the Vietnamese and ethnic Chinese that has existed since the colonial period.

32) The international coffee price collapsed in the 2000s because the production of Robusta by Vietnamese farmers rapidly increased in response to rising coffee prices. This is an impressive case of the farmers' market adaptability in Vietnam.

References

- Bos, Mourice [1936] “Le développement et l’avenir des plantations de caoutchouc en Indochine.” *Revue Générale du Caoutchouc*. 125.
- Brenier, H. [1914] *Essai d’atlas statistique de l’Indochine française : Indochine physique, population, administration, finances, agriculture, commerce, industrie*. Hanoi : Imprimerie d’Extrême-Orient.
- Brocheux, P. and D. Hémerly [2009] *Indochina : An Ambiguous Colonization, 1858-1954*. Berkeley : Univ. of California Press.
- Bureau of Southern Affairs, Min. of Greater East Asia [1943] *Agricultural Resources* [Nosan Shigen]. Bureau of Southern Affairs, Min. of Greater East Asia.
- Crevost, C. [1927] *Catalogue des produits de l’Indochine*, Tome IV, *Exsudats végétaux-stick-lac*. Hanoi : Gouvernement Générale de l’Indochine.
- East Asiatic Economic Investigation Bureau, South Manchuria Railway Co., Ltd. (ed.) [1939] *Ethnic Chinese in French Indochina* [*Futsuryo Indoshina Niokeru Kakyō*]. East Asiatic Economic Investigation Bureau, South Manchuria Railway Co., Ltd.
- Fogel, R.W. and S.L. Engerman [1974] *Time on the Cross : The Economics of American Negro Slavery*. Boston : Little, Brown.
- Gourou, P. [1936] *Les paysans du Delta tonkinois : Etude de géographie humaine*. Paris : L’Ecole Française d’Extrême-Orient.
- Groupment Professionnel de la Production Agricole et Forestière de l’Indochine [1942] *Le Caoutchouc : Note de l’association des producteurs de caoutchouc, résines et gommes de l’Indochine*. Saigon : Groupment Professionnel de la Production Agricole et Forestière de l’Indochine.
- Hayami, Y. [2004] *Development Economics : From the Poverty to the Wealth of Nations* (New ed.) [*Shinpan Kaihatsukeizaigaku*]. Tokyo : Sobunsha.
- Hayami, Y. [2010] “Plantation Agriculture.” Pingali, P. and R. Evenson (eds.) *Handbook of Agricultural Economics*, vol. 4. Amsterdam : Elsevier.
- Henry, Y. [1932] *Economie agricole de l’Indochine*. Hanoi : Imprimerie d’Extrême-Orient.
- International Labour Office [1938] *Labour Conditions in Indo-China*. Geneva : International Labour Office.
- Jones, W.O. [1968] “Plantations.” In *International Encyclopedia of the Social Sciences*, vol. 12. ed. Sills, D.L. New York : Macmillan.
- Kano, H. (ed.) [2001] *Prosperity and Decline of the Colonial Economy* [*Shokuminchi Keizai No Hanei To Choraku*]. Tokyo : Iwanamishoten.
- Kikuchi, M. [1988] “The Impact of the Opening of the Port of Saigon on Cochinchina’s Economy.” [*Saigon Kaiko No Rekishiteki Igi*.] *Southeast Asia : History and Culture*. 17, pp. 3-37.
- Lan, J. [1911] *Notes sur l’hévéa brésilien en Cochinchine*. Saigon : Imprimerie F. H. Schneider.
- Lewis, A. (ed.) [1970] *Tropical Development 1880-1913 : Studies in Economic Progress*. London : George Allen & Unwin.
- Marglin, S.A. [1974] “What Do Bosses Do ? : The Origins and Functions of Hierarchy in Capitalist Production.” *Review of Radical Political Economics*. 6 (2), pp. 60-112.
- McKenzie, D. and C. Woodruff [2014] “What Are We Learning from Business Training and Entrepreneurship Evaluations around the Developing World ?” *World Bank Research Observer*. 29 (1), pp. 48-82.
- Narusawa, S. [1982] “History of Natural Rubber : Focus on works of British Wickham, Ridley and Dutch Scientists Cramer Who Have Contributed to Culture Hevea.” [*Tennen Gom No Rekishi : Toki Ni Hebea Saibai Ni Koken Shita Eikokujin Wickham To Ridley Oyobi Orandajin Kagakusha Cramer No Gyoseki*.] *Journal of The Society of Rubber Industry, Japan*. 55 (10), pp. 610-626.
- Phillips, U.B. [1910] “The Decadence of the Plantation System.” *Annals of the American Academy of Political and Social Science*. 35, pp. 37-41.
- Robequain, C. [1939] *L’Evolution économique de l’Indochine française*. Paris : Centre d’Etudes de Politique

Etrangère.

- Sugihara, K. [1996] *Patterns and Development of Intra-Asian Trade [Ajia Kan Boeki No Keisei To Kozo]*. Kyoto : Minervashobo.
- Takada, Y. [1988] “Labor Problems of French Indochina in the late 1920s : “Immigrant” Contract laborers in the Rubber Plantations.” [*Furansu Shokuminchi Indoshina No Gomu Noen Niokeru Rodomondai : 1920nendaimatsu No Aru Keiyaku Rodosha No Taiken Wo Chushin Ni.*] *Sogo Kenkyu.* 2, pp. 47-95.
- Takahashi, R. [2006] “The Introduction of Modern Technology and the Choice of Optimal Plant Size in Rice Milling Industry : The Changeover from the Exportation of Brown Rice to White Rice.” [*Kochishina Seimaigyo Niokeru Kindaigijutsu No Donyu To Kojo Kibo No Sentaku : Genmai Yushutsu Kara Hakumai Yushutsu He.*] *Ajia Keizai.* 47(7), pp. 2-28.