CHAPTER 4. THE IMPACT OF WESTERN ENTERPRISE, 1900-1930.

In the first three decades of the 20th century, tin production in the Malay States continued to increase although at a rate slower than previously experienced.[1] Production was centred almost wholly in Perak, particularly the Kinta Valley which by this time had become the world's most productive tin field.[2] During this period, however, a number of changes occurred in the industry that had a profound impact on Chinese tin mining labour. Most significantly, in the decades 1900-1930 the technological basis of the industry became modernised with the successful introduction and rapid development of capital-intensive mining by Western or foreign enterprise.[3] By virtue of their superior technology, Western companies began to gain a hold in the industry and gradually eroded the Chinese monopoly on tin production.

The Malayan tin mining industry also began to develop increasingly within the framework of government regulations. Prior to 1895 each state had passed its own mining regulations that limited the authority of the government to deciding on the terms of land tenure and the use of water for mining purposes. However, with the passing of the Perak Mining Code the first step was taken to extend the powers of the administration to control the direction and working of the industry. Mining within the framework of regulations tended to increase the costs of operation of individual mines, particularly those in the Chinese open-cast sector.

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[1] See Tables 2 & 3 Appendix A. As in the past the manufacture of tin plates constituted the single most important industrial use of tin, although the metal was also increasingly employed in the manufacture of dyes, white metals, and in the machined bronzes and antifriction metals for the growing motor, electrical and mechanical industries. Moreover, there was little likelihood that substitutes for tin would be seriously considered or easily obtained. It should also be noted that by 1912 the United States had become the world's largest producer of tin-plates. However, there was, on the whole, little change in the direction of the Straits tin trade because the London metal brokers continued to be the principal distributors of the metal. See Minchinton, "Diffusion of Tinplate Manufacture", pp.349-58; Fermor, *Report Upon the Mining Industry*, pp.72-73.

[2] Mining enterprise reached its peak production in Selangor in 1894 and in Negri Sembilan in 1905. In Pahang tin mining was virtuously synonymous with the Pahang Corporation.

[3] The terms "European", "Western" and "foreign" are used interchangeably to refer to non-Chinese investment in the tin mining industry because the available statistical data, while differentiating between "European" and "non-European", does not differentiate according to nationality. In the event the bulk of Western investment in the industry was British in origin.

This chapter will outline at the changes that occurred in the Malayan tin mining industry during the period 1900-1930 and examine their impact on Chinese tin mining labour. The chapter is divided into two sections. Section 1 broadly outlines the introduction and rapid growth of Western tin mining from the latter years of the 19th century to 1930. The major concern is to emphasise the factors that promoted the successful development of Western mining, in particular the introduction of labour-saving machinery. Section 2 examines the impact of the rise of Western enterprise on Chinese tin mining labour. Emphasis is placed on two aspects - the overall reduction in employment as a result of structural changes in the industry and the demise of the Chinese open-cast sector. Incorporated into the discussion is an examination of changes to the pattern of employment, wages, conditions and methods of recruitment of Chinese tin mining labour.

I. THE DEVELOPMENT OF WESTERN MINING ENTERPRISE, 1880-1930:

Three distinct phases are apparent in the development of Western enterprise in the Malayan tin mining industry in the period 1890-1930: (i) the beginning of Western involvement in the industry (c.1880-1900), during which a number of companies began operation but, on the whole, failed in the face of competition from Chinese mines; (ii) a phase of transition (1900 to 1920), during which Western companies gained a foothold in the industry and increased significantly in number; and (iii) a phase of expansion (1920 to 1930), during which Western enterprise underwent rapid growth following an investment boom in the mid-1920s.

Early Western Enterprise in Malay Tin Mining, c1880-1900

Until the beginning of the 20th century Western enterprise played only a negligible part in the development of the Malayan tin mining industry. Although contemporary writers on Malay subjects had rightly estimated that the potential stanniferous wealth of the Malay Peninsula was unequalled in the world, Western capitalists were reluctant to invest in tin mining in a country where political disorder was rife.[4] Even with the establishment of settled conditions following British intervention in 1874, this reluctance continued for several years.[5] Consequently, by 1883 "British capitalists [had] ...as yet done little or nothing in Perak; a feeble commencement only being yet apparent on the part of two concessionaries from Australia, to whom large grants had been given".[6] In Selangor, the British Resident remarked;

> It is curious how comparatively slight an interest Europeans in Singapore and Penang have shewn... during fifteen years of British Protection and yet it is possible that very little enterprise and a comparatively small expenditure in the right direction would have given something more than a satisfactory return. I...allude to...the prosecution and extension of that legitimate enterprise which has enriched so many of the Chinese Colonists in the Malay States, and also to the research by methods unknown to the Chinese, for minerals in a form requiring the treatment of Western skill and appliances.[7]

Then from the early 1880s, beginning with a French company the Societe des Mines d'Etains de Perak, Western mining companies made various attempts to enter the industry.[8] By

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[4] Writers such as John Crawfurd, Sir Thomas Raffles, T.J.Newbold and J.R.Logan, were deeply impressed by the technological advances made in the Cornish tin mines and believed that if the Chinese with their energy and simple tools, could render the mines in the Malay States productive then Western enterprise with the additional advantage of superior technical knowledge would soon oust the Chinese if it should participate in the industry. For Western investors, however, political stability was a prerequisite for investment because it reduced the hazards of speculation. In fact the Malayan Peninsula (East India) Tin Mining Company, the first company formed in London to mine tin in Selangor, was floated only after political events indicated that the British Government was most likely to reverse its traditional non-intervention policy in the Malay States. Wong, "Western Enterprise", pp.78-107, 133-34; Beecher, "Mining in the Malay Peninsula", pp.78-107.

[5] One reason, as Swettenham explained, was that "...British capitalists declined to risk even small sums in the Malay States till the years after the enterprise and industry of the Chinese had established and developed the mines". Swettenham, *British Malaya*, pp.262-63. At the same time, Western investors could profitably employ their funds in mining elsewhere. In Britain there were many investment opportunities in Cornwall. Then, during the early 1870s, the exploitation of the Australian tin fields excited much interest. By 1875 Australia had become the world's largest tin producer, a position it maintained to 1882. Furthermore, it was generally considered that the alluvial deposits of the Malay States were only temporary sources of tin. For details see Wong, *ibid.*, pp.135-36; Flower, *A History of the Trade in Tin*, pp.35-36.

[6] *Annual Report, Perak, 1883*, p.5 cited in Yip, *Development of the Tin Mining Industry*, p.95.

[7] *Ibid.*,

[8] In 1882 the Hong Kong and Shanghai Tin Mining Company Limited, financed largely by Western merchants in Shanghai, commenced mining in Perak. In 1883 it was joined by the Sandhurst Tin Mining Company Limited, the Larut Tin-Mining Company and the Melbourne Tin Mining Company Limited, which together produced 14,000 pikuls (about 830 tons) of tin ore in 1887. Selangor also experienced a short "boom" in the years 1882-1884, during which mining land was leased by European concerns and negotiations made for the purchase of Chinese mines. Yap Ah Loy, for example, sold his Ampang mine to a Singapore firm, but retained shares equivalent to about one-sixth of the purchase price. *Ibid.*, p.97.

1890 this interest had generated into an investment boom.[9] This movement was stimulated by a number of external and internal factors Firstly, the price of tin was rising steadily as demand for the metal increased following the development of the American tin-plate industry.[10] Second, the development of communications, especially railways, were solving the problems of transporting tin from the inland mining valleys to the west coast. At the same time steamship services from the major ports were both quicker, via the Suez Canal from 1870 onwards, and more frequent, and the establishment of smelting centres at Pulau Brani near Singapore (1887) and Penang (1897) by the Straits Trading Company assisted the collection of smelted ore, improved its quality and saved shipping space. Thirdly, Western capitalists were induced to enter the industry by the "special terms" offered on mining concessions by British administrators in each state.[11] By 1887 the combined production from foreign mines in Perak was approximately 1,200 tons out of a total output of nearly 13,000 tons.[12]

With few exceptions, however, the companies that began operating in the latter decades of the 19th century failed to survive in the face of competition from Chinese miners.[13] This

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[9] In the course of 1889, 1890 and 1891 a number of Western mining companies were floated to begin operations in the Malay States. Many of the companies were for working in Pahang. This was the period of the so-called "Pahang Boom", detailed studies of which are given in Wong, *The Malayan Tin Industry to 1914*, pp.126-37. See also Memorandum of the Visit to the Bandahara of Pahang, May, 1885, F.A.Swettenham in CO 273/134; Journal of Hugh Clifford's Mission to Pahang in CO 273/144; *Report on Certain Matters Relating to the Present State of Pahang and Its Inhabitants*, Hugh Clifford, 3 August, 1887 in CO 273/146; *Report on the State of Pahang*, Hugh Clifford, 1 October, 1887, in CO 273/148.

[10] In 1899 the industrial consumption of tin in the United States amounted to 31,500 tons, about 75 per cent of the amount consumed in the same year by all the industries in Europe. In early June 1886 a meeting of company promoters was held in London to discuss the advantages of employing British capital in the development of the mineral resources of Burma, Thailand and the Malay States. See Beecher, "Mining in the Malay Peninsula", pp.103-5, 131-5.

[11] The general perception was that the tin industry would benefit from Western enterprise *per se* and from the conversion from Chinese to Western technology and commercial organisation. Many of the "special terms" were therefore granted on the condition that the companies formed worked the mines with Western machinery under the management of Western managers and engineering experts. In Selangor, for example, the colonial administration granted to Western concessionaries large areas of land characterised by the size of the land granted, the remission of $1 or $2 in the tin duty on every *bahara* of tin produced, and the length within which the land had to be selected, defined and worked. Many of the concessionaires were closely connected to the British administration. By February 1884 a total of 6 concessions aggregating 3,800 acres of mining land, had been granted. For details see Wong, *The Malayan Tin Industry to 1914*, p.147-153. See also Draft Prospectus of the Selangore (East India) Tin Mining Co. (Ltd.), Seymour Clarke to CO, 17 November, 1878, Lambert, Burgin and Petch to Sec. State, 25 June, 1873, CO to Lambert, Burgin and Petch, 5 July, 1873, Seymour Clarke to Sec. State, 18 July, 1873, CO to Seymour Clarke, 5 August, 1873 all in CO 809/1; Gov. to Sec. State, 2 June, 1888 in CO 273/153; Acting Gov. to Sec. State, 1 October and 15 November, 1884 both in CO 273/130; Gov. to Sec. State, 3 February, 1888 in CO 273/15 .

[12] Of this approximately one quarter was produced by the Societe des Etains de Kinta. In comparison Capitan Ah Kwee, the largest Chinese tin producer in Perak, alone accounted for over 1,700 tons (29,000 pikuls) of total output.

[13] The "Pahang Boom" had collapsed by 1896. By 1897, more than a decade after the introduction of Western capital, only three foreign mining companies were operating in Perak and Selangor, namely the Gopeng Mining Company (which was floated in 1892 with Cornish capital and, in 1912 amalgamated with the Ulu Gopeng Ltd. to become the Gopeng Consolidated Ltd., one of the most successful foreign mining companies in

failure was due to higher costs of operation, bad management and labour difficulties. In the first instance, Western companies experienced problems in acquiring sufficient mineral-bearing land to begin operation, since the best ground was held by Chinese or Malay smallholders who would not part with their land except at very high prices. Initial capital outlay was further increased by the construction of accommodation for highly paid European staff and on the installation of expensive and elaborate machinery that was unsuited to alluvial mining.[14] Encumbered by such fixed investments, Western mining companies were structurally inflexible; they could not be easily abandoned without heavy loss to capital. Secondly, Western mining companies often began with inadequate or careless prospecting with the result that, after incurring large costs in removing the overburden, it was discovered that the land was not as rich as would justify continued expenditure.[15] Thirdly, Western companies experienced great difficulties in obtaining and controlling Chinese labour. To some extent this was due to the reluctance of the Chinese to work for employers not of their own race. More important was the fact that Chinese mining capitalists, through their secret societies, had a monopsony over the supply of Chinese labour. This monopsony was maintained through the truck system.[16] Furthermore, the employment of Chinese workers on Western mines required the time consuming and costly appointment of Chinese supervisors or overseers. Therefore, whether

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later years), the Societe des Etains de Kinta, and the Malay States Tin Mining Company. Together these companies produced less than one-tenth of total output. R.Parry, *Report on Tin Mining in the Protected Malay States of Perak and Selangor*, Rangoon, 1898, pp. 25-26 cited in Yip, *Development of the Tin Mining Industry*, p.97. See also Fermor, *Report Upon the Mining Industry*, pp.24-25. E in Sec. State to Gov., 9 June, 1868, Sec. State to Gov., 9 June, 1868, Paterson Simons and Co. to Sec. State, 8 May, 20 June, 18 July, CO to Paterson, Simons and Co., 15 August, 1868 all in CO 273/25.

[14] A foreign mine invariably meant European management the cost which was extremely high. In 1889 the British Resident of Selangor told how a Chinese mine-owner, hearing of the monthly sum paid to the European staff of a mining company, said. "...I could put on 400 additional coolies for that amount". Straits Settlements, *Legislative Council Proceedings, 1890*, Paper No.15, p.C79, cited in Yip, *Development of the Tin Mining Industry*, p.102. The installation of mining machinery rested on the belief in the superiority of everything Western and the confusion of technology with economy.

[15] An advantage commonly recognised in alluvial mining, unlike lode mining, is that a deposit can quite easily and cheaply be tested before mining begins. In the Malay States testing was all the more simple because the overburden was naturally thin and soft. Early Western mining companies introduced a scientific method of testing alluvial deposits in the form of boring, an important technical development that, if carefully performed, could greatly reduce the risk of enterprise. In practice, however, test boring proved unreliable because Malay deposits, although shallow and easily accessible, were generally unevenly distributed thus making accurate boring extremely difficult. For details see Yip, *ibid.*, p.100-01; J.J.Puthucheary, *Ownership and Control in the Malayan Economy*, Kuala Lumpur, University of Malaya Press, 1974, pp.82-83.

[16] In 1889 it was recorded that the Chinese generally preferred to work on Chinese mines although they were fully aware that through the truck system the wages they would ultimately receive would be lower than those offered on European mines. The presence of non-monetary

under the *kongsi-kung* or the *nai-chiang* system of employment, Western employers were forced to pay wages between 10 and 15 per cent higher than their Chinese counterparts.[17] At the same time, a number of aspects of British administration such as the system of revenue farming and the discharge-ticket system of employment, strengthened the competitive position of the Chinese capitalists and denied Western employers an adequate labour supply.

In the short run, the failure of early Western mining enterprise led the majority of officials and Western capitalists in the Straits Settlements and the protected states to conclude that, under existing conditions, Western mining enterprise could not compete with the Chinese employing labour-intensive methods. This conclusion was confirmed by experience; in practically every instance the land abandoned by Western mining companies was worked at a profit by the Chinese.[18]

The Period of Transition, 1900-1920

From the turn of the century there was a rapid expansion of Western, most notably direct British, investment in the Malayan tin mining industry.[19] As in the earlier period this expansion was stimulated by a number of external factors such as the high prices being obtained for tin on the world market and the size of the Malayan output, which by 1895 was

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advantages such as the supply of opium and the facilities for gambling were additional attractions. Hall. *Report on Tin-Mining*. p.9 cited in Yip, *ibid.*, p.104

[17] D.C.Alexander, "Mining in the Federated Malay States". *Department of Commerce and Labour, Bureau of Manufactures*, Special Agent Series-No.59, Washington, 1912, p.12, cited in Yip, *Development of the Tin Mining Industry*, p.103.

[18] In fact in the 1880s and 1890s the few European companies that successfully operated in the western Malay States such as the Societe des Etains de Kinta, were all working on a modified version of the Chinese tribute system. *Annual Report Perak 1891*, p.16. *Annual Report Selangor 1891*, p.44: *Annual Report Sungei Ujong and Jelebu 1893*. p.65 all cited in Wong, *The Malayan Tin Industry to 1914*, pp.149-50. It should be noted, however, that during this period Western enterprise was successfully established in the tin smelting industry through the development of the Straits Trading Company. For a detailed account see Yip, *ibid.*, pp.105-09; Gov. to Sec. State, 18 August, 1893, Resident, Perak to Col. Sec., 28 August, 1893 both in CO 273/189.

[19] Although French and Australian companies also invested in the industry after 1900 the bulk of Western investments were British. British investments were of two forms, either "sterling" companies (registered in Britain), or "dollar" companies (registered in the FMS or Straits Settlements). A large number of British companies were controlled by two closely associated organisations, the Gopeng Consolidated Tin Company Limited, a flourishing Malayan company, and the Redruth Mining Exchange, a limited Cornish company formed to accommodate brokers dealing in mining and other shares. Through a system of interlocking directorates these two associations not only controlled a very large number of mining companies in the Malay States, but also numerous mines in Cornwall thus creating an intimate link between Cornish and Malayan mining interests. For details see Yip, *ibid.*, pp.139-48.

driving one Cornish mine after another out of the margin of profitable production.[20] More importantly, however, Western enterprise had finally succeeded in entering the industry because economic circumstances in the Malay States had altered in favour of the introduction of Western capital and technology. Most significantly, it had become widely apparent by about 1905 that the shallow and more easily accessible deposits that the Chinese had been mining for decades were becoming exhausted.[21] Consequently, the industry became increasingly dependent on the mining of lower-grade and deeper deposits by advanced mining methods. The application of advanced technology also enabled Western companies to overcome the labour difficulties that had contributed to the failure of earlier enterprise.

The application of Western technology occurred in three main stages. In each stage the machinery introduced mechanised one or more of the processes involved in tin mining and resulted in a considerable reduction of the cost of treating per cubic yard of *karang*. The first stage in the process towards mechanisation involved the use of a monitor that was capable of breaking down the *karang* at a tremendous rate through hydraulic sluicing.[22] The main advantage of the hydraulic method was its low average cost compared with the open-cast

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[20] For details see Wong , *The Malayan Tin Mining Industry to 1914*, pp.119- 23, 145-46; Flower, *A History of the Trade in Tin*, pp.35-36. It should also be noted that the 1910s and 1920s were a period of general expansion of British investment overseas. By the middle of the 19th century, British investments amounted to only £200 million and were directed mainly to Europe. After 1870 both the magnitude and direction of investment changed; between 1875-1913 British overseas investment amounted to about £4,000 million and was directed to the less-developed primary producing countries of North and South America, South Africa, Australia and Asia. See Havinden & Meredith, *Colonialism and Development*, Chapter 1.

[21] This exhaustion was evidenced by declining tin yields per cubic yard of *karang*. A decade or two earlier no Chinese open-cast miner would work a deposit that yielded less than 2 katis of tin-ore per cubic yard of *karang*, while yields of as high as 4 to 5 katis per cubic yard were common. By 1910 a deposit that contained 1 *kati* of ore per cubic yard of *karang* was considered rich in open-cast mining. A few years later dredges were mining profitably deposits that yielded less than half a kati of tin-ore per cubic yard of *karang*. Yip, *Development of the Tin Mining Industry*, p130.

[22] Hydraulic mining in the Malay States was an adaptation of the system employed in California for the recovery of gold. It was first introduced in Perak in 1892 by F.D.Osborne, manager of Leh Chin Mining Limited, with the object of working low-grade deposits neglected by the Chinese. By 1905 there were 9 hydraulic mines in the Federated Malay States. In hydraulic mining the *karang* is broken down by water issued from a monitor under natural pressure, obtained by damming a stream 100 feet or more above the mine, and conveyed through pipes to the mine face. This produced a pressure usually sufficient to break down even the strongest *karang*. The broken-down *karang*, mixed with water, was then raised to the surface, initially by labourers using baskets suspended between bamboo poles, but later by hydraulic elevators working on the suction principle- a jet of water, projected under natural pressure up the inside of a pipe, created a suction that drew the mixture of *karang* and water to the mine surface where it was discharged and concentrated in a system of sluices. The success of hydraulic mining depended on the availability of water of sufficient height to provide the necessary pressure. Hydraulic mines were usually located close to foothills. Early hydraulic mines included the Gopeng Consolidated, the Tekka and the Kinta Tin Mining Companies in Perak, the Serendah Tin Mines in Selangor and the Kanaboi Tin Mines in Negri Sembilan. Yip, *ibid.*, p.130; Beecher, "Mining in the Malay Peninsula", pp 80-82, 93-94.

method.[23] It thus enabled the treatmen of very low grade ores and meant that large areas of land that could not be worked profita ly by the Chinese were brought within the region of potential exploitation.

The second important Western innovation was gravel-pump mining which began in Perak in 1906. Like hydraulicing, gra el-pumping made use of a jet of water issued from a monitor to break down the *karang* and, by means of a gravel-pump, raise the *karang* to the surface. Unlike hydraulicing, the powe in gravel-pumping was artificially generated either by steam, oil or (later) electricity.[24] The main advantage of the gravel-pump method was that it reduced the incidence of stoppage due o flooding thus allowing miners greater freedom in the choice of mining sites. Mining coul also be carried to even greater depths than under hydraulic sluicing.

The third and most important advance in mining technology occurred in 1912 with the successful introduction of a bucket-dredge at Batu Gajah in Perak by the Malayan Tin Dredging Company.[25] With the introd ction of dredging the process of tin mining became completely mechanised. Consequently Western companies developed a strong competitive advantage within the industry. This facilitated the rapid expansion of Western mining enterprise in the Malay States. As sh own in Table 12 below, despite a slight interruption caused by the First World War which prevented the importation of building materials, the number of dredges in the industry inc eased rapidly. By 1915, 11 dredges were in operation

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[23] In 1912 the working costs of treating per cubic yard of *k arang* by hydraulic methods was estimated at $0.13, compared with between $0.61 and $0.94 for open-cast methods. Alexander, "Mining in th Federated Malay States", pp.18-19, cited in Yip, *Development of the Tin Mining Industry*, p.131.

[24] This tended to raise the average working cost of gravel-p mping above that of hydraulicing, to an estimated $0.57 per cubic yard of *karang*.

[25] Dredges were first used for mining in New Zealand. From there the method spread to Australia, and via Australia to the Malay States. Although the possibility of working Malayan alluvial tin de osits by dredging had been recognised as early as 1906 when Messrs. Osborne and Chappel, a firm of consulting mining engineers had insta led a suction-dredge at Tanjong Rambutan in Perak, the method was not trialed successfully until 1912. For details see Wong, *The Malayan Tin Industry to 1914*, pp.209-10; Fermor, *Report Upon the Mining Industry*, pp.25-26. A description of the nature and working of a bucket-dred e is given n Appendix G.

producing 37,500 pikuls (more than 2,000 tons) of tin-ore.[26] By 1920 the number of dredges had increased to 20 and dredging output to 78,200 pikuls (about 4,700 tons), equivalent to 13 per cent of total tin production.

Table 12

Number of Dredges and Dredging Output in the FMS, 1913-1920.

Year	Number of Dredges At End of Year		Dredging Output of Tin-Ore	
	In Operation	Total	Average (pikuls)[a]	Average (tons)[b]
1913	1		3,800	230
1914	2	2	5,400	160
1915	10	10	37,500	230
1916	14	14	65,400	270
1917	15	15	74,900	260
1918	16	16	65,400	240
1919	18	18	76,600	260
1920	20	20	78,200	230

Source: FMS, *Statistics Relating to the Mining Industry, 1929-31* cited in Yip, *Development of the Tin Mining Industry*, Table II-9, p.163.

Notes: [a] These figures relate to those dredges that were active during the year. Figures are given in nearest hundred pikuls.
[b] Figures are given in the nearest ten tons.

The advantages of bucket-dredging were largely three-fold. Firstly, dredging solved the physical problem of working deposits in low-lying, swampy and very wet grounds which hitherto could not be attempted in open-cast, hydraulic or gravel-pump mining except with the use of very expensive pumping machinery and at a very high average working cost.[27] Second, dredging had the economic advantage of being able to efficiently treat *karang* at a cost per

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[26] This represented approximately 5 per cent of the total output of the FMS. H.D.Griffiths, "Bucket-Dredging for Tin in the Federated Malay States", *The Mining Magazine*, 1917, p.2. See also Lim Chong Yah, *Economic Development in Malaya*, Kuala Lumpur, Oxford University Press, 1967, pp.69-73.

[27] In Kinta, for example, dredging brought within the range of profitable exploitation the extensive swamp lands and river flats located in the centre of the valley. The introduction of dredging in Kinta came at a time when the well-drained foothills on both sides of the valley were being rapidly exhausted and miners were beginning to look for profitable deposits elsewhere. Batu Gajah, the site of the first bucket-dredge in the Malay States, was located in the Kinta valley.

cubic yard lower than most other alluvial mining methods.[28] This brought within the range of profitable exploitation grounds previously considered too poor in content to be worth mining and grounds that had earlier been incompletely exploited by Chinese methods but had remained unprofitable for re-working by hydraulic or gravel-pump methods.[29] As shown in Table 13 below, none of the early tin dredging companies (all of which were in Perak), were working on mining lands that yielded more than 1 *kati* of tin-ore per cubic yard of *karang*. The average yield for all the dredging companies in 1915 came to 0.62 *kati* per cubic yard, a yield outside the range of profitable mining by open-cast, hydraulic or gravel-pump methods. On the whole, the working costs of these early dredges ranged from 10.7 cents to 13.5 cents per cubic yard of *karang*.

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[28] In 1912 the Malayan Tin Dredging Company had a working cost per cubic yard of *karang* of $0.16, compared to $0.13 in the case of the Tekka Mines (hydraulic), $0.57 the case of the Pengkalen Ltd. (gravel-pump) and $0.61 in the case of the Tambun Mines (open-cast). With its relatively low average working cost and greater efficiency of recovery, the Malayan Tin Dredging Company was able to treat *karang* that yielded on the average less than 0.5 *katis* per cubic yard. Griffiths, "Bucket Dredging", Table 1, p.3.

[29] A case in point was the Larut district of Perak where dredging was successfully employed to exploit large tracts of land supposedly "worked out" under early Chinese open-cast methods. There were several reasons why areas such as this still contained tin-ore in appreciable quantities for dredging. First, the grade of tin-ore that was economically feasible to extract depended to a large extent on the price of the metal. With the price of tin towards the end of the 19th century at £60-120 per ton, grounds that yielded less than 3 *katis* of tin-ore per cubic yard were usually not considered worth working and were left untouched. Second, because of the practice of selective mining, early Chinese mining was not thorough; the irregular and unsystematic method left wide margins of land along the boundaries that separated the numerous small mines in the district unworked. Third, owing to the absence of efficient pumping machinery, the early miners usually failed to reach the true bottom of the deposits and *karang* that lay below 30 feet usually remained untouched. Overall, tailings and "worked out" mining lands, such as those in Larut, had a tin-ore content that averaged between 0.5 and 1 kati per cubic yard, a yield that within the range of profitable mining by dredges. Yip, *Development of the Tin Mining Industry*, p.133-34.

Table 13

Working Costs and Yields per Cubic Yard of *Karang* of the Seven Tin Dredging Companies in the FMS in 1915.

Dredging Company	Location	Number of Dredges	Average Working Cost per Cubic Yard (cents)	Average Yield per Cubic Yard (katis)
Malayan Tin Dredging Co.	Kinta	4	12.2	0.49
Ipoh Tin Dredging Co.	Kinta	1	11.0	0.62
Chenderiang Tin Dredging Co.	Kinta	1	12.5 [a]	0.56
Tronoh Mines Ltd.	Kinta	2	12.0	0.55
Kamunting Tin Dredging Co.	Kinta	1	10.7 [b]	0.96
Kampong Kamunting Co.	Larut	2	11.8	0.79
Tekka Taiping Co.	Larut	1	13.5	0.74

Source: Compiled from Griffiths, "Bucket-Dredging", Figure 1, p.2, Table I, p.3 and Table IX, p.21.

Notes: [a] For the year 1916.
[b] For six months of 1916.

Dredging also enlarged the scale of mining operations. As shown in Table 14 below, early dredges in the Malay States had a productive capacity to treat between 60,000 and 100,000 cubic yards of *karang* per month. This large productive capacity meant that it was necessary for dredging companies to acquire extensive areas of mining land in order to keep the dredges working continuously. It has been estimated that 400 acres was the minimum mining area for a dredging enterprise.[30]

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[30] Griffiths, "Bucket-Dredging", pp.13-15. Any area less than 400 acres was regarded as uneconomic because of the high capital outlay dredging entailed. Indeed, none of the early dredging companies listed in Table 14 had dredging land of less than 400 acres: the Kampong Kamunting Company had the smallest area of 402 acres of dredging land, while the Tronoh Mines Ltd. and the Tekka Taiping Ltd. each had 2,000 acres of dredging land.

Table 14

Dimensions and Productive Capacities of Early Dredges in the FMS.

Dredging Company	Bucket Sizes [a]	Digging Speed of Buckets [b]	Digging Depth (in feet)	Dredging Capacity [c]	HP-Employed
Malayan Tin Dredging Company					
No.1 Dredge	10	0-12	50	57,000	250
No.2 Dredge	11	0-12	50	69,000	300
No.3 Dredge	11	0-12	60	87,000	300
No.4 Dredge	11	0-12	60	93,000	300
Ipoh Tin Dredging Company	7	2-14	49	66,000	237
Chenderiang Tin Dredging Company	10	16	40	88,000	180
Tronoh Mines Ltd.	12	12	60	86,000	315
Kamunting Tin Dredging Company	7.5	12	45	99,000	200
Kampong Kamunting Company	6	20	45	67,000	200
Tekka Taiping Ltd.	12	11	45	74,000	200

Source: Compiled from Griffiths, "Bucket-Dredging", Table VIII, p.21.

Notes: [a] Figures are given in cubic feet.
[b] Number of buckets per minute.
[c] Cubic yards of *karang* per month. Productive capacities of dredges are based on actual performance.

The Phase of Expansion 1920-1930

The decade 1920-1930 witnessed a spectacular expansion in tin production in the Malay States. As shown in Table 15 below, between 1921 and 1929 tin output rose from 34,000 tons to 67,000 tons, an increase of 97 per cent. Of this increase two-thirds occurred between 1926 and 1929. The rapid expansion in production during this period was largely the result of an investment boom in Western mining enterprise from the mid-1920s, particularly in dredging.[31]

[31] This investment boom was itself caused by an over-optimism about the future of the tin market and an over-exaggeration of the amount of new productive capacity required to meet future demand. Between 1919 and 1929 world consumption of primary tin rose from 110,000 tons to 184,000 tons, an increase of 67 per cent.

Table 15

Tin Production in the FMS, 1921-30

Year	Tin Output (tons) [a]	% Increase of Output Over Previous Year	Malayan Output as a % of World Output
1921	34,000	na	30.4
1922	35,000	2.9	27.1
1923	38,000	8.6	29.9
1924	44,000	15.8	33.0
1925	46,000	4.5	32.0
1926	46,000	na	32.5
1927	52,000	13.0	33.4
1928	62,000	19.2	35.5
1929	67,000	8.1	35.0
1930	62,000	-7.5 [b]	36.5

Source: Federated Malay States, *Statistics Relating to the Mining Industry*, 1929-31, cited in Yip, *Development of the Tin Mining Industry*, Table II-7, p.161.

Notes: [a] Figures are given in nearest thousand.
[b] (-) represents a percentage decrease in output.
na = not available.

At the beginning of the decade the tin mining industry in the FMS was caught in a postwar tin slump in which tin prices had collapsed (from £296 per ton in 1920 to £165 per ton in 1921), largely as a result of the accumulation of tin stocks in the FMS and Netherlands East Indies.[32] The FMS Government, urged by the foreign sector of the tin mining industry, adopted two measures calculated to rescue Malayan tin producers from the slump. The first measure involved a type of domestic "buffer stock" arrangement involving price-supporting practices.[33] The second measure, known as the Bandoeng Pool, involved the formation, in co-

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[32] In order to prevent the local price from falling further the Government guaranteed a minimum price for tin by agreeing to purchase all the tin produced in the Malay States when the price fell below a certain level, and to sell it when the world market had recovered. By this time production in the FMS and the Netherlands East Indies constituted approximately half the world's tin output. The accumulation of stocks had been caused by the shortage of shipping facilities during and immediately after the First World War and the resulting difficulty of transporting tin to markets in the West.

[33] In this way the domestic market was divorced from the overseas market and the impact of the tin slump reduced. Accordingly on 6 December 1920, a local price of $110 per pikul (about £216 per ton) was fixed by the Government as the minimum at which it would undertake to purchase and stock all the tin produced in the Malay States. As the slump deepened at the beginning of 1921 this minimum guaranteed price was lowered to $100 per pikul. On 20 December 1920 this minimum price was raised to $115 per pikul when it was discovered that many of the small marginal Chinese mines could not be kept operational at the original price. This price level was maintained until 25 February 1921 when it was decided to discontinue the practice of supporting the local tin price. Between 6 December 1920 and 25 February 1921 the price at which tin was bought by the Government averaged £223 per ton, compared to the average London price of £165 per ton in 1921. While the amount of tin accumulated during the period is unknown, it is believed not to have exceeded 10,000 tons. For details see Yip, *Development of the Tin Mining Industry*, pp.154-55.

operation with the Netherlands East Indies, of an international buffer stock.[34] The sale of tin from the Bandoeng Pool continued into 1923. During this period the price of tin increased gradually until, at the end of 1924, the local tin price had reached £132 per pikul (£259 per ton).

Of the two measures the Bandoeng Pool had the greatest impact on the domestic tin mining industry.[35] Most significantly, it encouraged an investment boom in the industry by Western mining companies. This was largely because the Pool had concealed from the world market the fact that world capacity to consume had greatly exceeded world capacity to produce.[36] In 1925, when the whole stock of tin in the Bandoeng Pool had been sold, it suddenly became apparent that a tin shortage was developing. Consequently, the tin price began to rise very sharply and at its height during 1926-27 the annual average price stood at £290 per ton. This temporary shortage (which could partly be explained in terms of the inelasticity of supply of tin), was taken by the promoters of many mining companies to be a sign of increasing scarcity in the future. The result was a sudden boom in shares which led to substantial amounts of capital being attracted from Britain and other countries in the West to the tin-producing countries, including the Malay States.

The expansion in foreign investment in Malayan tin mining between 1920 and 1927 in terms of the issued capital of "sterling" and 'dollar" companies is shown in Table 16 below. As in the earlier decades the bulk of investments in the industry during this period were British.

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[34] During 1921 the Bandoeng Pool withheld from the world market 19,000 tons of tin (12,000 tons from the FMS and 7,000 tons from the Netherlands East Indies), equivalent to nearly one-third of the world's total tin output in that year. This was kept from the world market until June 1923 when it was gradually released (at more than 5 per cent per month), following a revival in consumption in the United States and Europe that forced the tin price to £200 per ton. Yip, *Development of the Tin Mining Industry*, pp.155-156.

[35] The domestic government price-supporting programme lasted for too short a time to achieve very much. It did represent, however, the first positive steps taken by the FMS Government to support the industry during a tin slump.

[36] Between 1921, the worst year of the slump, and 1925 world demand for tin rose from 80,000 tons to 150,000 tons while world tin production increased from 116,000 tons to 146,000 tons. *Ibid.*

Table 16

Tin Mining Companies and Total Issued Capital in the Tin Mining Industry in 1921 and 1927 (in £ sterling).

	1920	1927
Foreign-Registered		
British	3,644,000	8,744,000
French	91,000	191,000
American	na	100,000 [a]
Locally-Registerd	1,517,000	2,182,000
Total	5,352,000	12,117,000

Source: Yip, *Development of the Tin Mining Industry*, Table on p.158.

Note: [a] Estimated outstanding capital in 1929.
na = not available.

Of the various sectors of the mining industry, investments in dredging were the most significant. Furthermore, the largest proportion of dredging capital in the period came not from new capital investments but from established mining companies that had changed from open-cast, hydraulic or gravel-pump mining to dredging as it became accepted as a more efficient method of large-scale tin mining.[37] As shown in Table 17 below, the number of dredges in operation increased more than threefold during the decade; from 30 in 1921 to 105 by 1929. More than two-thirds of this increase occurred between 1926 and 1929. As a result, dredging output increased markedly. By 1930 the annual output per dredge was approximately double that of the prewar period. This was despite the fact that dredges installed towards the end of the period were working on land of poorer content than that worked by earlier dredges.[38] In terms of the total increase in output during the decade, the expansion in the number of dredges was significant; of the increase of 28,000 tons in total output during this period, 22,000 tons, or

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[37] In 1919, for instance, dredging investments accounted for one-quarter of the total investments of "sterling" tin mining companies and investments in other methods of mining (ie. gravel-pump, hydraulicing, open-cast and lode mining) for three-quarters. By 1927 these proportions had been reversed- dredging investments accounted for three-quarters of total investments of "sterling" tin mining companies and investments in other methods of mining for one-quarter. Yip, *Development of the Tin Mining Industry*, p.145.

[38] The dredges that came into operation after 1926 must therefore have been highly efficient. Dredging capacity, for instance, had increased from about 80,000 cubic yards to 200,000-300,000 cubic yards per month. Furthermore, the dredges were now working to a depth of 100 feet or more compared to 40-50 feet in the previous decade. *Ibid.*, p.163; Ooi, "Mining Landscapes", p.360.

nearly 80 per cent, was attributed to dredging.[39] Thus, while in 1920 dredging output accounted for only 13 per cent of the total output of the FMS, this had risen to nearly 40 per cent by 1929.

Table 17

Number of Dredges and Dredging Output in the FMS, 1920-1930.

Year	No. of Dredges At End of Year			Dredging Output of Tin-Ore		
	In Operation	Stopped During the Year [a]	Total	Total (pikuls)	Average (pikuls)[b]	Average (tons) [c]
1920	20	-	20	78,200	3,900	230
1921	30	-	30	108,000	3,600	210
1922	22	11	33	125,600	5,700	340
1923	33	7	40	193,200	5,800	350
1924	38	4	42	210,000	5,500	330
1925	40	2	42	211,600	5,300	320
1926	41	11	52	213,000	5,200	310
1927	48	22	70	291,700	6,100	360
1928	89	-	89	433,800	4,900	290
1929	105	-	105	605,500	5,800	350
1930	69	38	107	550,200	8,000	480

Source: FMS, *Statistics Relating to the Mining Industry, 1929-31* cited in Yip, *Development of the Tin Mining Industry*, Table II-9, p.163.

Notes: [a] Shows the number of dredges which for various reasons (repairs, change of sites etc.), were not working at the end of the year. The large number of dredges not working at the end of 1930 was due largely to the onset of depression.

[b] Figures relate to those dredges that were active during the year. Figures are given in nearest hundred pikuls.

[c] Figures are given in the nearest ten tons.

II. THE IMPACT ON LABOUR:

The rapid development of Western mining enterprise in the Malay States in the period 1900-1930 had a number of profound implications for Chinese tin mining labour. These can be discussed broadly in terms of: (i) the change in the pattern of tin mining, in particular the gradual substitution of capital for labour in all mining processes; and, (ii) the changing

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[39] See Tables 16 and 17 above.

ownership and control of production, notably a rise in the foreign sectors' share of total output and a decline in Chinese output over the period. Incorporated into these developments are changes in the type of employment, wages, conditions and methods of recruitment of Chinese tin mining labour.

Changes in the Pattern of Tin Mining

At the beginning of the 20th century, tin mining in the Malay States was characterised by the traditional small-scale, labour-intensive exploitation of shallow and easily accessible deposits by a large number of individually-owned operations. However, with the growth of Western enterprise and the increased application of advanced mining techniques, this pattern underwent significant change. Tin mining in the Malay States became characterised by the capital-intensive exploitation of deep deposits by a few large-scale Western mining companies. As mechanisation advanced, machine-power gradually supplanted labour power in the mines. The technological changes in mining methods over the period therefore had an important impact on, *inter alia*, the total number of workers in the industry.[40]

Power in tin mining was required for various purposes- for draining the excess water from the pit, for breaking down and lifting the *karang* to the surface and for separating waste material in the *karang* from the tin-ore. In the Chinese open-cast mines nearly all these processes were performed by labour, the only piece of machinery being the traditional *chin-chia* which was employed in draining water from the mine pit. In Western mines, on the other hand, machinery performed most of these operations, with the result that the mechanical capacity of the industry gradually increased. Increased mechanisation is clearly demonstrated

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[40] In hydraulic mining, for example, the monitor eliminated the need to rely on coolies to break down the *karang* with changkols which was an extremely slow process. Likewise, the introduction of the gravel-pump enabled the *karang* to be mechanically raised up a *palong* thus rendering the use of coolies redundant. With dredging, although the scale of production was large, the number of workers required to work the plant was small; a dredge with 12-foot buckets with the application of about 300 mechanical horse-power and the help of about 90 coolies under European supervision could dig and treat in one day as much *karang* as 2,000 coolies during the same period. A.C.Perkins, "Tin Dredging in the Federated Malay States", cited in Yip, *Development of the Tin Mining Industry*, p 134.

by the employment of mechanical horse-power in the mines. As shown in Table 18 below, the employment of mechanical horse-power was particularly significant following the introduction of the bucket-dredge.

Table 18

Total Mechanical Horse-power Employed in Tin Mining, Total Tin Mining Labour Force and Total Tin Output in the FMS, 1904-1920.

Year	Horse-power Employed [a]	Labour Equivalent [b]	Labour Employed [c]	Tin Output (tons)
1904	6,500	52,000	193,000	52,000
1905	7,500	60,000	209,000	51,000
1906	8,200	65,600	213,000	49,000
1907	9,300	74,400	231,000	48,000
1908	10,100	80,800	195,000	51,000
1909	13,000	104,000	183,000	49,000
1910	18,000	144,000	170,000	44,000
1911	20,600	164,800	196,000	44,000
1912	22,600	180,800	211,000	48,000
1913	25,800	204,800	225,000	50,000
1914	41,600	352,800	172,000	49,000
1915	56,200	449,600	164,000	47,000
1916	58,100	464,800	139,000	44,000
1917	55,600	444,800	123,000	40,000
1918	60,000	480,000	145,000	37,000
1919	51,300	410,400	113,000	37,000
1920	64,400	515,200	90,000	37,000
1921-25 [d]	74,800	598,400	96,400	39,000
1926-30 [e]	153,200	1,225,600	105,500	58,000

Source: Figures for horse-power employed, labour employed and tin output are derived from FMS, *Statistics Relating to the Mining Industry*, 1929, pp.2, 21-22 and FMS, *Mines Department Reports* cited in Yip, *Development of the Tin Mining Industry*, Table II-3, pp.138. Figures for labour equivalent are calculated using the formula 1 horse-power = 8 labourers as determined by the 1895 Mining Code.

Notes: [a] Figures given in the nearest hundred.
[b] Figures given in the nearest hundred.
[c] Figures given in the nearest thousand.
[d] Quinquennial average.
[e] Quinquennial average.

When statistics first became available in 1904 there was less than 7,000 mechanical horse-power employed in all the mines in the FMS.[41] By 1911, following the development of hydraulic and gravel-pump mining, this figure had trebled to nearly 21,000.[42] By 1914 the steam, gas, hydraulic, oil and electric plant in the mines amounted to approximately 41,600 horse-power. The sudden increase in the employment of mechanical horse-power, from 22,600 to 56,000 between 1912 and 1915, was largely the result of the expansion of dredging, the number of dredges during this period having increased from one to twelve. By 1920, despite the interruption of war, the total mechanical horse-power employed in the industry had increased to 64,400, nearly ten times greater than in 1904. In the following decade, as the number of dredges in use and dredging capacity increased, the mechanical capacity of the mines expanded rapidly. Between 1921 and 1925 mechanisation in the mines averaged 74,800 horse-power; in the period 1926-1930, during which time the number of dredges in operation rose from 20 to 69, this increased to an average 153,200 horse-power.

Parallelling the expansion of mechanical horse-power in the tin mines was the significant decline in the employment of tin mining labour. As shown in Table 18 above, the tin mining labour force fell from 193,000 labourers in 1904 to 90,000 by 1920. Although part of this decrease could be explained by the corresponding fall in tin output over the period (from 52,000 tons to 35,000 tons), it was due mainly to the substitution of capital for labour in the mines. In 1914, for example, the labour equivalent provided by machines in use totalled some 352,800 labour units. This clearly surpassed the actual number of labourers employed in the mines, which in this year was approximately 172,000. Whereas in the mid-1900s actual labour employed constituted about 75 per cent of total labour units in the mines, by the early 1920s it

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[41] This was applied to work a wide range of devices of European and Australian origin, such as mills, mechanical puddlers, concentrating tables, steam diggers, stamps and wire-ropes. Until 1906 the prime movers were all steam-driven, but owing to the growing costs of hard-timber and good charcoal, without which the steam engines could not function economically, oil engines and suction-gas plants capable of efficient performance on poor quality coal were introduced. By 1911 hydro-electric plants had also been introduced.

[42] As in the past, progress in the use of mechanical power was faster in Perak than elsewhere. By 1911 the labour equivalent of the steam, hydraulic, and electric plants in the state (120,984 men) actually exceeded the mining labour force (107,864 men).

comprised only 12-13 per cent. Even in 1927, when approximately 77,500 labourers were employed in the mines (the highest recorded during the tin-boom of the 1920s), actual labour employed constituted only 9 per cent of total labour units. It is clear, therefore, that with increased mechanisation, especially the introduction of dredging, substitution of mechanical power for labour power resulted in a significant reduction in the total labour force employed in the tin mining industry. At the same time, the pattern of employment was altered.

It will be recalled that by the turn of the century labourers on Chinese mines were of two types, either wage labourers working on piece-rates (*nai-chiang* labourers) or on daily wages (*kongsi-kung* labourers), and tribute labourers who had no fixed wage but either received the value of all the tin they produced (less an agreed percentage paid to the mine owner/ advancer), or sold all their tin to the mine owner at a fixed price. The growth of mechanisation in due course modified this pattern.[43] Most significant was the growing importance of wage labour and a greater division of labour into specific tasks. On gravel-pump mines for instance, the number of workers employed averaged 35. These were divided into four categories: monthly-rated, daily-rated, piece-rated, and, contractors' labourers. Of the monthly-rated staff, the *kepala* or mine-manager was the most important. Subordinate to the *kepala* was the assistant, and under the assistant were two or three shift overseers (*kuen paan*) in charge of the successive labour shifts. On a second management tier were the *hang kong* or quartermaster of the mine who was in charge of purchasing food and stores, and a clerk for routine administrative work. The daily-rated labourers, on the other hand, fell into various grades depending on skill and responsibility. Thus the *pong shau* (who was often a budding *kepala*), was the general all-round assistant; the *tsap kung* was the labourer who had specific tasks and was often in charge of a particular section of the work; and the *kongsi-kung* was a labourer who did all the miscellaneous manual work. The majority of the daily-rated labourers lived on the mine dormitory-style in the *kongsi-house* with the employer engaged a

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[43] The following is based on Siew, "Labour and Tin Mining", pp.411-419 and Jackson, "Changing Patterns of Employment", p.148-153.

cook and supplied free food.[44] The third group of labour on the mines were piece-rate workers who were usually engaged for grass-cutting or repairing embankments and other menial work. Contractor's labourers formed the fourth group of workers employed on gravel-pump mines. These labourers, who were employed through a contractor for specific purposes, were engaged either regularly at intervals, as in the fortnightly ore-dressing or final preparation of the ore; irregularly at intervals, as in the construction or repair work on buildings; or regularly and continuously, often accompanying mining machinery. In the latter case, for example, the contractor, for a lump sum each month, provided engine-drivers and apprentices who operated the pumping machinery.

The number of labourers required on dredging operations was much less than that required on the gravel-pump or hydraulic mines. Moreover, as the management of the tin dredging companies was entirely in the hands of Europeans, the labour employed to work on the dredges was employed directly by the company that owned the dredge. Apart from the senior supervisors and technical personnel, the workers were usually daily-rated. Labourers usually worked in 8-hour shifts and averaged 24 days work a month. Many of the labourers lived near the dredges with their families in housing provided by the employer.

Simultaneously, the introduction of Western mining methods directly altered the racial composition of the mining labour force; Western technology lessened the drudgery of mining work, which previously only the Chinese could withstand, thus making it possible for the employment of Indian, Malay and Javanese labourers on the mines (Table 19). These labourers, especially the Javanese, were suitable as engine drivers, firemen, greasers, fuel men, winchmen, riffle attendants, and watchmen. Indian labourers were also employed in actual mining work and owed their engagement to the introduction of winding gears and trucks on rails for the removal of the overburden and tin sand. In gravel-pump and hydraulic mines, where trucks were employed, Indian labourers were often preferred to Chinese labourers (even

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[44] A detailed description of the kongsi-house is given in Appendix C.

in some of the large Chinese mines), because, carrying the burden on their heads instead of the shoulders as the Chinese did, the Indian labourers could load the trucks with natural ease. Chinese labourers, on the other hand were dependent on such superstructure as platforms, staging and ladders, which had to be moved continuously as the tramway advanced with the working face. Furthermore, Indian labourers were, on the whole, cheaper because they did not take a complete holiday for 14 days at a time as was customary with the Chinese. Indian labourers also tended to work better on wages than did the Chinese who generally would not exert themselves unless they had a personal interest in the operation. Western companies also found it easier to manage Indian labourers and soon learnt that Chinese labour rings could be broken by employing Indian workers.

Table 19

Racial Composition of the Mining Labour Force, 1901, 1911, 1914.

	1901	1911	1914
Chinese	153,784	189,010	163,636
Indians	501	4,625	5,824
Malays	4,223	2,577	1,997
Others	276	214	342
Total	158,687	196,427	171,799

Source: *Annual Report Mines Department FMS 1911*, p.5 and *1914*, p.5; *Census FMS 1901*, p.144, cited in Wong, *The Malayan Tin Industry to 1914*, Table XXXVII, p.219.

The Rise of the Foreign Sector and the Decline of the Chinese Sector

Serious reduction in the total quantity of labour employed in the mines was only one important consequence of technological changes concomitant on the development of Western mining enterprise. A second important and related impact was the relative and absolute decline of the Chinese open-cast sector. As the labour-intensive sector of the industry, the demise of the Chinese open-cast sector had a significant impact on Chinese tin mining labour.

As shown in Table 20 below, European mines accounted for only 10 per cent of total tin output in the FMS at the beginning of the 20th century. By 1910, however, this share had increased to 23 per cent and by 1920 European mines accounted for over one-third of total tin production. Following the expansion in foreign investment in the industry from the mid-1920s, the control of tin production passed effectively into the hands of Western enterprise. By 1930 foreign mines accounted for 63 per cent of total tin production in the FMS.

Table 20

Tin Produced by Chinese and Western Mines in the FMS, 1900-1920.

Year	% of Total Output		Year	% of Total Output	
	Chinese	Western		Chinese	Western
1900[a]	90	10			
...	....		1920	64	36
1910	78	22	1921	61	39
1911	77	23	1922	62	38
1912	80	20	1923	56	44
1913	74	26	1924	55	45
1914	76	24	1925	56	44
1915	72	28	1926	56	44
1916	68	32	1927	59	41
1917	71	29	1928	51	49
1918	68	32	1929	39	61
1919	68	32	1930	37	63

Source: Fermor, *Report Upon the Mining Industry*, Table 1, p.67.

Note: [a] Figures for 1900 are estimates since official statistics relating to the volume of output by foreign and Chinese mines were not compiled until 1910. These estimates are based on Hall, *Report on Tin Mining*, cited in Yip, *Development of the Tin Mining Industry*, p.149.

The expansion in the Western sectors' share of total production during the first three decades of the 20th century was due primarily to the expansion in dredging output.[45] By 1915

[45] Dredging is normally regarded as a "foreign" or "European" sector. From its early development just prior to the First World War, the foreign identity of dredging was unambiguous: the sector was found by European companies that were registered abroad with capital raised overseas and were managed by European managers.

dredging accounted for 5 per cent of total production and by 1920 this share had increased to 13 per cent. Thus between 1910 and 1920, when foreign output rose from 22 to 36 per cent of total production in the FMS (an increase of 14 per cent), 13 per cent of the increase was accounted for by a rise in dredging output.

Corresponding to the rise in the foreign sector's share of total output was a decline in the Chinese sector's share- from 90 per cent of total production in 1900 to only 37 per cent by 1930 (Table 20). As shown in Table 21 below, in terms of absolute tonnage, the decline in Chinese production was even more severe. In the period 1900-1910 production in the Chinese sector declined from 39,000 tons to 36 000 tons and between 1910 and 1920 it fell from 36,000 tons to 24,000 tons. Although total output also declined between 1910 and 1920 (from 46,000 tons to 37,000 tons), this reduction occurred only in the Chinese sector, for during this period foreign output increased from approximately 4,000 tons to nearly 13,000 tons.

Table 21

Production by Chinese and European Mines, 1900, 1910, 1920 and 1930
(Figures are given to the nearest thousand tons).

	Chinese	European
1900	39,000	4,000
1910	36,000	10,000
1920	24,000	13,000
1930	31,000	36,000

Source: Table 5 Appendix A.

As the labour intensive sector of the industry, the absolute and proportional decline in Chinese production had a significant impact on Chinese tin mining labour. As shown in Table 22 below, the greatest fall in employment in the industry in the period 1910-1929 occurred in the open-cast sector. In 1910 this sector was the largest employer of tin mining labour; of the 170,000 workers employed in the industry, 123,000 workers were engaged in open-cast mining. Over the following decades, however, whereas employment on dredges and in gravel-

pump and hydraulic mines increased, in the Chinese open-cast sector employment fell, from a peak of 168,000 in 1913 to only 42,000 by 1920. By 1929, the eve of the Great Depression, the number of workers employed in the Chinese open-cast sector had fallen to 13,000.

Table 22

Employment by Methods of Mining, 1910-1929[a] (Figures given to the nearest hundred thousand).

Year End	Open-Casting	Hydraulicing	Underground	Dredging	Gravel-Pumping[b]	Total
1910	123	19	19	...		170
1911	150	31	15	...		196
1912	157	35	19	...		211
1913	168	37	20	...		225
1914	124	32	15	...		172
1915	118	33	11	2		164
1916	95	31	11	2		139
1917	82	29	11	2		139
1918	97	33	12	3		145
1919	73	28	10	3		113
1920	42	25	10	3		90
1921	41	20	10	6		86
1922	37	22	9	5		82
1923	34	25	12	6		97
1924	40	2	8	6	39	106
1925	29	4	7	7	40	107
1926	29	2	6	9	55	110
1927	28	2	6	11	60	123
1928	19	0	6	14	60	109
1929	13	9	6	17	59	104

Source: Lim Chong-Yah, *Economic Development*, Table 2.7, p.53.

Notes: [a] Figures before 1910 are unavailable. Figures refer only to FMS and include all mining sectors, but since tin mining tin the FMS was of preponderating importance in comparison with other mining, the data reflects the pattern of changes in employment in the tin-mining industry of the Malay States as a whole.

[b] Labour employed on gravel pump mines is included under hydraulicing prior to 1924.

Several interrelated developments contributed towards the decline in the output of, and hence employment in, the Chinese open-cast sector. The majority of these developments had their origins in the last few years of the 19th century and all had the general effect of increasing the costs of Chinese mining enterprise and therefore altering the competitive position of Chinese miners *vis-a-vis* their Western counterparts.

In the first instance, the decline in Chinese output after 1900 may be partly explained by the exhaustion of the rich and easily accessible surface tin deposits in the principal tin-fields of the Malay States from about 1890 onwards.[46] Production had been steadily declining since 1888 as the stanniferous soil had become exhausted to the extent that it was uneconomical to work by labour-intensive methods. In 1896 tin output dropped severely for the first time since the advent of British administration. Declining output, coupled with the drastic drop in prices during the 1890s depression, forced many Chinese mines out of production.[47]

At the same time, Chinese open-cast miners were operating under rising labour costs due to a general scarcity of labour caused by a reduction in Chinese immigration after 1893 (Table 23).[48] Fluctuating tin prices during the 1880s and 1890s was sufficient cause for a reduction in immigration, however, a number of other adventitious circumstances also contributed to the decline.[49]

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[46] For instance, in the Kuala Lumpur district Serendah, which was the prosperous mining centre between 1896 and 1902, began to languish as capital and labour, which had tended to move outward from the capital, began to return to the old and abandoned fields in the Klang Valley. Similarly, the Tambun mine had almost exhausted its richest land by 1905. Output per labourer began to decline regularly thereafter. Frequent references to the impoverishment of the tin land were also made in official and nonofficial publications after 1905. J.E.Scrivenor, the geologist of the Federated Malay States, commented in a report of work undertaken between September 1903 and January 1907 that the future of tin mining depended on "deeper-seated and low-grade surface deposits." J.E.Scrivenor, *Geologist's Report of Progress, September, 1903 to January 1907*, Kuala Lumpur, 1907, p.42, cited in Wong, *The Malayan Tin Industry to 1914*, p.212. See also Owen, "The Tin Industry of the Malay Peninsula", pp.651-52.

[47] Impoverishment of the tin soil meant that the average output per labourer declined. In the past, when fresh tracts of land with rich and accessible ores were continually laid open for exploitation, the Chinese had been able to abandon one mining district after another as the diminishing yields of ore progressively narrowed the margin between production costs and market values of the metal. The cyclical depressions in the market had therefore barely affected production. By 1897, however, almost all the tin deposits in the Malay States had been discovered and worked by the Chinese to the extent that they could no longer all be profitably mined regardless of the state of the tin market. Drainage and the difficulty of raising the ore-bearing earth to the surface from deep mines were the main problems. Owen, *ibid.*, p.654.

[48] It is virtually impossible, due to the absence of information, to trace the fluctuations in wage rates in the mining industry. However, Wong Lin Ken cites that the Annual Reports for the years 1899 onwards often refer to the scarcity of labour and the need to pay higher wages. Thus in 1899 the prevailing wages at which mining labourers would work in Perak were about 70 to 80 cents per day, compared with 33 cents per day in 1896. Again in January 1911, the average rate of mining wages rose to 75 cents a day, having doubled the average level prevailing in 1907 and 1908. See Wong, "Western Enterprise", p.148.

[49] Immigration from Hong Kong and China was interdicted from June to September 1894 and again from May to November 1899 owing to outbreaks of bubonic plague in China. In 1897 good harvests in the maritime provinces of South China temporarily relaxed the pressure to migrate overseas. In the last few years of the century, Chinese immigration into the protected states was also adversely affected by the increase in the demand for labour in China itself and elsewhere in French Indo-China and the Dutch colonies. See *Annual Report Chinese Protectorate Straits Settlements 1897* in CO 275/55, pp.190, 231; *Annual Report Straits Settlements 1899* in CO 275/59, p.360; *Straits Government Gazette 1895*, p.7. *Perak Government Gazette 1898*, p.294; *Labour Commission Report 1891*, in CO 275/41.

Table 23

Supply of Chinese Labour in Perak and Selangor, 1891-1901.[a]

Year	Immigrants	Emigrants	Balance	Deaths	Total Available
1891	56,757	43,606	13,151		
1892	85,105	43,428	38,677		
1893	109,059	57,597	51,462		
1894	87,920	57,066	30,854		
1895	96,895	65,691	31,204		
1896	74,376	64,779	9,597	11,341	- 1,744
1897	52,916	58,338	- 5,422	10,754	-16,171
1898	53,765	50,548	3,217	7,816	- 4,599
1899	84,043	51,610	32,433	7,908	24,525
1900	107,188	65,859	41,329	12,198	29,131
1901	112,098	78,357	33,741	11,830	21,911

Source: Wong, *The Malayan Tin Industry to 1914*, Table XXVI, p.172.

Note: [a] Perak and Selango are the only states for which statistical evidence is available.

The available supply of Chinese labour was further diminished by the efflux of Chinese labourers returning to China. From 1891 onwards the net immigration gain in Chinese males in Perak and Selangor began to decline and by the trough year of 1896 did not even compensate for the reduction in the Chinese labour force owing to deaths. In the years 1896 to 1898, therefore, the labour force available for employment was less than that in 1895.

This labour scarcity prevailed into the 20th century. As shown in Table 24 below, in the period 1900-1914 the annual inflow of Chinese immigrants did not flood the local market with labour.[50] In the years 1909 and 1914 the numbers of Chinese men leaving the Malay States on the west coast were not replaced by fresh immigrants.[51] During this period, the employment of Chinese labourers to build roads and railways and on estates (because of the failure of assisted

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[50] Subsidised immigration from Canton to ease the labour shortage in the mines was discussed in 1903 but was never implemented. For details see Wong, *The Malayan Tin Industry to 1914*, p.186; High Com. to Sec. State, 17 February, 1899, in CO 273/250; High Com. to Sec. State, 14 December, 1899, in CO 273/252; High Com. to Sec. State, 14 December, 1899, in CO 273/262, 7 July, and 29 November, 1900 in CO 273/263, and 13 April, 1901, in CO 273/272; British Consul to Sec. State for Foreign Affairs 3 May, 1901, in CO 273/275.

[51] In 1909 the deficit was largely caused by the most severe tin depression since the turn of the century, whereas in 1914 it was the result of war conditions. As the tin market in the Straits was expected to crash with the outbreak of war, immigration was prohibited on 3 August 1914 in anticipation of the unemployment that might result from such an eventuality. When the war finally broke out the tin market crashed and the government offered to repatriate free of charge the Chinese labourers thrown out of employment from the mines and elsewhere. The prohibition of immigration and government repatriation accounted for the large immigration deficit in 1914.

Indian immigration to meet the needs of agricultural enterprise), increased the competition for labour on the mines.

Table 24

Annual Gain or Deficit in Chinese Male (Adult) Immigration in Perak, Selangor and Negri Sembilan, 1900-1914.

Year	Perak	Selangor	Negri Sembilan	Total
1900	24,865	16,441	4,152	45,458
1901	23,379	10,363	4,612	38,354
1902	22,374	14,879	8,637	45,890
1903	21,414	16,899	5,805	44,118
1904				
1905	8,499	9,982	-1,125	17,356
1906	7,464	11,961	- 239	19,186
1907	20,145	23,031	2,132	45,308
1908	- 2,047	5,412	- 835	2,530
1909	- 5,025	2,679	- 446	- 2,792
1910	- 3,112	7,807	1,220	5,915
1911	9,032	19,818	4,794	33,644
1912	12,546	19,369	5,151	36,066
1913	15,497	16,100	7,224	38,821
1914	- 8,401	- 11,685	2,192	-17,894

Source: Wong, *The Malayan Tin Industry to 1914*, Table XXXI, p.205.

While the supply of labour was diminishing, the demand for labour was the greatest since 1874 owing to labour requirements to work the extensive land taken up during the tin rush of the late 1880s and early 1890s. In the meantime, the administration had introduced a more vigorous policy of resuming unworked tin land. In Perak and Negri Sembilan, under the 1895 Mining Code, the lessee of a piece of mining land was given one year to start *bona fide* mining operations and a maximum period of two years for which the land could be retained by employing a "nominal labour force" of two labourers per acre or their mechanical equivalent at the rate of 1 horse-power per eight labourers.[52] Furthermore, the lessee was obliged at any time

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[52] This policy was introduced in an effort to resume unworked tin and by progressively curtailing the time allowed for land to be held in idleness, thereby making it impossible for land to be locked up indefinitely for future exploitation or speculative purposes. The practical significance of the time limit lay not so much in its reduction as in its being enforced more rigorously than in the past.

to increase the labour force and main ain it at such required standard for a period of twelve months should the Warden of Mines re quire.[53] If such an order was not complied with, general forfeiture proceedings would then be initiated against the owner. While such a rule complied with the overall purpose of eliminating speculators and in this regard was not discriminatory in intent, nevertheless there were certain other provisions in the same laws that provided loopholes to those who were wealthier and in possession of a greater are of land.[54] On the whole, general forfeiture proceedings mostly affected the small Chinese open-cast miners.[55]

Furthermore, in its operation, the time clause in the mining lease put the Chinese open-cast miner in difficulties in times of labour scarcity and low tin prices because the miner often held several pieces of land which, owing to the different degrees of richness, would be profitable to mine only at different levels of tin prices. The time clause prevented the miner from rationalising the working of the property to secure a reasonably stable income over a longer period. Moreover, while the labour stipulation within the time clause not only increased the cost of holding the land, or preparing it for *bona fide* operations in times of labour scarcity, but could not be fulfilled in situations of acute labour shortage. As shown in Table 25 below, in the period 1896-1901 the resumption of land in which the labour stipulation had not been fulfilled in Perak and Selangor led to a sudden increase in labour demand in the industry, for

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[53] Under the 1899 Federal Mining Enactment the time period for starting *bona fide* mining operations from the date of issue of a lease was reduced to six months and the maximum period allowed for retaining the land by employing a nominal labour force of two labourers per acre or their mechanical equivalent was limited to one year. A further extension of one year for retaining the land could be obtained by the payment of certain fees.

[54] The first of these loopholes pertained to payment of additional fees to gain a time-extension for starting full-scale operations. Secondly, workers did not actually need to be emplaced on the mines if machinery was available, a 1 horse-power piece of equipment being considered the equivalent of 8 workers. Moreover, these mechanical installations were allowed to fulfil requirements for different leases insofar as these leases were for "contiguous lands", that is lands having common boundaries. In 1927 a subsequent ruling by the Chief secretary allowed for the same installations to fulfil requirements for different leases, even if they were not contiguous. A.C.Towers, Secretary, Federated Malay States Chamber of Mines to Under-Secretary to Government. of Federated Malay States, 5 February, 1927, Encl. 1 in Sel. Sec. 1780/1927: *Report of Sub-Committee of Federated Malay States Chamber of Mines on "Contiguous Lands"* and A.F.Richards, Under-Secretary to Government. Federated Malay States to Secretary, Federated Malay States Chamber of Mines, 9 April 1927, Encl 4A in Sel. Sec. 1780/1927 both cited in Francis Loh Kok Wah, *Beyond the Tin Mines- Coolies, Smatters and New Villagers in the Kinta Valley, Malaysia, c.1880-1980*, Singapore, Oxford University Press, 1988, pp.17-18.

[55] In 1914-15 in Kinta some 1,031 leases were issued with notices and finally 323 leases (amounting to 6,086 acres) were forfeited. Another 298 leases (amounting to 4,966 acres) were also withdrawn on the grounds that their 21 year terms had expired. Most of the blocks forfeited were small (only two blocks were larger than 30 acres in area). These forfeited lands were subsequently reissued to European miners. Yip, *Development of the Tin Mining Industry*, pp.115-16. The general forfeiture proceedings conducted in 1921-22 had the same overall result. A total of 350 leases accounting for 5,000 aces were forfeited. More than two-thirds of these leases were less than 20 acres in size and the leases involved were mainly Chinese. Loh, *ibid.*, pp.18-20.

the actual labour force employed in the mines was far below the required legal minimum. On the whole, the intensification in the demand for labour to fulfil legal obligations greatly aggravated the situation of labour scarcity. The general effect was to further increase the rate of wages and, therefore, the cost of mining. In the long run, it was increasingly difficult for the Chinese to make their labour-intensive methods pay.[56]

Table 25

Mining Labour in Perak and Selangor, 1896-1901.[a]

(a) Perak

Year	Land Alienated (acres)	Mining Force Required by Law	Actual Labour Force	Labour Force Short of the Legal Minimum
1896	67,554	135,108	53,213	81,895
1897	84,302	168,604	49,305	119,299
1898	91,044	182,088	54,316	127,772
1899	100,894	201,788		
1900	109,825	217,650	70,963	146,687
1901	117,330	234,660	75,998	158,662

(b) Selangor

1896	28,757	57,514		
1897	30,461	60,922	49,202	11,720
1898	39,605	79,210	49,177	30,033
1899	49,034	98,068	65,052	33,016
1900	48,433	96,866	61,530	85,336
1901	52,039	104,078	57,308	46,770

Source: Except for 1901, the figures of mining land and actual labour force are from *Annual Report Perak* and *Annual Report Selangor, 1896 to 1901*, *Annual Report Mines Department Perak* and *Annual Report Mines Department Selangor 1898 to 1901*. Those for 1901 are from *Census Report Federated Malay States 1901*, pp.102, 122. All figures cited in Wong, *The Malayan Tin Mining Industry to 1914*, Table XXVII, p.175.

Note: [a] All figures are for the month of December of each year, excepting those for 1901 which were for March. Figures for Negri Sembilan are not available.

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[56] Even in 1901 when the inflow of Chinese labour had risen to a scale comparable to that before the recession, the labour force in Perak and Selangor mines was still 205,432 labourers short of the legal minimum, a figure that was still very high even if allowances were made for engines, monitors and other labour-saving devices.

Rising production costs in the Chinese sector were further compounded by the closure of application books in Perak and Negri Sembilan from 1896. This meant that the Chinese were forced to work land of poorer quality and, in many instances, to work the same land over a second and sometimes third time.[57] This was a move the mining authorities hoped would force those already in possession of mining leases to be more efficient in their operations. When the books reopened in 1907 the premium charged for acquiring a lease had increased from $5 to $25 an acre. Moreover, because mining land with proven deposits had become scarce, there was usually more than one applicant for a given plot of land. When such a situation occurred the practice adopted by the authorities was to conduct and auction. This was a means to raise additional revenue. However, it also meant that those with more capital at hand- particularly the European joint stock companies and some wealthy Chinese *towkays*- ended up acquiring all the land.[58] Although many were prepared to sub-lease their lands to smaller miners on the tribute system, the high percentages demanded often made it uneconomical for small-scale miners. Hence much land, although alienated for mining, remained unworked. This not only resulted in a decline in production, but also in "the passing of the small miner".[59]

It was only after 1901 that the Chinese mining community generally accepted that there was little likelihood of further discoveries of new deposits and that the existing deposits had to be reworked by more sophisticated methods of production. As a result, many Chinese miners

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[57] *Annual Report Mines Department Perak 1901*, p.4 cited in Wong, *The Malayan Tin Industry to 1914*, p.174-75.

[58] As a consequence of the hike in premiums and practice of auction ng land to the highest bidder, the Commission of Enquiry was set up in 1918 to enquire into the problems confronting the industry. The Commission noted that much land had been "locked up" by the wealthier European mining companies and Chinese *towkays*. Auctions were also conducted when land designated as agricultural land was discovered to contain considerable tin deposits. These lands, however, first had to be converted and this involved greater sums of money. On one occasion bidders were prepared to pay as much as $150 per acre, a price no small mine-owner could ever afford. *Annual Report Perak 1903*, p.8 cited in Loh, *Beyond the Tin Mines*, p.17.

[59] *Report of the Commission Appointed to Enquire into Various Matters Affecting the Tin Industry in the Federated Malay States 1918*, Federal Council Papers, 1919, p.2 cited in *ibid.*

changed to a system of underground mining called *ta lung*.[60] But the need to work deeper deposits also created the problem of raising ores to the surface, for it was no longer economical to employ labourers to carry the ore to the top of the mines. Conversion to more mechanised means of production using Western machinery was an obvious alternative; it would enable the small Chinese miner to save on labour costs as well as to work detrital deposits. However, although considerable mechanisation was achieved in Chinese mines during this period, particularly in the adoption of gravel-pump mining and in the use of mechanical haulage in open-cast mining, this was possible only among the larger of the Chinese mines and these were in the minority.[61] On the whole, the Chinese were slow to adopt more advanced mining techniques; the majority continued using the labour-intensive open-cast method and employing only the *chin-chia* in the mining of shallow deposits, until the increasing costs of working (resulting from declining yields), ceased to justify continuation. The mine would then be abandoned.[62]

To some extent the failure of the Chinese open-cast mines to convert to mechanised production was due to a lack of technical knowledge and the inherent traits of individualism and clannishness. More important, however, was lack of access to sufficient capital. Western methods of tin mining involved a large capital outlay that could be best raised by joint-stock companies, the formation of which required a radical reorganisation of the Chinese mining

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[60] By 1900 *ta lung* had become widespread in the western tin states. In many places it was the only possible mode of working because the depth of the tin gravel, or the small size of the working (or both), made open-cast mining uneconomical. A factor contributing to the popularity *ta lung* was its usefulness as an economic probe into the value of the deeper deposits. By 1900 large mines were seldom operated before their value had been assessed by government inspectors. But, owing to the heavy demand for this service, the Chinese experienced considerable delay in operating their mines. They subsequently discovered that they could do equally well if they started a *ta lung* venture on uncertain land. These mines could then be converted into a regular open-cast mine once the tin deposits had been properly evaluated by sinking shafts and running levels.

[61] The most Westernised mine at the time was the Tronoh mine, owned by Foo Choo Choon a member of the Perak State Council and one of the state's principal Chinese miners. In this mine the enormous labour cost of removing the thick overburden and raising the tin gravel led to the appointment of a Western manager in 1898 to introduce more economical methods of mining. Innovations adopted in subsequent years included the inclined shaft that reached a depth of 420 feet. Tin sand was brought up the shaft in trolleys hauled by wire ropes worked by a winding engine. Wong, *The Malayan Tin Mining Industry*, pp.200-. 01.

[62] In 1905 the Perak Mines Department attempted to show the Chinese how much they stood to lose by refusing to follow the times but the initiative failed to change Chinese organisation. Fermor, *Report Upon the Tin Mining Industry*, p.64.

company.[63] In this regard, therefore, Western mining interests had a distinct advantage. With access to capital these companies were able to acquire the necessary machines, including the revolutionary dredge, to enable them to mine more efficiently ground of poorer tin content.[64] Chinese adoption of Western technology was also hindered by the scarcity of local capital, owing to the quickened rate of development of other sectors of the Malayan economy.[65]

The decisive factors that brought about the decline in Chinese output after 1900 were economic. However, the introduction of a series of laws and policies in relation to labour, fiscal and mining land policy beginning from the late 1880s, and with that administrative practices over the following two decades, further contributed to the demise of the small Chinese open-cast miner.[66] The focus of these policies was to establish greater control over matters affecting the Chinese population as a whole and to promote "scientific and less wasteful" mining.[67]

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[63] With the introduction of Western enterprise came the development of an important element in the organisational structure of the industry, namely the joint-stock company controlled by headquarters usually located in Britain. At the same time, there emerged a superstructure of Western managerial and technical expertise over the heads of Asian manual and clerical workers. Western banks were able to participate in the financing of the mines on a scale and in a manner hitherto impossible on account of the credit-structure of Chinese enterprise.

[64] At the outbreak of World War I there was not a single Chinese mining company operating on the limited liability principle. Gov. to Sec. State, 17 January, 1896, in CO 273/212; J. van Helten & G. Jones, "British Business in Malaysia and Singapore Since the 1870s", in R.P.T. Davenport-Hines & G. Jones (eds.), *British Business in Asia Since 1860*, New York, Cambridge University Press, 1989, p.166.

[65] From 1906 onwards local capital became increasingly involved in rubber planting with the result that capital for mining ventures was harder to obtain. In 1903, 1904, and 1907 the scarcity of credit drove Chinese miners to borrow from Indian money lenders at exorbitant rates because Western banks refused to accommodate them. As early as 1904 some influential Chinese *towkays* were reported to have approached certain Europeans with influential financial connections abroad to work their land on tribute. *Annual Report FMS 1903*, p.9, *Annual Report Mines Department 1904*, p.9; *1907*, p.7, and *1910*, p.11; *Annual Report Mines Department FMS 1904*, p.7 cited in Wong, *The Malayan Tin Industry to 1914*, p.203.

[66] The introduction of these laws and policies at this time reflected the attempt by the British authorities to consolidate the colonial state. Previously, the British administration had been preoccupied with establishing control over each of the Malay states individually. Although a semblance of law and order had already been achieved and a basic infrastructure laid down prior to 1896, nevertheless many aspects of British rule, even in the following decades, remained "indirect". For instance, revenue continued to be raised through the "farm system" and the control of the Chinese population continued to be maintained indirectly via the Capitan China. A detailed analysis of the consolidation of the colonial state apparatus after 1896 is given in Sadka, *The Protected Malay States*, Singapore, 1968, pp.65-97.

[67] Although it may be argued that these changes were part of an overall social evolution and did not constitute a deliberate policy to weaken the competitive position of the Chinese against the foreign tin mining incustry, it is clear that from the beginning of British administration in the FMS it was the Government's aim to encourage the growth of Western (particularly British) tin mining enterprise. This became a matter of sound policy after the 1890s with the growing interests of British capital in the industry. Wong, "Western Enterprise", p.149, Yip, *Development of the Tin Mining Industry*, p.151; Gov. to Sec. State, 17 January, 1896 in CO 273/212.

Most directly causing the demise of the small mine owners were the new laws and administrative policies pertaining to mining itself.[68] The administrative changes to mining laws embodied in the 1895 Perak Mining Code, which had as its stated objective "the enhancing of more scientific mining" and the "elimination of the speculator", have already been outlined. This piece of legislation became the basis for all subsequent enactments, with the result that official control over tin mining was established and no-mine could be opened without permission from the government.[69] In the granting of licences to open mines the amount of capital that a mining firm could raise was one of the most important factors influencing official decisions. As soon as this standard was applied the larger Western companies were naturally favoured.

In terms of labour policy, the Chinese *towkays'* monopoly over the tin mining labour market was gradually eroded by a number of laws and enactments designed to enforce greater control over the Chinese population. First, the power of the secret societies, through which both the supply and lives of the labourers was manipulated, was broken from the 1890s onwards as effective legislation was passed in the Straits Settlements and Malay States for their suppression.[70] Related to this move was the enactment of the 1895 Labour Code which outlawed indentured labour and the widespread practice of supplying workers with opium in

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[68] From turn of the century onwards the changes in the mining legislation resulted largely from pressure from Western miners. The conference of government mining officials and Chinese and Western miners held at Ipoh to discuss all matters connected with the mining industry, had more non-official Western mining representatives than Chinese. Discussion concentrated on matters pertaining to the encouragement and regulation of more advanced techniques of mining and to the improvement of the Mines Department to meet the needs of the prospective change in the character of the industry. W.P.J.Hume and F.J.B.Dykes, *Report of Proceedings of the Mining Conference Held at Ipoh, Perak, Federated Malay States, 23rd September to 6th October, 1901*, Taiping, 1902, pp.1-4 cited in Wong, "Western Enterprise", p.170.

[69] The 1899 Federal Mining Enactment was followed by the Federal Mining Enactment and Mineral Ores Enactment 1904. This enactment was later superseded by another enactment passed in 1912 which was enforced in July 1914. Under these policies mining affairs and the administration of the enactment in each state were controlled a Warden of Mines, appointed by the British Resident and assisted by European Inspectors and native overseers. Gov. to Sec. State, 17 January, 1896, in CO 273/212; High Comm. to Sec. State, 29 June, 1899, in CO 273/251. See also Virginia Thompson, *Postmortem on Malaya*, New York, The Macmillan Company, 1943, p.71.

[70] By 1899 only 5 per cent of the Chinese population in Krita were estimated to be members of secret societies, whereas in 1896 70 per cent of the Chinese population was said to belong to one society a one. By 1898 no secret society of any influence existed in Selangor and reputedly no less than 5 per cent of the Chinese population were members of secret societies. *Annual Report Chinese Protectorate Perak, 1898*, p.5 and *Annual Report Chinese Protectorate Selangor, 1898*, p.1 cited in Wong, "Western Enterprise" p.150. For a detailed study see Whynne. *Triad and Tabut*, pp.352 *et seq.*

lieu of wages.[71] Therefore, unless bound by written contracts, labourers could abscond with impunity after one month while still under advances. They also had the right to terminate their contracts, and were bound for shorter periods. Furthermore, labourers could not be kept indefinitely for debt. These laws effectively freed tin mining labour so that, from the early 1900s, labourers could go to work in another mine as soon as they were offered higher wages.[72] This encouraged, particularly in a situation of labour scarcity, a flow of Chinese tin mining labour to foreign mines as well as a general drift to other sectors of the rapidly developing economy. Overall, as a result of the loss of monopolistic control over labour, the profitability of Chinese open-cast mining, which relied on a guaranteed and cheap labour supply, diminished.[73]

The process of undermining the employers' grip on labour was further hastened by a change in the pattern of employment on open-cast mines. It will be recalled that towards the end of the 19th century the system of mining on contract and daily rates was giving way to the co-operative system of leasing, whereby the miners themselves were financially involved in the quantity of ore produced. By the turn of the century the tribute system of mining was

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[71] The 1895 Labour Code was uniformly passed in Perak, Selangor and Negri Sembilan. In contrast to the whole body of discharge-ticket regulations which it supplanted, the Labour Code did not recognise as valid labour engagements for more than 30 days unless they were made in writing. Labourers could not be bound for more than 12 months (or 360 working days), if engaged in the Straits Settlements or the Malay States, and not more than 3 years (or 1,000 working days), if engaged elsewhere. Labourers also had the right to have 30 days off for sickness and to terminate their contracts if they repaid their advances and other debts plus $2 smart money for every month or 30 days of work still incomplete in the contract. The 1895 Code was superseded following the recommendation of the 1910 Labour Commission by the legislation of 1910 and 1911 that reduced the period of indenture and provided for Government supervision of immigrants. These two pieces of legislation were later incorporated into the Labour Code of 1912 and Labour Enactment 1904 No.2 (Chinese Mining), under which indentured contract labour was declared illegal. This Code was superseded by a new Code in 1923. Detailed studies of these successive codes are given in Blythe, "Historical Sketch", pp.90-97; Parmer, *Colonial Labour Policy*, pp.16-19. See also High Comm. to Sec. State 17 September, 1904, in CO 273/303; Sec. State to High Com. 3 August, and 9 November, 1906, High Com. to Sec. State, 19 September, and 3 October, 1906, all in CO 273/321, and 17 May, 1907, in CO 273/330.

[72] When communications improved and the facilities for absconding increased, indentured labour on the mines fell into disfavour and the numbers declined rapidly. *Labour Commission Report, 1910*, cited in Jackson, *Immigrant Labour*, p.14.9.

[73] In theory employers could protect themselves by employing labourers under written contracts. In practice this was difficult. On the one hand, old labourers knew the disadvantages of written contracts and declined to bind themselves again in the same manner. The larger class of new immigrant labour was also fully aware of the disadvantages of being indentured and, consequently, would not make contracts demanding instead to work on the tribute system on the best possible terms. Furthermore, by the force of the custom, both employers and labourers preferred to make oral agreements with the result that neither had legal recourse against the other. Moreover, when written engagements were made the contracts were often invalid because they failed to go through the formal procedure of registration. The result was that mining labourers, whether engaged on the spot or outside the states, were outside the law. Once they grasped the legal implications of oral contracts, therefore, labourers took advantage of their position. Contributing to this situation was the recision of corporal punishment for the breach of contract, singly or in conspiracy with others, that led to the stoppage of work and other serious losses to the employer, or inconvenience to the public. Introduced on 2 November 1895, under the instruction of the Colonial Office, this amendment to the Labour Code removed the only effective deterrent to absconding. Wong, *The Malayan Tin Industry to 1914*, pp.181-82. See also Sec. State to High Com. 13 August, 1895, in CO 273/203; High Com. to Sec. State, 4 February, 1898, in CO 273/212.

widespread. In 1896 of a Chinese labour force of 38,000 men employed in mines worked by more than five men, two thirds were tribute labourers and the remaining one third wage and contract coolies.[74] By 1901, the proportion of tribute coolies to other mining labourers had increased to 70 per cent.[75] As shown in Table 26 below, the tribute system of mining was the most popular form of engagement in the period 1903-1914.[76] In addition to their success in demanding participation in the tribute system, the labourers also succeeded in bargaining for a larger share in the industrial profits.[77]

Table 26

Number of *Nai-Chiang*, Wage and Tribute Coolies Employed in the Mining Industry, FMS, 1903-1914.

Year	*Nai-chiang* Coolies	Wage Coolies	Tribute Coolies
1903	55,656	29,015	96,666
1904	50,558	34,958	107,153
1905	53,590	30,472	114,952
1906	59,259	27,519	125,882
1907	75,923	30,965	124,480
1908	51,943	23,274	118,864
1909	46,535	22,930	113,913
1910	47,489	22,912	99,960
1911	59,753	28,681	107,993
1912	60,693	33,789	112,175
1913	64,474	43,395	114,347
1914	40,110	27,309	101,909

Source: *Annual Report Mines Department FMS, 1903-191* in Wong, *The Malayan Tin Industry to 1914*, Table XXXII, p.208.

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[74] *Perak Government Gazette* 1895, p.904; *Selangor Government Gazette 1897*, p.416; R.Parry, *Report on Tin Mining in the Protected Malay States of Perak and Selangor*, Rangoon, 1898, p.17 cited in Wong, "Western Enterprise", p.147

[75] The growth of tributors occurred only in Perak and Selangor. In Negri Sembilan where conditions were more suitable to the *kongsi* system of mining, the trend was reversed; in 1900 tribute coolies formed about 30 per cent of the total mining labour force in the state, whereas in 1898 they were about 50 per cent. *Perak Government Gazette 1897*, p.425 *Annual Report Mines Department Perak 1901*, p.2 cited in Wong, *The Malayan Tin Industry to 1914*, pp.176-77. See also Yip, *Development of the Tin Mining Industry*, Table I-6, p.79.

[76] The popularity of tribute mining was largely underscored by the demise of the *nai-chiang* system as employers began to have increasing trouble with *nai-chiang* coolies from the turn of the century. Taking advantage of the scarcity of labour *nai-chiang* workers had won for themselves a working day of 5½- 6 hours (instead of the usual 7 hours), and the guarantee that when their daily earnings fell short of a minimum of 60 cents per day employers would make up the balance. Because they were paid by piece and not by time, *nai-chiang* coolies could hinder the productive work of the mines unless they worked according to schedule. Gradually, *nai-chiang* labourers came to regard the guarantee of a minimum wage made in times of labour scarcity as a customary right and unless they received it they would desert their employers. On the other hand, unless they worked a seven hour day, their work in most mines was not worth 60 cents a day. In the long run the employment of *nai-chiang* labourers became a drain on profits and many mines solved labour difficulties by having their property worked by tribute labourers, who were less liable to create trouble, and had every incentive to maximise their efforts because they shared in the profits. Wong, *ibid.*, pp.206-208.

[77] In 1896, for instance, Perak landowners could no longer demand the customary 10 per cent tribute and had to be satisfied with 8 per cent or even a great deal less rather than risk the reversion of their land to the state for leaving it unworked.

Coinciding with the growth of the tribute system was a change in the method of collecting labourers in a mine. From the turn of the century mining employers began to recruit more and more of their labour by sending trusted men to China with sufficient money to enable them to return with their friends and relatives who would then work for the employers until they repaid their passage-money.[78] Furthermore, with the growth of a local labour force and the increased facilities for absconding, labour was increasingly recruited within the states. By the turn of the century the well-established custom was to post a notice in the newly opened mine, inviting labourers to work on the terms advertised.[79]

The tribute system itself had undergone some modification. In the past, when employers could dictate terms, the conditions for working tribute had been formalised in standard contracts with such stereotyped conditions as the payment of 10 per cent tribute to the mine owner. But such contracts were no longer in touch with the realities of economic circumstances and labourers refused to enter into these written contracts because they could bargain for better terms. Furthermore, under the Labour Code, they were free and independent agents and could abscond with impunity if they made only verbal agreements.[80] Instead, they preferred to sell all the minerals won to the mine owner or lessee at a price fixed below the prevailing market rates rather than pay a certain proportion of the output.[81]

The relationship between labour and capital in the tribute system also underwent significant change. In the past the relationship between the advancer and labour in the mines

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[78] In broad outline, this form of recruiting resembled the traditional system of indentured labour, but the labourers were not brought or sold in the immigration depots and were free to bargain for their terms of employment and to leave the moment they paid back the actual cost of their passage. The process was devoid of legal sanction, but it worked satisfactorily. Practised to a limited extent as early as 1890, this system of recruiting became widespread in the mines by 1908. By this date indentured labour was scarcely employed in the mines. Parmer, *Colonial Labour Policy*, pp.99-100; High Comm. to Sec. State, 14 February, 1902 in CO 273/284.

[79] As early as 1890 mine owners in Kinta had begun to recruit labour by sending out notices to invite labourers to work in their mines after they had cleared the land of jungle and built labourers' huts. High Com. to Sec. State, 14 February, 1902, in CO 273/284; High Comm. to Sec. State, 17 September, 1904 in CO 273/303.

[80] The labourer's position was further improved by the Labourers' Wages Priority Enactment of 1899, which had been introduced in the teeth of opposition from mining employers to give the payment of wages to workers priority over the claims of other unsecured creditors when mines or estates were sold by order of the court. See High Com. to Sec. State, 29 June, 1899, in CO 273/251.

[81] In this way the risk of adverse fluctuations in tin price was transferred to the mine owner as well as exposing him to being cheated by the miners selling their ores to the local smelters at better price. Fermor, *Report Upon the Mining Industry*, p.107.

was purely an economic one, as the labourers had been brought by professional recruiters who had originally recruited them. But, owing to the practice of successful immigrants sending for their friends and relatives, or assisting them to come to the Malay States, this impersonal nexus was giving way to a personal one as early as 1894, especially in the smaller mines working shallow deposits. The system was described in the following manner:

> A is a mine owner; he lets a piece of land out to B, who is the advancer; B, not knowing the richness or otherwise of the land gets his friends to work it on the tribute system....A lets his land to B for 10 per cent, or whatever arrangement may be made. B lets it out to the tributors, say, for 20 per cent on every pikul of ore, but on the output of the ore the following deductions are first made; first, the tribute to the mine owner, that is to A; secondly, the cost of making the water-course, building the kongsi-houses, the cost of provisions, and if any portion of the land has to be stripped by the *nai chang* coolies the cost of such stripping is also deducted; after deducting these expenses from the amount realised by the sale of the ore, the balance, if any, is divided amongst the coolies...If the mine is not profitable, the advancer loses everything; he has no claim against the coolies.[82]

Such ventures prevailed as late as 1907, and, in their typical form, were started thus:

> A small shopkeeper hears of or sees a piece of mining land which he fancies. If it is in private hands he goes to the owner and offers so much per cent of his output for permission to work; if is Government land, he usually dispenses with this preliminary. He then builds the kongsi house and collects a number of his own friends and clansmen, whom he knows he can trust, and starts them on a small advance each, and they then work on the 10 per cent system; but as the returns are immediate, or at least come in a short time, they very soon find out whether the ground will pay or not, and if it does not they stop work and go elsewhere.[83]

These were the co-called "fossickers" whose method of mining was called *lampan*. The *lampan* method was very different from that described earlier, however, in that it involved repeatedly washing the overburden and ore by means of a foot-driven wheel or swing buckets (called *katis*).[84] The fact that labourers could take to fossicking or small scale *lampan* workings

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[82] *Report of the Opium Commission 1907-08*, II, pp.831-2, quoted in Wong, The *Malayan Tin Industry to 1914*, p.178.

[83] *Annual Report, Federated Malay States 1903*, p.8 quoted in *ibid.*, p.179. See also Jackson, *Immigrant Labour*, p.85.

[84] In Perak the usual form of *lampan* working was proscribed as early as March 1889. In Selangor small groups of labourers employed it to work small patches of land in inaccessible places. In 1893 *lampan* workings formed over 40 per cent of the mines in Ulu Selangor, and were somewhat less in the Ulu Langat and Kuala Lumpur Districts. In Negri Sembilan, where large mines had always been the exception rather than the rule, the hilly terrain drained by numerous streams particularly favoured the growth of *lampan* mines. Between mid-1889 and August 1900 the government deliberately encouraged Chinese labourers to take to fossicking by reducing the price of temporary licences from $10.00 to $1.50 per year. It was hoped that this policy would provide the state with "an army of private prospectors". While the policy did not result in any significant discovery of new deposits, it did encourage the growth of small-scale mining by groups of labourers. From 1898 to August 1900,

meant that they could become independent of the financial backing of the big capitalists. Their bargaining position was thus greatly strengthened.[85]

In addition to losing control over labour, Chinese employers also found their profits adversely affected by changes to government's fiscal policy. In the first instance, following the formation of the FMS, the rate of tin duties imposed in the component states were made uniform.[86] This was followed in July 1897 by the introduction of a sliding scale of tin duties which varied automatically with the daily fluctuations of the metal in the Straits tin market. Introduced with the object of securing a larger and steadier revenue for the government, the sliding scale removed the uneven burden of the tin duties to correspond with market conditions. In the long run, however the sliding scale increased the rate of duties.[87] In a second fiscal change, the truck system, following the Truck Enactment of 1908, was ruled illegal except for the few mines which were removed from towns and villages.[88] Likewise, in the course of the last few years of the 19th and the early 20th century, the revenue farms were gradually abolished in the protected states.[89] The gradual removal of the revenue-farm system

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9,014 temporary licences were issued. *Annual Report Mines Department Perak 1898*, pp.3-4; *Annual Report Mines Department Selangor 1898*, pp 2-3; *Annual Report Negri Sembilan 1896*, pp.6-7; *1899*, p.6; *1899*, p.12; and *1900*, p.3; *Annual Report Mines Department Negri Sembilan 1898*, p.2 cited in Wong, *The Malayan Tin Industry to 1914*, p.179-80

[85] In 1898, for example, no labourer would work for wages if they could make $1.50 a day fossicking on their own account. Large mines suffered most from wage labourers deserting to work on their own mine. In Kinta labourers were in a particularly strong position because natural conditions there, more than anywhere else in the Peninsula lent themselves to fossicking. *Perak Government Gazette 1898*, pp.296-97; *Annual Report Federated Malay States 1898*, p.7 cited in *ibid.*

[86] In order to save marginal mines from being closed by the slump in the tin market, tin duties in Perak and Selangor were reduced on 1 August 1896 - from $12.50 per *bahara* to $12.00 per *bahara*- to equal the duty in Jelebu and Sungei Ujong. On 1 October 1898 the rates for all the Federated States on the west coast were reduced to $11.00 per *bahara* so that for the first time since the extension of British rule over these states there was a uniform rate of tin duty. *Perak Government Gazette 1896*, pp.465, 695; *Selangor Government Gazette 1896*, p.537, 669; *Negri Sembilan Government Gazette 1896*, p.277; *Annual Report Sungei Ujong and Jelebu 1893*, p 1 cited in Wong, *The Malayan Tin Industry to 1914*, pp.189-90.

[87] See *ibid.*, Table XXVIII, pp.190.

[88] The introduction of the Truck Enactment coincided with a severe drop in tin prices and effected a credit squeeze. In Kinta towards the middle of November, "...foreclosures [on mortgages] began and notices of sale by order of the court [came] in a steady stream". At the same time there also occurred an increase in new mortgages taken by small mining properties from chettiars, "the last resource of the desperate". *Annual Report Kinta Land Office, 1908*, pp.2, 5, cited in Loh, *Beyond the Tin Mines*, p.16.

[89] The opium farm was abolished in Perak on 1 January 1895; in Selangor on 1 January 1900, and Negri Sembilan on 1 January 1901. The farms for tobacco, alcohol, and pawnbroking were abolished subsequently. By 1913 the gambling farm, the last of the productive farms, had been abolished. A detailed study of the abolition of the farming system is given in John Butcher, "The Demise of the Revenue Farm System in the Federated Malay States", *Modern Asian Studies*, Vol.17, No.3, 1983, pp.387-412. See also Gov. to Sec. State, Confidential, 4 October 1906 in CO 273/321; Sec. State to Gov. Confidential, 3 April, 1895 in CO 273/202; Gov. to Sec. State Confidential, 5 July and Sec. State to Gov. Confidential, 16 August, 1895 in CO 273/205.

by 1913 ended yet another important source of credit for the *towkays* who, as local agents of the revenue-farmers, had shared in the takings. These profits had in turn helped to maintain the mines, particularly during times of falling tin prices. Overall, these small mine owners were confronted with the exhaustion of surface tin deposits, a decline over the control of labour, rising wages and the loss of the ancillary profits that had underpinned their invulnerable economic position in the 19th century. These factors ultimately contributed to the demise of the Chinese open-cast sector *vis-a-vis* the Western sector, and concomitantly, a reduction in employment of Chinese labour in the industry.

In summary, the period 1900-1930 was one of significant change for Chinese tin mining labour. On the one hand, the general labour scarcity which prevailed from the 1890s greatly strengthened the bargaining position of labour. This, coupled with the dissolution of the Chinese *towkays'* monopsony over the labour market, meant that labour was gradually freed from indenture and exploitation. A large number were able to demand employment under the tribute system. On the whole, however, these gains were overshadowed by changes to the pattern of tin mining in the Malay States consequent on the expansion of Western enterprise and the concomitant employment of capital-intensive techniques. As Western companies gradually gained control of production, they were supported by changes in the government's administrative policy that favoured capital-intensive production at the expense of the open-cast sector. Consequently, the period witnessed the gradual demise of the small-scale Chinese miners and a drastic reduction in total employment in the industry.