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STAFFING POLICIES AND HUMAN RESOURCES MANAGEMENT IN ELECTRICITY INDUSTRY IN PENINSULAR MALAYSIA: THE DEVELOPMENT OF MALAY ENGINEERS, 1949-1990

Towards the second half of twentieth century, the electricity industry in Peninsular Malaysia was gathered in single, nationalized company. The governance structuring strategy to redevelop electricity supply facilities involved every state and the consumer sector that were heavily affected by the Japanese Occupation during World War II causing the need for the expert staff in electrical engineering to be vital. Due to the lack of professional electrical engineers, priority was given to development of human resources involving local staff. This situation then gave opportunity to Malays, to participating in the electricity industry. Up to the early 1940s, Malay participation was limited due to the staff hiring policies of the British, which prioritised expatriates. This article aims to study the human resources management and growth of Malay engineers in the electricity supply services in Peninsular Malaysia from 1949 to 1990. The following discussion uses archival and library research, analysing various primary and secondary sources such as the Colonial Office files, the Annual Reports of the Central Electricity Board (1949-1964), Annual Report National Electricity Board (1965-1990), ministry files, books, and articles. The findings show that the functions and roles played by Malay engineers in electricity supply services grew throughout the 1960s with their success in executive roles, including an increase in the number of those appointed as senior engineers to oversee administrative affairs and development projects.

Keywords: Recruitment patterns, managerial styles, professional development, top executives, scholarship.

Introduction

Electricity was introduced in Malaysia in 1894. Since then, the electricity industry grew as a new, rapidly developing industry, from isolated plants supplying mining operators into a localised district supply system supplying the commercial, industrial and domestic sector. This was then followed by centralised electricity board, keeping with the economic scale, accompanied

by construction of transmission lines and a national grid supplying the whole nation. After the Second World War, the electricity industry in Peninsular Malaysia, like in most other countries, were nationalised and centrally managed by a government-owned company. Centralisation was done with the intent to re-develop electricity supply facilities with haste, as they were heavily damaged during the Japanese Occupation. As a centralised government owned company, it was easier for the electricity industry to seek and receive the required funding to finance investments, either from the Government or through Government guarantees.¹ In addition, centralised management allowed for the electricity supply network to be interconnected between one area and another, and thus shaped a national network system at minimal cost. A high-capacity and economical power station using hydropower, only located in certain areas, could be built to supply, not just the locality, but also any part of the country. By creating a centralised electricity company, it also ensured that engineers and technicians could be moved around the country, building expertise and managing projects more efficiently and effectively.

The implementation of the Electricity Ordinance led to the establishment of the Central Electricity Board (CEB) on 1 September 1949, responsible for matters of administration, asset construction, and electricity supply involving each consumer sector and area in Peninsular Malaysia.² The establishment of an organisation to coordinate electricity supply services within a wider context meant prioritising human resource development for experts in engineering. As one of the key areas of expertise required to manage electricity supply services, the CEB formulated a strategy to produce more local engineers. This is in line with the process of self-government, with the handover of the reins of government from the British to local leadership, thus marking the end of expatriate staff service in every sector, including in electricity supply. At the same time, the nationalisation of the electricity industry provided a challenge to the CEB to ensure sufficient staff, complete with technical know-how. As a statutory body, the CEB was authorised in the hiring of employees. Clause 12 of the Electricity Ordinance clearly states, “The Board may, from time to time, appoint and employ a Secretary and such other officer and servants as may be necessary for the purpose of this Ordinance”.³ However, the process of employment recruitment became a critical issue when no local staff has the required qualifications as engineers. Electrical engineering and engineers roles were still unfamiliar to local staff, especially Malays. To address this issue, efforts were aimed at the production of local engineers.

Studies focusing on the development of Malays in the administrative structure since the British colonial period received the attention of Khasnor Johan,⁴ Abdul Rahman Embong⁵ and Jomo.⁶ Previous studies show the introduction of modern education system caused the transformation in the structure of Malay society. British educational policies provided the opportunity for Malays to receive English education, which allowed them to hold posts in

the British administration. This situation improved their social standing, and they were categorised as upper middle class. Sharifah Darmia⁷ explains that the Malayanisation scheme opened a lot of doors for Malays to participate in the civil service. Previous studies only explained Malay achievements in non-technical fields. Compared to those studies, this discussion emphasises Malay development in technical fields, especially the electricity industry. Therefore, this study focuses on human resource management and the professional development of Malay executives and engineers in the electricity supply services in Peninsular Malaysia from 1949 to 1990. The selection of 1949 as the starting period of research was because in that year, the government began taking steps to nationalise the electricity industry and centralise its management under a government-owned company, the Central Electricity Board. The discussion is limited to 1990, as following this period, electricity supply service governance was privatised. Therefore, this article looks at the human resource development when the electricity industry was under the management of the government. The first part of this article explains the policies and patterns of employee recruitment for electricity supply facilities management prior to 1940. The approach of the British in this period affected the preparation of experts among local staff. This situation was due to lack of support given to local staff in regards to electrical engineering. Next, the second part discusses the development of human resources to train local experts following the restructuring of the electricity industry in the late 1940s. The final part analyses the growth of Malay staff in the governance of electricity supply services. Clearly, the strategy of human resources management as implemented by the government has prepared local staff, especially Malays, to take the lead in governance of electricity supply services.

Management Styles and Staffing Strategies of British in Colonial Malaya

Up to the 1870s, Malaya virtually under traditional rule. The centre of power was the Sultan, and he appointed officers to administer areas in his kingdom. Therefore, these officers were fully responsible to managing administrative issues, including the development of their respective fiefs.⁸ Evidently, Malaya during this period still has no organised bureaucratic system in place. British intervention in Malaya later introduced a modern administrative system, through separation of responsibilities by departments. The states of Perak, Selangor, Negeri Sembilan, and Pahang, the first group of states to be absorbed into the ambit of British colonial rule at the end of the 19th century, also became the first states to undergo modernisation of administrative system, followed by the other states of Terengganu, Johor, Kelantan, Kedah, and Perlis during the early decades of the 20th century. Although progressed gradually in the period of implementation, the administrative structure the British introduced in every state showed uniformity. Through the modernisation of the administrative

system, various departments were set up to manage matters of government administrative affairs and physical development.

In general, the British utilised the services of expatriates to handle the administrative machinery at the federal, state, and departmental levels. This was necessary, especially in departments that require technical skills and know-how. British policy of employee recruitment focused on foreign staff, especially those of European descent. A number of departments, established to manage basic facilities such as the Electricity Department, depended on experts in engineering. Due to the lack of qualified and skilled Malays in electrical engineering, it necessitated the hiring of European professional engineers to lead the governance, facility development, and operation of electricity supply services.⁹ For instance, in 1919, Frederick Bolton, a qualified and experienced hydroelectric engineer handling a number of projects in Britain and South Africa, was appointed the Electrical Adviser to formulate an electricity supply scheme.¹⁰ Later, W.J. William, a graduate from the University of Liverpool that served as Electrical Engineer in London and Hong Kong, was appointed as Director of the Electricity Department.¹¹ Furthermore, the government also published vacancy advertisements in London to hire qualified employees. J. Sharples, who applied for Assistant Electrical Engineer, was among the candidates that passed the interview in December 1936.¹² For semi-professional staff, most were hired from India.¹³

Although the establishment of the Electrical Department and the rapid growth of electricity supply facilities led to the expansion of staff composition, Malay participation was still limited. Undeniably, the British had taken initiatives to develop human resources with the view of involving locals to be absorbed into employment in the electricity industry. However, this did not necessarily mean providing opportunities to locals, especially Malays, to hold the highest offices within the administrative structure. In fact, Malay employment was limited to lower-level work such as wiremen, electricians, and chargemen. The basic requirement to develop human resources i.e. the education system as practised by the British, was only limited to basic education, and unable to produce students with knowledge in engineering. In other words, British education system was intended to train locals and natives to occupy lower offices that require little technical skills. This was proven by R.J. Wilkinson in his statement that the introduction of the Malay College Kuala Kangsar for Malay training was, “to supply Malay civil servants, interpreters and clerks, but not (as yet) surveyors, draughtsmen, foresters, engineers etc”.¹⁴ Similarly, in Sultan Idris Training College, basic curricula such as the Malay Language, Literature, and History were offered, without offering what was called ‘western urban subjects,’ such as Mathematics, Geography, and Science.¹⁵

It is evident that the British policy on education in Malaya was not intended to produce local manpower qualified in the field of engineering. Comparing this situation to India, another British colony, where a number

of institutions of higher learning provided advanced engineering training for the natives, such as the Bengal Engineering College, Thomason Engineering College, Madras Engineering College, and the College of Science.¹⁶ In fact, three Indian universities, each in Calcutta, Bombay, and Madras, offered advanced degrees such as Masters of Civil Engineering (MCE) and Licentiate in Civil Engineering (LCE).¹⁷ In Malaya, by contrast, only one educational institution provided technical knowledge, the Technical School that was set up in Kuala Lumpur in 1906, but this school closed down after eight years due to financial troubles. In 1918, the government set up the Lemon Committee for Technical and Industrial Education to revise a more suitable system for technical and industrial education, as well as training programmes for students.¹⁸ As a result, a decision was made to re-open the Technical School in October 1925, with emphasis on subjects such as electrical and telecommunication, surveying, civil mechanics, and engineering with English as the medium of instruction.¹⁹ Students would also undergo practical training in related governmental departments such as the Electrical Department, the Public Works Department, the Railway Department, the Survey Department, and the Post and Telegraph Department before their absorption into the service in these departments.²⁰ However, those appointed served as technical apprentices or assistants, and not senior engineers. Up to 1931, there were 257 electrical engineers in Malaya, and all of them were of European descent.²¹ It was only in 1938 that we see the first instance of a Malay engineer, Raja Zainal Raja Sulaiman, who served as Customer Engineer in Ipoh. He was the sole student that received scholarship to continue his studies in the University of Birmingham in electrical engineering for three years.²²

Scholarship as a Strategy for Human Resources Development

After the Second World War, British staffing policies regarding the electricity industry changed, by focusing more on hiring local staffs fully, compared to their prior dependence on European engineers. This change was in line with the Malayanisation policy in the civil service, introduced in the late 1940s to recruit local staffs that would eventually take over the roles hitherto held by expatriates.²³ The dependence on foreign staffs without prioritising the development of human resources among the locals meant the electricity industry faced a dearth of professional engineers, and the CEB found it difficult to carry on with their development projects.²⁴ Almost 80 expatriate staffs in service of the Electricity Department decided to not continue their services with the CEB.²⁵ Among them included the Deputy Director of the Electrical Department, T.E.R. Morphy.²⁶ In addition, a number of experienced staff members such as H.R. Sparrow, F.L. Llewellyn, and L.G.W. Ward lost their lives when they were imprisoned by the Japanese.²⁷ These vacancies could not be filled immediately, as no local staff were qualified and skilled enough in

electrical engineering.

By the 1950s, the CEB implemented a human resource development programme through the medium of education and practical training to produce more local professional engineers, thus ensuring their availability from time to time. Lacking the proper educational institution and training facility at home, the CEB took the initiative to send staff, including students, to continue their studies at the diploma and degree level overseas. In addition, the CEB also provided scholarships, aside from receiving aid from the government and other countries via the Colombo Plan. The provision of scholarships was significant, as it encouraged local students to venture into engineering, hitherto overlooked in the British education policy. Scholarships were provided to students aged between 17 and 23 years of age, who passed English, Chemistry, Physics, and Mathematics.²⁸ Furthermore, students also had to attend post-graduate training for at least a year and a half after completing their studies, and were bonded to the CEB for no less than five years.²⁹ Usually, students that received scholarships were sent to continue their studies in the United Kingdom except for those under the Colombo Plan, which continued their studies in the countries that awarded the scholarships. A large number of scholarship students studied in engineering fields, which included electrical, civil, and mechanical, and only a handful went into management and accounting. This was in line with the need for more engineers to oversee CEB development projects in every area.

The awarding of scholarships provided local staff and students the opportunity to continue their studies in engineering, and then become professional engineers. As soon as it was introduced in 1956, four engineering and one personnel management scholarships were awarded by the CEB to students to continue their studies in the United Kingdom.³⁰ In 1957, the CEB approved four engineering and one accounting scholarships, which increased the number of sponsored students studying overseas to 19 people.³¹ At the same time, 11 new students were selected to receive scholarships to continue their studies in the following year.³² The CEB played a more active role by funding students in order to produce more local experts. Until 1963, the CEB awarded scholarships amounting up to \$25,000,000 to fund the total cost of training and education at the diploma and degree levels at Brighton Technical College.³³ Through the Colombo Plan, 22 scholarships were awarded by the Australian Government to local students to continue their studies in learning institutions there.

The CEB also sent its staff to attend training overseas in preparation for them overseeing the power stations. From the mid-1950s, the CEB also focused on the construction of high-capacity power stations for consumer use, which previously depended on low-capacity power stations. In January 1952, the CEB sent four technical assistants for training as shift control engineers in the United Kingdom to prepare them before their assignment in Connaught Bridge Power Station, Kelang, expected to be ready by 1956.³⁴ In 1961, three

employees were sent for training as maintenance engineers, while five others were sent as shift control engineers.³⁵ Meantime, five other shift control engineers were sent for training in the Laxapana Hydroelectric Power Station in Ceylon to learn the ins and outs of hydroelectric station management. They were then posted to Sultan Yussuf Hydroelectric Station, Pahang which began operation in 1963.³⁶

The CEB human resource development has succeeded in producing many local experts with the skills and qualifications as engineers. This development allowed local staff to eventually take over the roles in the CEB from the expatriate officers, and to lead the electricity supply services in Peninsular Malaysia. In 1964, the CEB has 245 senior officers, and 164 of them were local, compared to 81 expatriate staff. The numbers showed that local staff now dominated the employment in the top executive positions within the electricity supply services.³⁷ From this number, 29 were Malays. The dominance of local staff made the electricity industry to be the earliest sector to be successfully taken over.³⁸ In line with this development, the CEB was re-branded in 1965 into the National Electricity Board (NEB), which saw the ability of local staff to manage electricity supply services, which previously were handled by expatriate staff. By 1968, 268 local staff held senior officer positions, as opposed to only five expatriates still working with the NEB.

From the 1960s, the NEB strategy to develop human resources were expanded to involve more learning institutions, either domestically or overseas. Aside the from United Kingdom, the NEB also began sending sponsored students to Australia, Canada, the United States, New Zealand, Japan, and South Korea. Domestic education included the University of Malaya (UM), the *Universiti Teknologi Malaysia* (UTM), *Universiti Sains Malaysia* (USM), *Universiti Kebangsaan Malaysia* (UKM), and polytechnics. For instance in the early 1970s, 42 students under scholarships from the NEB continued their studies in UTM, while 40 students studies in Ungku Omar Polytechnic, Ipoh, Perak.³⁹ By the early 1980s, 315 students received funding from the NEB to continue their studies overseas, and 493 students studied locally, with a cost of \$14,485,699.⁴⁰ The NEB also diversified their scholarship offers to include education programmes up to Masters and Doctorate levels, to ensure their staff possessed high levels of qualifications and skills in line with current developments in the electricity industry. For instance, in 1987, there were five candidates at Masters' level specialising in transmission & distribution, project analysis, and coal power generation, while one PhD candidate researching energy conversion, power & transmission was awarded a scholarship to continue studying overseas.⁴¹ Later, in 1988, three scholarships were awarded to doctoral candidates in energy systems and management, energy technology management, and thermal energy.⁴² Overall, 1,492 staff members in the NEB had diploma and degree certificates in 1986, and this number increased to 1,700 within the next five years.⁴³ The NEB also took the approach to conduct short-

term training programmes by encouraging their staff to take courses overseas. For example, a number of employees were sent to Japan to attend courses on thermal power generation, electrical distribution, and power planning at the Electric Power Development Company Limited and The Tokyo Electric Power Company.⁴⁴ Among the Malay staff that attended these courses included Ismail Ahmad and Ibak Abu Hussin.

The Development of Malay Engineers: Functions and Roles

Scholarships to continue higher education in engineering became an important basis for producing local qualified staffs as professional engineers, later serving in the electricity industry. Although this opportunity only emerged in the late 1950s, those receiving education overseas and exposure to practical training managed to take over the posts at the executive and technical stages, hitherto held by expatriates. At the early stages of the CEB, expatriate staffs dominated the key posts in administration. For instance, in 1951, there were 39 senior officers, and 29 of them were expatriates. However, from time to time, the number of local staffs showed an increase in line with the human resource development programmes implemented by the CEB. From 1961, the number of local staff appointed to senior officer roles have exceeded expatriates. By 1968, the process of position takeovers by local staff in electricity supply services was successfully carried out within 12 years, earlier than the targeted 20 years.⁴⁵ 268 local staff were appointed to senior officer positions, compared to only five expatriate staff.

For Malay staff, their participation in the electricity industry showed a noticeable development. The CEB initiative of human resource development programmes have raised the position of Malay staff into a higher level. This is more evident when more Malay staff obtained qualifications as engineers, then appointed to main positions in top management. By 1968, the number of Malay engineers recorded an increase to 58 people, out of only two in the last 15 years. Among the earliest Malay engineers appointed to executive roles were Raja Zainal Raja Sulaiman, Abu Zarim Haji Omar, Jalaluddin Zainuddin, and Tengku Daud Tengku Besar Burhanuddin. Beginning as support staff to expatriate officers, all of them later succeeded to executive roles and headed electricity supply services. In addition, the increase in the number of Malay engineers were also seen in the technical sector, responsible for operation and maintenance of power stations. In 1953, there were 52 engineers responsible for managing field work. As soon as electricity supply services governance was taken over by local staff in 1968, the number of Malay staff assigned in the technical sector increased to 617 people.

From the mid-1960s, the development of Malay engineers was not limited to its numbers, but also growth in their functions and roles in electricity supply services governance, with their technical qualifications and skills, and

the Malayanisation policy, which also included the electricity industry, Malay engineers managed to place themselves in the higher-level administrative structure, either as policy-makers that decide the direction of the electricity industry, or as leaders of a section in their organisation. Raja Zainal Raja Sulaiman, who worked since the 1920s, became the first Malay engineer appointed to administrative roles in CEB top management. In 1954, Raja Zainal Raja Sulaiman was appointed the Chief Electrical Inspector, replacing F.R. Wardrop and responsible to the management of registration and inspection of electrical installations, issuing licences for public and private supplies, managing electrical engineer qualification certification examinations, and investigating electricity-based accident cases. While he held that office, Raja Zainal Raja Sulaiman introduced innovations in investigation of electricity accidents, by including pictures in accident reports to provide clearer and stronger evidence.⁴⁶ Since then, this method has been the standard operating procedure for staffs in charge of electricity accident cases.

In 1958, Raja Zainal Raja Sulaiman was promoted to Senior Engineer and transferred to the Engineering Section, a key section that managed asset construction and electricity supply systems. Raja Zainal Raja Sulaiman progressed further when appointed as Assistant General Manager in 1960, before serving as Deputy General Manager in the following three years. Raja Zainal Raja Sulaiman's career as a Malay engineer reached its heights when he was appointed CEB General Manager in 1964, replacing J. Sharples and became the most important individual setting the direction of the electricity industry. The challenges faced by Raja Zainal Raja Sulaiman was mainly to continue the efforts to takeover CEB from expatriate officers, and overcome the issue of lack of experts. He therefore suggested to the CEB Chairman, Dato' Kurnia Jasa Haji Osman Talib to intensify efforts to produce more local engineers. As a result, the number of candidates sent to continue engineering studies overseas increase to 20-30 candidates at any given time.

Raja Zainal Raja Sulaiman also proved his mettle as General Manager by ensuring the rapid growth of the electricity industry in Peninsular Malaysia. Aside from continuing power station construction projects as initiated by expatriate officers, he also implemented new projects to meet the growing electricity needs. Recognising the importance of electricity in stimulating the growth of industry and urbanisation in the west coast of Peninsular Malaysia, a decision was made to build a new power station in Port Dickson, Negeri Sembilan. This new station, with a generation capacity of up to 600,000 kW, made it the largest stream station built by the NEB. More noticeable was the fact that this construction project happened when electricity industry governance was in the hand of local engineers. Raja Zainal Raja Sulaiman also continued to play an active role in ensuring electricity supply meets consumer demand. In June 1967, Raja Zainal Raja Sulaiman urged the Federal Government on the need to obtain expertise from Canada to formulate a hydroelectric scheme in

the Perak River. In February 1969, Donald Ian Martin was sent to Malaysia by the Canadian Government to help the NEB to develop a hydroelectric station. In addition, a number of specialist companies such as John Henry Scovil, Peter Banks, and Alan Conway Graves also participated in this scheme, along with a financial aid of \$2.7 million to fund costs of equipment and work on project sites.⁴⁷ The Shawinigan Engineering Company Limited was handed the concession to manage the building of hydroelectric stations in three areas: Temenggor, Bersia, and Kenering, with the combined ability of generating up to 625,000 kW.⁴⁸

After Raja Zainal Raja Sulaiman ended his services in 1974, the role of NEB General Manager went to another Malay engineer, Abu Zarim Haji Omar, who obtained a degree in electrical engineering from Loughborough University, and held various roles in administrative stages since the 1960s, was later appointed General Manager. As before, Abu Zarim also faced challenges to meet the ever-increasing demands for electricity supplies, due to the opening of enterprise and industrial zones and new residential areas in every state. Therefore, plans were made to build three high-capacity power stations. Interestingly, two of these stations were built in the East Coast, an area hitherto ignored. In 1978, power station construction work in Klang Valley begun, with a generation capacity of 600,000 kW and it completed and began operations in 1986. Meanwhile, in Terengganu, a hydroelectric station was built in Kenyir in 1976 by Snowy Mountain Hydroelectric Authority with a financial aid of A\$1.1 million from the Australian Government.⁴⁹ In 1986, a hydroelectric station with the generation capacity of 400,000 kW was completed, and it became the largest hydro-type station built by the NEB. A power station was also built in Paka, Terengganu using natural gas supplied by *Petroliam Nasional Berhad* (PETRONAS) with a generation capacity of up to 900,000 kW. Judging from the construction projects, clearly NEB governance under Raja Zainal Raja Sulaiman and later Abu Zarim spearheaded the growth of the electricity industry. Then the General Manager role went to Mohd Jalaluddin Zainuddin in 1984, the installed capabilities for all power stations nation-wide increased to 2,922,944 kW, compared to a recorded 39,724kW in 1950.

Aside from the General Manager position, Malay engineers were also appointed to key offices in administration in sections, and played an important role in managing electricity services. For instance, Tengku Daud Tengku Besar Burhanuddin became Area Manager (Southern Region) (covering Johor, Melaka, and Negeri Sembilan) in 1964 until 1967, and later became Deputy Chief Engineer (Division). After six years, Tengku Daud Tengku Besar Burhanuddin appointed as Chief Engineer (Division) and finally as Deputy General Manager (Administration) in 1974. Entering the 1970s, more Malay engineers were appointed to key roles in administration and development of electricity supply facilities. Abdul Wahab Hassan, who received an engineering scholarship from CEB in 1956, was appointed Chief Electrical Inspector from

1973 to 1975.⁵⁰ In 1977, Wan Hussein Endut was appointed Area Manager (Eastern Region) (covering Kelantan, Terengganu, and Pahang), while Che Ibak Abu Hussin was appointed Federal Territories and Petaling Jaya Regional Manager. In 1989, Che Ibak Abu Hussin was promoted to General Manager to replace Mohd Jalaluddin Zainuddin.

Meanwhile, Mokhtar Taib, who received an engineering scholarship from CEB in 1957 and continued his studies in Brighton Technical College, became Area Manager (Northern Region - covering Perak, Penang, and Kedah) in 1972.⁵¹ Interestingly, Mokhtar Taib was later promoted as chief engineer and responsible for leading a new department established in 1978, the Rural Electricity Supply Section. Although electricity supply in rural areas began in the 1960s, the setting up of a specific section based on a study by the Rural Electricity Supply Seminar in November 1977 was seen to further streamline matters pertaining to electricity supply in rural areas.⁵² The setting up of this section has proven to stimulate the growth of electricity supply in rural areas, with the focus on building mini-hydro stations. For instance, in 1981, a total of 148 rural electricity supply projects involving 223 villages with a population of 68,426 were completed. In 1983, a number of mini-hydro stations were constructed in Chepir river (Kedah), Dong river (Pahang), Kongkoi river (Negeri Sembilan), and Rek river (Kelantan).⁵³

Aside from using hydro methods, the Rural Electricity Supply Section also diversified their methods of electricity generation through using paddy husks as fuel. Two stations were built in Teluk Kuchai and Jerlun, Kedah, capable of supplying electricity to 800 nearby residents and the paddy factory in the area.⁵⁴ In addition, the NEB also cooperated with University Sains Malaysia and the *Centre Nationale de la Recherche*, France to develop solar energy. In 1982, a pilot project was launched in Kampung Teluk Apau, Pulau Langkawi involving 37 houses.⁵⁵ In the following year, installation of solar power generators was made in 70 houses in Kampung Tembeling, Pahang, followed by 53 houses in Pulau Sibul, Johor by 1985.⁵⁶

Even more noteworthy, the development of Malay engineers also saw women holding senior office in the administrative structure. The policy of offering scholarships to qualified students regardless of gender has opened doors to women, especially Malay women, to continue their studies in engineering. In 1961, Maimunah Sulaiman became the first woman to be awarded an engineering scholarship to enrol in a diploma course for one year, before continuing her studies at a degree level for three years at Brighton Technical College.⁵⁷ After completing her studies, Maimunah joined the NEB as a trainee engineer, the first female engineer. Maimunah was later appointed Senior Engineer in Headquarters, and played an important role in electricity supply management in rural areas. Later, Maimunah was transferred to the Department of Education and Training as an assistant, before being promoted to Senior Officer for Education and Training in 1979. While in that office,

Maimunah played a key role in developing human resources through offering scholarships in various fields including architecture and computer science. Maimunah's abilities as a senior officer grew more evident when she was appointed as Deputy Chief Engineer (Research and Development) responsible for identifying new technology to be utilised in development projects.⁵⁸ Maimunah, along with her staff, worked to introduce this new technology to reduce cost and ensure more effective electricity supply to consumers. As a result, the use of alternative fuel, such as paddy husks and solar energy, were used to generate electricity for use in rural areas.

Conclusion

The change in the staffing policy and human resources management in the electricity industry by focusing on local staff was related to the Malayanisation policy. Through this policy, the British worked to train local staff before taking over administration, hitherto managed expatriate officers. In addition, the dearth of professional engineers drove the efforts to produce more local engineers. Its implementation has introduced significant changes in appointments, especially at the top management level, which saw the emergence of Malay engineers as administrators. Until the late 1940s, there was limited participation of local staff in the electricity supply services, and most of them were junior staff, serving under expatriate officers that dominate all executive roles. This situation was caused by lack of exposure in education and training in engineering. The British education policy of not emphasising on technical fields such as electrical engineering was identified as the most significant hurdle for local staff to become professional engineers. In fact, the British also hired staff from outside, while disregarding necessary for local staff. Dependence on foreign staff then contributed to a dearth of local experts. By the 1950s, the increasingly urgent need for experts following plans to develop electricity supply facilities at a large scale to meet the ever-increasing consumer demands, meant initiatives were taken to develop human resources and involve local staff.

Human resource development programmes through awarding of scholarships and sending students to continue their studies in electrical engineering became an important start to produce local staff, especially Malay, to be qualified as engineers. The number of Malay engineers then gradually increased. Their qualifications allowed Malay engineers in the electricity industry to become administrators and lead a number of divisions in administration, formerly led by expatriate officers. This newfound position allowed Malay engineers to play their roles as policy makers and determine the direction of electricity supply services. The appointment of Malay engineers to executive positions not only met the goals of Malayanisation, but also served to spur the growth of the electricity industry. Although still relatively new in

engineering, Malay engineers showed their mettle as able administrators, as they succeeded in handling governance effectively, thus contributing to the development of management of electricity supply in Peninsular Malaysia.

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