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Speech by Dr Goh Keng Swee, Deputy Prime Minister  
and Minister of Defence at the Institution of  
Engineers Annual Dinner at the Shangri-la Hotel  
Island Ballroom on Saturday, 4 October 75 at 8 pm

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While collecting material for this address, I thought that the logical starting point would be to find out how many engineers there are in Singapore. Imagine my surprise when the answer turned out to be "Nobody knows".

People have been trying to find the answer to this question since 1971 and it has always eluded them. In 1971 the Faculty of Engineering, University of Singapore, carried out its first survey of the engineering profession in Singapore and last year the survey was taken over by the Ministry of Science and Technology.

The 1971 survey gave a figure of 2076 professional engineers resident in Singapore in mid-1971. But since this figure included nearly a thousand addressees who did not return usable questionnaires to the university, the accuracy of the count must be held suspect.

The Ministry of Science and Technology did not attempt a definite count of engineers in 1974, but they got 1991 usable questionnaires which they stated represented an 83.6% response. If this were so, the number of engineers can be considered to be 2382. But the calculation of response rate was obscure. For instance, it was assumed that questionnaires returned in the past represented engineers still in Singapore

The 1970 census of population gave a figure of 3449 as the total number of engineers in Singapore, 656 in civil engineering, 738 in electrical and electronic, 1371 in mechanical, 285 in chemical and 399 in others. It is likely that people returned as engineers in the population census included those not professionally qualified, unlike the 1971 and 1974 surveys which used a strict definition. Census enumerators can hardly be faulted for being unable to distinguish between engineers and technicians.

Whatever the actual figures are, there is no question that the growth rate of the population of engineers in Singapore is a robust one, probably exceeding that of our GNP. For between 1971 and 1974, both years inclusive, the output of Singapore citizens graduating in engineering from the University of Singapore and universities abroad, came to no less than 830, 460 from Singapore and 370 from foreign universities.

In addition there was an increase during this period of 2414 of new employment pass holders stated to be engineers. But this figure must be treated with reserve. The definition used by Immigration Department is not certain; nor is it certain whether deductions had been made for departing engineers or lapsed passes.

The Ministry of Science and Technology survey of 1974 gave some interesting information about what work engineers do. More than half of the engineers in a sample, 50.5% to be exact, were occupying what the report called "administrative positions". By this is meant presumably, not only administrative positions in government or the statutory boards but also management positions in private business.

In a mature economy, one would expect engineers in management positions. They would have risen through the ranks of a business to the top positions in the company. Young engineers will not be in management positions as a general rule. But what happens in Singapore is that while a greater percentage of older engineers do management work, the percentage among the young is by no means small. For instance, no less than 51% of the youngest group, under 25, are occupying administrative or management positions.

The reason for this is not clear and has not been explained in the report. But there is little doubt that an exceptionally large percentage of engineers are occupying management positions which may or may not be related to engineering work. The response to a question on what kind of upgrading courses engineers would prefer supports the belief that engineers are more involved in business management than is the case in other countries. By far the most popular upgrading course desired was "Business Management", drawing 43.4% of the responses, with civil/structural engineering coming a poor second with 11.6%.

If one takes into account the large proportion of engineers in management positions together with the large number of expatriate engineers working on professional visit passes, one cannot but conclude that there is some kind of imbalance here even after allowing for ambiguities of the figures. It is a subject into which the Ministry of Science and Technology could well investigate further. In such investigations, they are well advised to supplement the sample survey technique which had been used so far with the method of selective case studies which would explain more clearly what exactly is going on. Case studies could be studies of individual engineers, individual firms or individual industries.

The subject is of importance not only in the private sector but also in the public sector. The 1974 survey shows that no less than 44.4% of engineers are employed in the public sector. If you take into account businesses in the private sector which are wholly or partly owned by the government, the percentage engineers connected one way or the other with the government would be closer to 50%.

Government places a great deal of importance in the training of engineers. In the four years, 1971 to 1974, out of 714 first degree scholarships in overseas universities awarded by the Public Service Commission, no less than 441, or 62%, were for engineering. Many of these scholarships were held in some of the most prestigious universities in the world. Our scholars usually perform well; indeed if they did not return with a first class honours degree, eyebrows are raised in surprise.

The concentration of the best brains in engineering studies overseas has a number of important consequences which need to be further examined. The first consequence is that the best brains produced in our schools and trained in universities abroad are not available to the government's administrative service. In many countries, the top echelon civil servants constitute an important section of the intellectual elite of the country. And this should be so for the task of governing a country is both complex and demanding.

The next consequence is whether there is work sufficiently challenging for these highly qualified engineers. If during the 8 years they are bonded to the government there is not sufficient

engineering work that can stretch their talent, then there will not only be unhappiness among these young engineers but the government itself is not likely to retain their services for long.

In a mature economy, the best scientific and engineering brains are not employed in running power stations, PWD maintenance depots, PUB waterworks, telecom services and such like. They are engaged in research and development laboratories of large corporations or in research institutes run by the government or universities. They work under people of world eminence on projects at the frontier of knowledge. Their researches result in innovations in technology, manufacturing processes, new product design and new materials.

There is no work of this kind in Singapore. Even when a foreign firm establishes a factory in Singapore producing advanced products, such as the Hewlett-Packard electronic calculator, the design work and the R&D effort are done in the United States.

This is a problem of utilisation of high quality manpower. One of the difficulties is that the young believe that an engineering degree provides the high road to success. At one time the rage was medicine, but now it is engineering. While this is undoubtedly true for most, the exceptionally talented may be disillusioned by the kind of opportunities available to them, either in the civil service or in the private sector. Eventually they will make good, but if they rise to the top, it is likely to be in management positions rather than in engineering. Here again, there is scope for further study on what happened to previous batches of engineering graduates trained under PSC scholarships. The issue

is not whether they remain in government service or leave for the private sector. In either case they make their contributions to our economic growth. But their contribution could have been better if we had proper career development plans for them. If the eventual position of the best engineers would be high level management, it may be advantageous both to government and the engineers concerned to train and transfer suitable ones to the administrative service, providing thereby a badly-needed stiffening to that service. This is already happening and the question is whether there should be more of it and how it could be more systematically done.