# The Role of Engineering Extension Work in the Expanding Economy of Oklahoma and the Southwest

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First, let me say I appreciate the opportunity to speak to this group of the Oklahoma Academy of Science on what is becoming one of my favorite subjects. Since we are concerned primarily with the State of Oklahoma, I would like to begin by quoting a few statistics regarding the changing nature of our population and economy in this state. In the year, 1940, the population of Oklahoma was 62 percent rural and 38 percent urban. The total population was roughly 2,300,000. In 1950 the population of Oklahoma had decreased about 100,000 people. However, at that time it was 49 percent rural and 51 percent urban, indicating a shift toward the cities. In 1960 we had regained the 100,000 population so that the total figure was approximately equal to that of 1940. However, that population was 63 percent urban and 37 percent rural. All indications are that this trend has continued through the first half of the 1960's. There were some other statistics in these years from 1940 to 1960 which are quite disturbing. Although the population remained essentially static during that time, the percentage of that population in the 18 to 24 age group decreased approximately 28 percent. A decrease of about 12 percent was noted in the age group from 10 to 17 and about 8 percent in the age group from 25 to 54. However, the age group of 55 and over increased by over 50 percent. Clearly, in these years, our young people have been going elsewhere to find opportunities.

Associated with these statistics is the inevitable fact of legislative reapportionment which we witnessed this last year. While many Oklahomans may have some misgivings about an urbanized legislature when it has traditionally been rural, we must nevertheless admit that it was inevitable that the legislature would be reapportioned if democracy was to have any meaning.

Superimposed on this rural-to-urban shift of both population and political control is a combination blessing and curse known as automation. Automation has been nurtured by economic requirements and fantastic engineering advances and is, of course, a nationwide phenomena. It is fairly easy for engineers such as ourselves to give technical descriptions of automation. For today, however, let us discuss its sociological meaning, because that is far more important than the technical details. For one

thing, it means far more unit productivity per worker per dollar. In turn, this means fewer jobs per unit production, higher skills required for those jobs, and also probably higher pay for those jobs. Where this demand for higher and higher education levels is going to end, no one really knows, not even the scientists and engineers who are creating it. Some examples of the result of this phenomenon are the higher auto production with fewer auto workers, automatic manufacturing of common electrical equipment involving very little labor, and closer to home, automatic oil well logging.

Another way to trace some of the social, economic, and political changes in Oklahoma in past years is to trace in a parallel way the development of our land grant universities. In this case, however, we shall take a somewhat longer period. It will be recalled that the Morrill Act called for the establishment of schools of agriculture and mechanical arts. Some people who claim to be scholars bitterly condemned this legislative act as nurturing the crassly practical instead of the intellectually esthetic. They say it degraded the heritage of the classical European University.

While every A. & M. College is hardly a Sorbonne, such an attitude is reminiscent of the French Revolution in which the intellectually elite were guillotined along with their wealthy patrons. The reason given for the execution of these people was simply that the Revolution had no need of savants. One could validly argue that the responsibility here was at least as much with the intellectuals as with some of the leaders of the revolution. The revolutionary leaders (some of them) had the excuse of ignorance, but the intellectual committed the unpardonable sin of ignoring the growing misery and suffering around him. He should have known better, and he, among others, was in a position to try to do something.

On the contrary, our Morrill Act recognized the fact that education was not an avocation but rather was an absolute necessity to the solid growth of the nation. It borrowed little bits from the classical European University and put them out here in the wilderness for you and me. That such borrowing was sometimes poorly done is not particularly remarkable. The most fantastic feature of this phenomenon was that it was done at all. In addition to the cultural training, meager as it sometimes was, the A. & M. Colleges created by the Morrill Act provided the training necessary for the following 100-year growth in our economy. This combination of culture and practical training was the most advanced concept of public education in history and in combination was superbly done.

The major objectives of the A. & M. schools under the Morrill Land Grant Act are stated in the charters of these universities and are summarized in the charter of the Oklahoma State University. The Oklahoma Agricultural and Mechanical College, as it was initially chartered, in common with all other land grant colleges, was created primarily to promote the practical application of knowledge to life. Four fields of service were involved:

1. Research, directed toward solving problems.
2. Extension Service, directed toward disseminating through the state the result of research.
3. Public Service, directed toward furnishing technical service and expert service to all citizens of the state.
4. Resident Teaching, directed toward technological and vocational education, due consideration being given to those studies which made for a well-balanced, cultured personality.

In our state, as in all midwestern states, the major emphasis for the first 75 years was agriculture, simply because the major economy was agriculture. In the process of implementing the basic charge of the Mor-

rill Act in agriculture, there were established agricultural research stations. Much work was done on the science of animal breeding, plant development, more efficient methods of planting and harvesting, etc. The resultant information was disseminated through short courses, two-year agricultural technology programs, and every county had (and still has) a county extension agent to assist the farmers and ranchers in that particular area. Let us not discount the importance of resident instruction, but simply remember that all of these activities were in addition to it in accordance with the initial charge.

The result of all of this work was the massive agricultural extension program now operating to feed *the* basic industry which is, and will remain, agriculture. Agricultural extension activities will remain massive, because the agricultural industry is no less massive just because it is becoming more industrialized and employs fewer people.

We can, however, learn from the development pattern of agriculture, because we see a similar pattern in general, if not in detail, developing industrially. New knowledge requires that we not only train new people but retrain older people. The availability of more and more knowledge means that we must highly train more and more people, because industry will become more broadly based. This in turn leads to the requirement that not only must we provide technical institutes but also graduate training in the physical sciences and engineering. Both the major state universities have been deeply involved in short courses for industry which are for the purpose of either retraining or disseminating new knowledge. Again, let us remember that resident instruction and research are still basic jobs, and this extension activity is an additional requirement which, though sometimes is done off-campus, is no less vital.

It appears that as the economy of Oklahoma becomes more and more industrialized, the colleges of physical science and engineering in the land grant universities will be required to perform services for this industrial development analogous to those services provided so superbly by the agricultural part of our institutions these last 50 to 75 years. If we do not move in and do these jobs, we will be derelict in our duties to the State of Oklahoma. The people of Oklahoma through the legislature will (and should) eventually abandon us if we do not rise to serve these needs as well as continuing to serve resident instruction. If, however, we perform these functions as we should, the people of the State of Oklahoma and the legislature should recognize that we must now put university resources into this extension activity. Then we educators in the physical sciences and engineering can meet our obligation to the state's industrial growth just as it was so magnificantly met by the agricultural educators in the last 50 to 75 years.