Higher Education for an Innovative Economy: Land-Grant Colleges and the Managerial Revolution in America

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> The educator's dream in every country, whether developing or developed, is a national policy that shows that government can be educationally effective and potent without being oppressive. The history of the Morrill Act is highly suggestive...[the act supported] a national system of state-based institutions guaranteeing educational opportunity of a kind heretofore neglected but permitting traditional classical education in parallel if desired. No comparable impact on educational advancement in a few years, over a continental empire, could have been made by private philanthropy, state appropriations alone, or a single national university, however great [7, p. 143].
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> The new land-grant universities were directed to teach agriculture and the mechanic arts, a purpose almost unique in higher education. At the same time the word "practical"' was used, a word that still distinguishes the land-grant universities from most others. In the terminology of today and tomorrow, "practical" can be defined as "problem solving." Problem solving becomes possible through research directed to meeting needs. This concept is one of the major building blocks of the land-grant system. Currently, more than 10 percent of the nation's undergraduate college students are enrolled in land-grant institutions, while some 40 percent of the Ph.D. degrees earned each year are granted by these universities [14, p. 240].

Introduction: Higher Education and Economic Leadership

Recent debates about how the United States can regain its prior role as the world's leading economy have stressed the need for a highly skilled workforce that engages in lifelong learning. Although much of this learning takes place on the job, the foundation for the acquisition of skills is the nation's educational

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system. As today's policy makers in business and government contemplate how the American educational system might be restructured to serve the nation's economic needs, they should consider how that system came to provide a foundation for innovation and economic leadership in the past.

Central to the rise of the United States to a position of global economic leadership in the first half of the twentieth century was the "managerial revolution." We have argued elsewhere that this managerial revolution occurred not only in major business corporations devoted to manufacturing, transportation, and communications but also in the "developmental state" that directed and implemented an innovative strategy for the development of the nation's agricultural sector [3]. So too, the transformation of the nation's educational system to support the managerial revolution involved the education of personnel for agriculture and industry.

In this paper, we focus in particular on how the land-grant college system was put in place to generate large numbers of agricultural scientists and industrial engineers who constituted the critical human resources of the managerial revolution in government and business. Although the original motivation for federal funding of the land-grant colleges was to upgrade the social standing of farmers and artisans, the actual transformation of the land-grant college system was--like the managerial revolution itself--in opposition to the nineteenth-century ideology that the foundation of American economy and society was the "Jeffersonian" producer.

We argue that the training of agricultural scientists for the managerial revolution in the developmental state was critical to the building of the world's foremost educational infrastructure that, in turn supported the world's foremost economy. Industrial corporations, which relied on the system of higher education to provide a large and reliable supply of engineers, would not have had the incentive or ability to build this infrastructure on their own. Had the land-grant college system not been so important to the organizational and technological transformation of agriculture, it would not have been available as a critical institution for the managerial revolution in manufacturing. The integration of the land-grant college system into the American economy, in turn, placed pressure on the traditional private university system to make itself relevant to the managerial revolution.

The Morrill Land-Grant Act

The land-grant system of higher education began to take shape after the passage of the Morrill Land Grant Act by the U.S. Congress in 1862. By this act, the federal government granted to each state 30,000 acres of land or land scrip for each member of Congress from the state in order to provide colleges for the benefit of agriculture and the mechanic arts. This and subsequent legislation produced a nation-wide system of "agricultural and mechanic arts" colleges (land-grant colleges) designed specifically to integrate higher education into the American economy.

Two important provisos of the Act were that acceptance of the grant must be made within three (originally two) years after the passage of the Act and that a college fulfilling the requirements of the Act must be established within five

years after the filing of acceptance in order for the state to retain the proceeds from the sale of the land grant. As Veysey summed up the offer that the states could not refuse: "The Morrill Act provided a basic incentive; what the states could obtain for nothing, they were likely to take" [21, p. 15]. By 1870, 36 states had accepted the land grants and at the end of the century there were over 60 land-grant institutions.

It was then up to the state legislatures to allocate the funds derived from the sale of the land or land scrip. In states such as Wisconsin and Minnesota, the funds were given to existing state universities. The universities simply added agriculture and mechanic arts colleges to their existing literary colleges. In Massachusetts, the grant was divided between the Massachusetts Agricultural College in Amherst and the Massachusetts Institute of Technology in Boston, each institution fulfilling one of the branches of learning required by the Morrill Act. In California, a new state university was created combining colleges in agriculture, mining, mechanic arts, civil engineering, and letters. Ezra Cornell obtained the land grant of New York by matching it with $500,000, and established the university bearing his name. Indiana, which already had a state university, used its land grant (along with $100,000 and land donated by John Purdue) to start a separate agriculture and mechanic arts college. In Virginia, Mississippi and South Carolina, colleges for blacks received a portion of the land-grant fund.

As well as being diverse in structure, the first land-grant colleges were diverse in their emphases. The Morrill Act provided no guidelines for agricultural and mechanic arts education. The extent to which a given college emphasized such education depended in the short run on its initial structure (for example, whether or not it was connected to a state university) as well as on the uses to which interest groups in a particular state wished to put the college. In the longer run, however, the influences working to determine the character of education of a particular college reflected the changing realities of economic conditions not just in the state in which the college was situated but also throughout the nation.

Education for Whom?

By 1872, agricultural and mechanic arts colleges had been started in 11 states and had been added to state universities in 15 other states [19, pp. 116-17]. A survey made by the U.S. Committee on Education and Labor revealed that of 1,391 students who had graduated from the land-grant institutions by 1872-73, 427 had graduated in agriculture, 243 in mechanic arts, and 591 in science and classics. Over two-thirds of the agricultural graduates came from three colleges--Cornell, Massachusetts Agricultural College, and the Agricultural and Mechanical College of Kentucky [8, pp. 98-99].

There were a number of reasons why the sons and daughters of farmers did not initially flock to the new colleges to study agriculture. In the East, those sons of wealthy farmers who wished to pursue higher education would more likely go to one of the prestigious classical colleges than to an agricultural college. And the poorer farmers and their families, if they wished to continue in agriculture, were likely to move West where 160 good acres of farm land could

be obtained as a result of the Homestead Act passed in the same year as the Morrill Act. In the West, the existence of virgin soils that did not require fertilizers for abundant yields along with the habitual overproduction of crops and livestock in the nineteenth century undermined the incentives for farmers to search for more scientific farming methods. In addition, rampant land speculation during these years made it quite profitable for a farmer to exhaust the soil, sell his farm, and move on to another [5, pp. 20-21]. In both the East and the West, then, the land-grant colleges failed to attract agricultural students at first.

In Indiana, the farmers were also initially apathetic towards agricultural education. Purdue University, established by a combination of land grant and benefaction in 1869, opened its doors in 1874 and received its first continuing appropriation from the State Legislature in 1889. By the late 1880s Purdue had shifted its emphasis to engineering, and additional state appropriations to Purdue in the 1890s were designated for engineering buildings. The President of Purdue laid the same charge of apathy against farmers as was being voiced in the East and West: "The farmers were themselves to blame. They had not awakened to the necessity of a liberal training for agriculture as a profession" [6, pp. 31, 39, 81, 89-90].

The fact is that during the first 25 years after the Morrill Act of 1862 agricultural production did not, and could not, make use of the land-grant colleges in any significant way. A major factor motivating the movement for agricultural education at the higher level prior to 1862 had been the non-economic benefits that would supposedly accrue to the farmers as a result of the establishment of their own institutions of learning. In the decades leading up to the Morrill Act of 1862, proponents of higher education for farmers and artisans had always stressed the need for these "industrious classes", as the embodiment of Jeffersonian democracy, to have educational institutions that would put them on a par with the "learned classes", who, with the status attained and social connections made at places such as Harvard and Yale, were becoming increasingly dominant culturally, politically, and economically. At least in the initial stages of development of the land-grant colleges, therefore, the social and cultural value of the land-grant institutions had to be judged relative to the standards set by the existing private institutions. To be equal in status to the existing classical institutions, the land-grant colleges had at least to adopt admissions requirements (in terms of general education previously attained) comparable to those of the private institutions.

The private colleges were supplied with adequately prepared students by the privately incorporated academies for secondary education. Prior to the Civil War, public secondary education had begun to take hold only in the urban centers of the Northeastern states [16, p. 281]. While an extensive system of public higher education was institutionalized by the Morrill Act, no extensive system of public secondary education existed to feed the new colleges and universities with students. In 1870 only 2 percent of the 17-year-old population were graduating from high schools. This percentage rose slowly in the next two decades and did not reach substantial proportions until well into the twentieth century (see Table 1).

Table 1. Percent of 17-year-old population graduating from high schools

Year	Percent
1870	2.0
1880	2.5
1890	3.5
1900	6.3
1910	8.6
1920	16.3
1930	28.8

Source: [20, p. 379]

In Massachusetts, where a more extensive secondary school system existed and where the private American college was solidly represented, an attempt was made to divert the Morrill funds to an agricultural school at the secondary level. This idea was, however, vetoed by the Governor's committee. The example of the Massachusetts educational system and the social and cultural objectives inherent in the land-grant college idea influenced the land-grant institutions to take steps to protect the value of their baccalaureate degrees [19, p. 143]. In the long run, the lower level gaps in the educational system were filled. In the short run, there was some compromise on the part of the land-grant colleges between the desire to increase college enrollment and the desire to be "true" institutions of higher education. The most important short run solution was to offer preparatory courses within the university structure itself, prior to the normal four-year college course for a B.A. or B.S. degree.

For agriculturally oriented youths who had received adequate secondary education, the college degree had to have scientific content. Within the higher education curriculum, a severe impediment to attracting students was the absence of a body of agricultural knowledge of some practical relevance to actual American agricultural conditions. The accumulation of such a body of knowledge awaited the expansion of agricultural research at the United States Department of Agriculture (USDA) and experiment stations that began in the 1880s. This body of knowledge was aimed at training agricultural scientists rather than the scientific farmers that the original proponents of the land-grant colleges had intended [3].

In 1890, the "second Morrill Act" was passed in Congress and gave further financial support to the land-grant colleges (appropriations to each state of $15,000 per year, increasing by $1,000 per year with an upper limit of $25,000 per year to be reached in 1900). Senator Morrill, a Republican, had been trying without success since 1872 to obtain further federal appropriations for the land-grant colleges. Opposition to these efforts during the 1870s and 1880s was

largely based on the fact that these colleges were not adequately fulfilling their intended purpose of serving the agricultural community [8, pp. 19-30]. Instead they were training lawyers, doctors, preachers, teachers and engineers. Nevertheless, the Morrill Act of 1890 represented a relatively low cost way to do something for the farmer. Even though the land-grant colleges were not primarily in the service of the agricultural community, these colleges were always considered agricultural colleges; and money appropriated for these colleges could be represented by politicians as money appropriated for the direct benefit of farmers.

The increased financial support ensured by the Morrill Act of 1890 did not accrue to the land-grant colleges just because politicians were trying to appease farmers who were facing hard times. Perhaps more important in securing these funds was a pressure group that was itself the product of almost three decades of land-grant college history. As one House Representative put it: "the only lobby I have seen at this session of Congress was the educational lobby composed of the presidents of the agricultural institutions....They have buzzed in your ears, sir, and in yours, and in the ears of every member of the House" [8, p. 53].

This lobby was probably the most important output of the previous thirty years of higher education in agriculture. During the formative decades of the land-grant colleges after 1862, a growing number of agricultural scientists and educators were finding their occupational roles within the colleges. In 1880, realizing that the future of the land-grant colleges in agricultural education depended on the development of scientific knowledge suited to American agricultural conditions, this group of scientists and educators formed the Society for the Advancement of Agricultural Science. By 1890 they had managed to put together a body of agricultural knowledge that could lay some claim to represent satisfactory erudition for higher education.

The U.S. government played a central role in promoting this educational agenda. In 1882, 1883, and 1885, the USDA called together representatives of the agricultural colleges to consider the problems of agricultural education and specifically to organize a joint effort of the department and the colleges towards obtaining congressional support for the establishment of agricultural experiment stations. Eighteen such stations were established in the U.S. (15 at land-grant colleges) before direct federal support. The Hatch Act of 1887 authorized federal aid to set up experiment stations at the land-grant colleges, and from 1888 yearly appropriations of $15,000 were given to each state and territory in order to support work on these stations [3].

The Hatch Act greatly influenced the objectives and further development of higher education in agriculture and industry. The USDA had united the separate efforts of the agricultural colleges. The Hatch Act directed these efforts toward agricultural experimentation and research. In 1887, following the passage of the Hatch Act, the Association of American Agricultural Colleges and Experiment Stations was organized; and in 1890, the U.S. Office of Experiment Stations (OES) was made a voting member of the Association. Thereafter, higher education in agriculture and the national interest were inextricably joined [19, p. 210; 22, pp. 234, 245].

The impetus given to agricultural education by the Hatch Act was strengthened by the Morrill Act of 1890. Moreover, the increased federal recognition of agricultural education had its effect in encouraging state recognition in the form of legislative appropriations to the land-grant colleges. In 1892, the federal government supplied 33% of land-grant college annual income; by 1900, just over 25%; by 1914, only 10%. The financial support for the experiment stations strengthened the position of agricultural education in the land-grant colleges because experiment station work added to the agricultural knowledge that could be taught in the colleges.

When, therefore, enrollments in agricultural courses began to grow steadily and significantly after 1905 (see Table 2), the agricultural commitment of the land-grant colleges was directed towards experimentation and research and the consequent training of agricultural scientists and teachers. Moreover, the growth of agricultural enrollments continued absolutely and relative to engineering enrollments, despite the declining share of agriculture in the American economy (see column three, Table 2). The shift to experimentation and research can be attributed to the scientific propensities of the colleges and to the technological demands of the changing economy.

In the last decade of the nineteenth century agriculture comprised about the same share of national income as manufacturing [10, p. 43]. Industrialists had a direct interest in the growth of agricultural productivity as a means of keeping down industrial wages. Railways, farm machinery manufacturers and other related industrial concerns looked to the agricultural sector for much of their profits. Banks and mail-order retailers also had important business connections with the agricultural sector. It is noteworthy that while the U.S. was becoming the world leader in manufacturing, it was also becoming the world leader in agriculture. The productivity of the agricultural sector had a great bearing on the international balance of payments position of the United States.

In 1893, the U.S. Land Office announced the exhaustion of arable land on the frontier. Farmers could no longer sap the fertility of their land and buy new farms cheaply. The application of fertilizers to the land they already held became a necessity. The technological needs generated by this shift to more scientific farming meshed well with the experimentation and research proclivities of the agricultural colleges and experiment stations. And the federal government continued to give support to these scientific endeavors. In 1906, the Adams Act authorized the appropriation of $5,000 per year, increasing yearly by $2,000 for five years, after which the appropriation would be $30,000 per year, for the more complete endowment and maintenance of agricultural experiment stations. The Nelson Act of 1907 provided $5,000 per year for each state, increased by $5,000 each year for four years, and thereafter $50,000 per year, for the more complete endowment and maintenance of agricultural colleges established under the act of 1862.

The development within the agricultural colleges of an agricultural science suited to American soil and climatic conditions would have been a sterile undertaking in terms of increased agricultural productivity without the development of institutions through which this knowledge could be diffused to farmers. But the development of such institutions required that the agricultural

colleges produce many more agricultural experts than they were producing at the turn of the century [19, p. 231].

Table 2. Actual and Projected Enrollments by Course in Land-Grant Colleges, 1894-1914

Year	Enrolled in Agricultural Course †	Enrolled in Mechanic Arts Course	Ratio of Actual to Projected Agricultural Enrollments*
1894-1895	2,712	5,053	0.71
1895-1896	2,881	6,093	0.72
1896-1897	3,053	5,851	0.69
1897-1898	3,190	6,059	0.70
1898-1899	4,390	6,730	0.80
1899-1900	5,035	8,341	0.85
1900-1901	5,625	9,605	0.83
1901-1902	na	na	na
1902-1903	2,471	10,535	0.43
1903-1904	2,331	12,236	0.36
1904-1905	2,473	13,000	0.36
1905-1906	2,963	13,937	0.40
1906-1907	3,930	15,896	0.45
1907-1908	4,566	17,411	0.47
1908-1909	5,873	17,435	0.57
1909-1910	7,241	17,259	0.81
1910-1911	8,859	16,301	0.96
1911-1912	10,691	14,847	1.14
1912-1913	12,462	15,141	1.23
1913-1914	14,844	16,235	1.30

†Agricultural enrollments prior to 1901-1902 include short course students.

* Projected enrollments are the number of agricultural students who would have been enrolled relative to mechanic arts students if both groups had been represented in enrollments in proportion to the relative shares of agricultural and manufacturing in U.S. national income.
na=not available
Sources: [8, p. 102; 10, p. 43].

The demand for experts from land-grant colleges emanated from various sources. The USDA had been founded in 1862 largely through the work and influence of the U.S. Agricultural Society. During the next two decades, while the land-grant colleges were still viewing their main function as direct cultural and technical training of the farmer, the USDA perceived research in agricultural sciences, productivity enhancement, and facilitation of marketing to be its major functions. The land-grant colleges failed in their original objective: to raise the status of the farmer in American society. But their alliance with the USDA in an effort to expand experimentation and research met with success. Especially after this alliance, the USDA as well as state agencies employed increasing numbers of college graduates as teachers and research workers, such that by 1910, the college men constituted the "characteristic personnel" of the Department [4, pp. 5, 15-16; 12, p. 28; 9].New teaching posts were created for the graduates of the colleges as agricultural education moved into the rural secondary schools with the rise of vocational education after the turn of the century. In 1906-1907, there were 75-80 high schools in the U.S. in which agriculture was taught; in 1907-1908, there were 240-250; and in 1908-1909, 500. By 1915, there were 3,675 institutions in the U.S. giving secondary instruction in agriculture [17, pp. 278-79; 1, p. 45; 15, p. 3; 19, p. 355].

Some of the secondary vocational education took place under the auspices of the agricultural colleges themselves with the purpose of training farmers and homemakers who lacked the necessary secondary education, finances, or desire to undertake a college program [2, p. 107]. The objectives of these vocational schools at the colleges were much different from those of the preparatory schools that the land-grant colleges had run in the decades after 1862. The preparatory courses had been a preliminary to college study, and instruction in these courses had been in the normal non-vocational high school subjects. Thus, these preparatory courses were of no relevance to agricultural education unless followed up by a college course in agriculture. The new vocational secondary schools on the other hand, were designed to diffuse agricultural and home economics skills to its students regardless of whether or not they intended to continue to the next level of education. In 1903, only five colleges had instituted such schools (the duration of courses was two or three years). By 1909, vocational education at the secondary level was given in at least 29 states. In addition, winter short courses for farmers were given at the agricultural colleges. In 1905, there were 4,631 students in these short courses; in 1910, 11,211 students [19, p. 275].

The integration of the farmers and their wives and their children into the work at the agricultural colleges helped overcome public skepticism that the colleges were too scientific for farmers. At the same time, however, the provision of such instruction at the secondary level had the effect of stratifying the system of agricultural education itself by clearly defining the role of the agricultural

college to be the training of agricultural experts and teachers and the role of vocational secondary education to be the training of the men and women who actually worked the soil.

Even more important both for creating new jobs for agricultural experts and for diffusing the agricultural methods devised at the colleges was the growth of extension courses. Extension work brought together the interests of industrial, financial, and governmental groups to promote productivity-improving technologies. Throughout the nineteenth century, experts connected with the agricultural colleges or societies had given lectures and addresses to groups of farmers. In the 1870s, these meetings had become institutionalized in Kansas and Iowa in the form of farmers' institutes. Meanwhile extension movements relating to a variety of scientific and literary fields had been gaining momentum, and in 1890 the American Society for the Extension of University Teaching was organized. From 1890 to 1900, 22 universities instituted extension departments [19, p. 276].

Agricultural extension grew as part of this general movement. It was motivated by the desire to pass on the benefits derived from the work of the agricultural colleges to the whole rural sector. Yet, it was not until the 1890s that the agricultural work within the colleges had been efficiently developed that its widespread diffusion might be of benefit to the mass of farmers. For the U.S. as a whole, approximately 2,000 farmers' institutes were attended by over 500,000 thousand farmers in 1899. In 1902, 2,772 institutes were attended by 820,000 people; and in 1912, over 7,500 institutes were attended by over 4 million people [2, p. 131]. A powerful private source, namely the Rockefeller-endowed General Education Board, also promoted extension work. This foundation began to allocate funds to the colleges (via the USDA) in 1906 for use in the demonstration of new agricultural techniques, thus stamping demonstration work as a highly respectable form of education [12, pp. 24-25; 4, p. 37].

Pressure for the agricultural colleges to undertake increased extension work emanated from more localized sources. The originator of demonstration work, Seaman Knapp (one-time President of Iowa State College) pressured farmers adopt his methods by convincing town merchants and bankers to deny credit to farmers who refused to do so. The American Bankers Association appointed a committee on agriculture in 1909 that became formalized into the Committee on Agricultural Development and Education in 1911. The Bankers Association looked to demonstration work as an agency to enable the farmers to advance themselves [12, p. 31].

The railroads passing through rural areas also had an obvious interest in seeing farmers adopt new farm practices. In addition, mail-order retailers viewed increases in the productivity of farmers as an extension of their potential markets. The president of Sears Roebuck (a company that, through its mail-order service, had from the 1880s built a close connection with the farming community) offered $1,000 each to the first 100 counties to employ a full-time county agent --that is, an agricultural expert whose job would be to demonstrate to the people in his county the new agricultural methods. After 1910, manufacturers of farm machinery such as John Deere & Co. and International Harvester Co. maintained their own extension departments in which they employed agricultural experts from the colleges [12, pp. 30-32].

Those who sought to induce farmers to adopt new technological methods formed the National Soil Fertility League in 1911. The league was made up of, according to its president, "nearly all the leading transportation companies and large numbers of financial institutions and manufacturing concerns" [12, p. 32]. This group combined with the USDA, OES, and the agricultural colleges to secure the passage of the Smith-Lever Act by Congress in 1914. This act provided funding for cooperative extension work between the land-grant colleges and the USDA.

Part of these funds were to be used to provide at least one trained demonstrator or itinerant teacher for each agricultural county [18, pp. 100-01], thus creating thousands of jobs for the graduates of the agricultural colleges and making the colleges fundamental to the prosperity of the agricultural sector and the economy. The Smith-Lever Act, therefore, institutionalized the means whereby higher education could become fully integrated into the process of agricultural production. Vocational education in agriculture, trade, and industry was institutionalized nation-wide at the secondary level by the Smith-Hughes Act of the U.S. Congress in 1917 [19, pp. 320-27, 365-71].

Conclusion: The Transformation of American Higher Education

By 1917 the U.S. economy was no longer predominantly an agricultural economy. Yet the continued interest in, and funding for, higher education in agriculture remained a driving force in the continued expansion and extension of the nation's system of higher education. Indeed, it can be argued that the involvement of the federal government in leading the transformation of higher education was critical to making it a *national system* that pursued consistent objectives across all of the states.

Business corporations in the manufacturing sector were, of course, involved in this transformation of higher education. As David Noble [13] has shown, the leaders of the managerial revolution in industry provided vision and considerable financial resources to ensure that the system of higher education served their needs for highly educated and properly socialized managerial personnel [11]. Even here, however, the mandate of the Morrill Act to serve the "mechanic arts" meant that the nation's industrial leaders looked first to the land-grant colleges to provide this new supply of human resources. Massachusetts Institute of Technology, to give the most prominent example, was a land-grant college. Unlike agriculture, business interests in industry had enough "private" (that is, corporate) resources to reshape the *content* of engineering schools without significant help from the state, thus transforming a land-grant college such as MIT into an essentially "private" educational institution. But even these powerful industrialists made use of a *structure* of educational institutions that government, on both the federal and state levels, had put in place and then sustained. It is not at all clear how quickly or effectively the business elite would have created such a system solely on the basis of corporate resources. Yet the quick and effective creation of such a system was critical to the success of the managerial revolution in industry that the business elite was leading.

The transformation of the land-grant colleges to service the managerial revolution in agriculture and industry put great pressure on the traditional

classical colleges to alter their course offerings and research agendas. As a result, by the second decade of the twentieth century, the content of a Harvard and Yale education was more like that received at an American land-grant college than it was like that received at Oxford or Cambridge where, absent a thoroughgoing managerial revolution in Britain, the classical curriculum and research still prevailed [11]. The transformation of the land-grant college system ultimately transformed the entire American system of higher education, in the process rendering the distinction between "private" and "public" meaningless as far as educational content was concerned.

Finally, whether in agriculture or the mechanic arts, the Jeffersonian ideals that had led to the passage of the Morrill Act of 1862 had been subverted. The managerial revolution in America was a triumph of collectivism over individualism. It was a revolution in which, circa 1914, virtually all of the participants were white anglo-saxon protestant males--the same group from which the Jeffersonian yeomanry had drawn its numbers. Through the involvement and cooperation of government and business, these "wasp" males had left these individualist ideals behind to join the managerial revolution. The revolution was, therefore, not just economic but also social. It was in the system of higher education, with the land-grant colleges in the vanguard, that the social revolution that underlay the managerial revolution occurred. The lesson of this history for today, we would assert, is that the organizational revolution that American business now requires to regain economic leadership will require a social revolution in the content of its system of higher education that may have to be as far-reaching as the one that occurred about a century ago.

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