

I. Introduction

The U.S. research university is often held up as a model for other nations to follow, especially developing nations, where U.S. influence operates ubiquitously through key governmental, inter-governmental, and non-governmental organizations such as the International Monetary Fund (IMF), World Bank, World Trade Organization (WTO), Organisation for Economic Co-operation and Development (OECD), and U.S. Agency of International Development (USAID) (Calderone & Rhoads, 2005; Collins & Rhoads, 2010). Additionally, many developed nations also look to the U.S. research university as part of a broad effort to elevate their own universities' research capacities and move toward the development of world-class universities capable of contributing to economic development in what alternatively has been described as a new knowledge economy, an information age, and a technology- and computer-based network society (Castells, 1997; Mohrman, Ma, & Baker, 2008; Peters & Besley, 2006; Rhoads & Torres, 2006; Slaughter & Rhoades, 2004).

There is much evidence to support the basic contention that the U.S. research university has great appeal around the world. For example, in Burton Clark's (1998, 2004) international comparative work on building and sustaining competitive universities, he pointed to several fundamental features necessary for advancing entrepreneurialism, an institutional characteristic he considered pivotal to success; Clark noted the importance of diverse income sources, private and public contributions, extensive outreach capacity, support for interdisciplinary and transdisciplinary work, and collaboration with business and industry. These features of academic entrepreneurialism have become the hallmark of U.S. research universities and are front and center in the work of Sheila Slaughter and Larry Leslie (1997) and Slaughter and Gary Rhoades (2004), most notably in their development of the concept of academic capitalism. Furthermore, Kathryn Mohrman, Wanhua Ma, and David Baker (2008) advanced the idea of the Emerging Global Model (EGM) of the research university, delineating eight fundamental features which, unsurprisingly, look quite similar to characteristics one finds at top U.S. research universities: global mission, research intensity, new roles for professors, diversified funding, worldwide recruitment, increasing complexity, new relations with government and industry, and global collaboration with similar institutions (p. 5). They acknowledged as much: "At this particular stage in the development of the university, many of these features of the EGM are rooted in the American experience of the past four decades" (p. 6).

Wanhua Ma pointed out that as far back as the 1980s, OECD nations began looking at the U.S. research university system, also noting its importance in shaping Chinese higher education reform and the quest to develop world-class universities (2007, p. 31). Some of this is to be explained by the fact that U.S.

universities, as Simon Marginson pointed out, occupy the very top levels of the global higher education competition, primarily on the basis of their “degree/brand status and research performance/reputation” (2006, p. 21). Other scholars have raised skepticism about blindly following the U.S. university model, while at the same time noting its pervasive appeal (Deem, Mok, & Lucas, 2008).

In my empirical work focused on university reform in diverse nations such as Argentina, China, Mexico, Thailand, and Uganda, the influence of the U.S. model of the research university is quite obvious, especially in terms of its entrepreneurial and academic capitalist features. In the cases of Argentina and Mexico, the U.S. model is idealized by many policymakers and institutional leaders as part of broad calls for stronger ties to business and industry, as well as the need to further develop industry-driven forms of academic science (Rhoads, Torres, & Brewster, 2006; Slocum & Rhoads, 2009). In Thailand and Uganda, the U.S. model of university entrepreneurialism is spirited by World Bank officials with their hands in the development of the higher education sectors of both nations respectively (Collins & Rhoads, 2010); from the World Bank’s perspective, an emphasis on entrepreneurialism is seen as consistent with a more privatized model of the university, accompanied, of course, by calls for reduced public expenditures for higher education (Collins, 2011). In China, the U.S. research university is held up as a model for encouraging greater faculty engagement in forms of academic capitalism marked by increased revenue generation, scholarly productivity, and international ties (Rhoads & Liang, 2005; Rhoads, forthcoming). This finding is reinforced in Po King Choi’s (2010) case study of Chinese University of Hong Kong, where reform initiatives were seen to be tied to instrumentalist views of globalization emphasizing English hegemony and academic capitalism.

With the U.S. research university being so highly regarded around the world, evident in both the literature and in countless interactions with foreign colleagues, I see the need for a deeper and more critical analysis of the basic foundations of the U.S. model. I am concerned about the lack of a well-rounded critique of the U.S. academic research enterprise. Although the U.S. university has achieved a level of research capacity unrivaled anywhere in the world, major problems exist that are rarely acknowledged by scholars of higher education, be they operating in the United States or within the broader realm of international comparative work. Hence, the goal of this paper is to review aspects of the development of the U.S. research university with an eye toward delineating both its strengths and weaknesses, so as to contribute to a more balanced and nuanced discussion of possible contributions to be made in the development of other nations’ university research systems. Of course, my points of criticism may also serve as guide posts toward the monumental challenge of refashioning the U.S. research university.

In what follows, I first discuss four critical stages in the historical development of the U.S. research university. This historical grounding is crucial to understanding the present-day rendition of the research university. Following my historical discussion, I then shift to the contemporary context, first delineating some of the great accomplishments of the U.S. research university, but then also outlining in some detail deep-seeded problems that continue to undermine its potential social and cultural contributions. I connect my discussion of contemporary problems to the four critical stages previously delineated, pointing to foundational problems of the U.S. research university. I conclude this article by delineating several considerations for policymakers, institutional leaders, and faculty members as they move forward in advancing the quality and scope of universities both within the United States and abroad. Here, I am especially concerned with global efforts to reproduce the U.S. research model as part of national efforts to build so-called world-class universities.

II. Four Stages in the Development of the U.S. Research University

Based on an extensive review of key works on the development of the U.S. university, including many of the most significant historical and sociological works (Geiger, 1986; Jencks & Riesman, 1969; Kerr, 1963; Slaughter & Rhoades, 2004; Veysey, 1965), I point to four critical stages in the development of the U.S. research university: 1) the Germanic influence of the 1800s, 2) the rise of government sponsorship of research during World Wars I and II, 3) the emergence of the multiversity, and finally, 4) the rise of the entrepreneurial university under neoliberalism.

Stage 1: The Germanic Influence

The early colleges founded on the soil of what now constitutes the United States of America were crafted along the lines of the English residential college. These early colleges included Harvard (1636), William and Mary (1693), and Yale (1701) and were more similar to boarding schools for young boys than what might be considered a college today. The English residential college idea dominated the colonies and the early decades of the United States, at least until the mid-1800s, when the landscape of higher education in the young nation began to change.

Laurence Veysey (1965) noted that during the middle and latter half of the nineteenth century, many U.S. professors traveled to Germany and observed first-hand the German intellectual ideals of *Lehrfreiheit*, emphasizing the free pursuit of non-utilitarian knowledge or pure learning, and *Wissenschaft*, stressing investigation and writing as key facets in the pursuit of knowledge (p. 126). While

U.S. colleges of this period tended to stress memorization of existing knowledge and technique—the so-called classical curriculum, including emphasis on mathematics, Greek, and Latin—the German Humboldtian model (advanced by Wilhelm von Humboldt) focused more on the pursuit of new knowledge, through “rigorous and precise examination of phenomena, whether natural or historical” (p. 127). Once German intellectual ideals became wedded to already existent English notions of empirical philosophy, “The practice of research became elevated into an all-encompassing ideal, while emphasis on professional autonomy—always somewhat grand and hollow on German lips—became translated into a much more down-to-earth, hard-hitting American campaign for academic freedom” (p. 127).

It was also during this period in U.S. history that the federal government began to put its stamp on the development of the university, primarily through passage of the Morrill Land Grant Acts of 1862 and 1890 (Geiger, 1986; Veysey, 1965). These acts helped to strengthen the application of science to agriculture and the industrial arts. In a matter of only a few decades the free and systematic pursuit of new knowledge became a core element of the emerging idea of the American university, although evidencing a uniquely American emphasis on pragmatism.

The intellectual and curricular turn toward what Veysey (1965) described as “utility” was a healthy step in the development of the U.S. university and helped to supplant the rote memorization and stale thinking associated with the long-standing classical curriculum whose time had long since passed. Building stronger ties to agriculture and industry for the purpose of better connecting higher learning and faculty outreach to the needs of society has generally been quite a positive outcome. The problem though, as I will explore in greater detail in Section IV, is that the form of intellectualism and academic science commonly embraced by U.S. universities and their professors was a rather limited version of the former Germanic ideals.

Stage 2: The Rise of Federal Sponsorship of Research during WW I and II

With the German research emphasis added to the existing English model of the residential college, a distinctly U.S. version of the university began to evolve. Nonetheless, by the dawn of the twentieth century, the U.S. university could hardly be compared to the more developed universities of Europe. As Roger Geiger (1986) explained, “The United States was all too often regarded as a provincial outpost in the international world of science” (p. 233). However, the early part of the 1900s was a period of rapid development for the U.S. university, reinforced by the events of World War I, as the U.S. government worked toward “the mobilization of American science” (p. 233). Geiger went on to note, “The United States thus attained a rough parity with other leading scientific nations

well before events in Europe forced the intellectual migration of the 1930s. The disintegration of learning in Central Europe and the reinforcement of American institutions with leading foreign scientists only accentuated this process. By the outbreak of the Second World War the United States was clearly the foremost center of science in the world” (p. 234).

The intellectual migration referenced by Geiger (1986) helped to plant the basic ideals of logical positivism, as developed by Ludwig Wittgenstein and other members of the Vienna Circle. This, combined with the influence of English empiricism and selective adoption of Germanic research ideals, pushed U.S. science and intellectualism in the direction of a reductionist, hypothesis-testing model grounded in observable and measurable experience. Critical questions of a metaphysical nature were seen as beyond the realm of this version of science, and therefore, were increasingly marginalized within the emerging model of U.S. academic science. This particular form of pseudo-scientific thought was highly criticized by Critical Theorists associated with the Frankfurt School in Germany, including the likes of Max Horkheimer (1972) and Jürgen Habermas (1971), the latter noting, “That we disavow reflection *is* positivism” (p. vii). Habermas’ remarks underscored a growing concern among many critical philosophers that the form of intellectualism taking root in Western thought, namely positivism, lacked the capacity to question its own validity and relevance.

Although the U.S. university was on the move as a research enterprise, its structural transformation was not yet complete. Efforts by the federal government to connect the nation’s top academic minds to national interests, defined mostly in terms of military dominance, had only partially succeeded during World War I. As Geiger (1986) explained, “University research...was wedded to the ideal of disinterested inquiry” (p. 175), despite the utilitarian influence of the Morrill Acts, academic scientists “tended to fear government interference with the autonomy of science more than they welcomed its succor” (p. 257). Vannevar Bush, Director of the Office of Scientific Research and Development (OSRD) and a leading American physicist, played a pivotal role in swaying university scientists by convincing President Franklin Roosevelt to increase funding by developing a New Deal for academic science. What resulted largely determined the long-term direction of federal policy relative to university science, manifested in the development of major funding sources for university professors willing to tie their research to the nation’s military interests. Indeed, the federal government created agencies such as the National Science Foundation (NSF), Office of Naval Research (ONR), Army Research Office (ARO), Air Force Office of Science Research (AFOSR), National Institutes of Health (NIH), and Atomic Energy Commission (AEC) to further the national agenda; this catapulted the federal government to the top position as a funder of university research, a reality that continues to the present.

The significant commitment of the federal government to fund university research and development at such massive levels is one of the critical factors in elevating the U.S. university to preeminent status. Federal support, combined with philanthropic contributions, especially at private research universities such as Harvard, M.I.T., and Johns Hopkins, enabled U.S. academic scientists to develop high quality laboratories capable of investigating the most challenging and vexatious questions of the times across a wide range of scientific fields. The contributions of U.S. academic scientists helped the nation to develop the most advanced weaponry and technological innovations anywhere in the world. Looking beyond their military application, and ignoring obvious moral questions, U.S. academic science of this era produced countless benefits for the broader society. A clear example is the role applied scientists at Stanford University played in the development of Silicon Valley, which was fueled in part by government-funded projects aimed at advancing military electronics. Today, this region of California is home to countless innovative firms producing numerous benefits for the broader society, including thousands of jobs. This is not a bad outcome, and in fact highlights a central responsibility most U.S. research universities embrace: regional economic development.

Additionally, academic scientists immigrating to the U.S. during the World War I and II periods played critical roles in advancing academic science and altering the intellectual landscape of U.S. society for years to come (Coser, 1984; Fermi, 1971; Geiger, 1986). A case in point is the powerful influence European scientists had on the field of atomic physics once they relocated to U.S. soil. Their influence was key to the Manhattan Project and the United States beating Germany to the ultimate development of atomic weapons. Today, the internationalization of the professoriate is generally accepted as an important quality in the development of world-class universities; to reiterate an earlier point, Mohrman, Ma, and Baker (2008) included “worldwide recruitment” and “global collaboration” in their list of key characteristics of the Emerging Global Model of the research university. One might easily turn to the World War I and II periods in the United States for powerful affirmation of such a conclusion.

Stage 3: The Emergence of the Multiversity

Although federal policy during and after World Wars I and II helped to propel the U.S. university as a research enterprise, such initiatives largely tied the university to the nation’s growing military industrial complex, including the development of advanced weapons systems. The evolution of the university during the late 1950s and throughout the 1960s and 1970s added another important facet to the research mission of this vital enterprise. As the U.S. university grew in size and scope, largely as a consequence of the Servicemen’s Readjustment Act of 1944 (commonly known as the G.I. Bill) providing easy

access to higher education for returning veterans (Jencks & Riesman, 1969), it soon was positioned as an engine for economic development, and institutional leaders increasingly sought to connect the basic tripartite mission of the university—teaching, service, and research—to the basic needs of business and industry. Students were educated for careers in the labor market, service was framed as a means to connect university expertise to local and regional economies, and research increasingly was defined in terms of the needs of business and industry (Kerr, 1963).

Of the university leaders of this era, few defined the multiversity—“multi” because there were now multiple missions, not just teaching—with the depth and vision of University of California (UC) President Clark Kerr. In a speech delivered to the UC Berkeley academic community, Kerr captured the changes underway in the early 1960s, including the growing importance of the knowledge industry:

The university is being called upon to educate previously unimagined numbers of students, to respond to the expanding claims of national service, to merge its activities with industry as never before. Characteristic of this transformation is the growth of the knowledge industry, which is coming to permeate government and business and draw into it more and more people raised to higher and higher levels of skill. The production, distribution, and consumption of knowledge is said to account for twenty-nine percent of gross national product, and knowledge production is growing at about twice the rate of the rest of the economy. What the railroads did for the second half of the last century and the automobile for the first half of this century, may be done for the second half of this century by the knowledge industry. And that is, to serve as the focal point for national growth. (Kitchell, 1990)

Kerr’s vision of the multiversity called on universities to be more responsive to business and industry; he did not limit such a vision only to the rapidly expanding military industrial complex, but instead saw university professors and their research as potential contributors to a variety of industries, especially those connected to the growing knowledge industry. Thus, as the U.S. research university evolved throughout the 1960s and 1970s, its research mission and capacities extended beyond the early policies advanced by Vannevar Bush that had helped to tie the university to national interests (and the military industrial complex) as defined by political leaders in Washington, DC. Now, the private sector, in the form of corporate and industrial interests, also laid claim to the U.S. university and its research and development capacities.

The idea of tying the U.S. research university more directly to corporate and industrial interests, as part of a broader vision of the university’s role in economic development, was in part the natural extension of the utilitarian ideals of the Land Grant model. However, whereas the Morrill Acts primarily implicated

public universities—a sub-sector at that, the Land Grants (e.g., Michigan State, Iowa State, Pennsylvania State, Texas A&M, etc.)—the vision emerging in the 1960s and 1970s pretty much included all research universities, including the private ones. Thus, even though the funding sources differed between public and private research universities, both types of universities increasingly embraced their responsibility in developing and/or supporting job-producing companies and industries. Such a vast responsibility was largely attached to their shared status as non-profit organizations, dependence on state and federal research support, and eventually, their reliance on large sums of financial aid for students after passage of the Higher Education Act of 1965.

Stage 4: The Rise of the Entrepreneurial University under Neoliberalism

The biggest factor in the development of the current rendition of the U.S. research university is the growth and dominance of a particular economic ideology placing great emphasis on entrepreneurialism and privatization. To advocates such as former U.S. President Ronald Reagan, the shift simply involved a turn to common sense by relying to a greater extent on market forces. To opponents, who often describe this dominant economic perspective as “neoliberalism,” because of the emphasis on the *liberalization* of markets, it was a direct attack on the key role governments and taxes play in creating greater economic equity through social programs, sometimes discussed as Keynesian economics (Boron & Torres, 1996). Here, terms can be somewhat confusing, as neoliberalism mostly has been led by economic conservatives, such as Milton Friedman and the Chicago Boys, but the movement also successfully captured many U.S. political liberals, including the likes of former President Bill Clinton.

Emerging from classic market ideology, neoliberalism was enacted politically and economically through the leadership of Reagan (Reaganism) and U.K. Prime Minister Margaret Thatcher (Thatcherism). Furthermore, neoliberalism is implemented at a global level through non-governmental organizations (NGOs) and inter-governmental organizations (IGOs) such as the WTO, IMF, and World Bank, which more or less establish and promote the basic rules of international trade and development (Rhoads & Torres, 2006). Under the neoliberal regime, government is to play a minimal role, except where it might stimulate the economy (presumably federal funding of university research in the United States qualifies). Neoliberals also stress tax benefits for business, industry, corporations, and the wealthy; deregulation of the economy (e.g., Wall Street); privatization of public services (e.g., social security), including K-12 schooling and higher education; the market as the ultimate source of social justice (advocates believe that liberalization of markets leads to greater economic fairness, where “fairness” mostly gets defined as individuals paying their own way); and the use of tax revenue for economic development (often in line with

corporate interests). Public services are to be turned over to the market wherever possible, an idea consistent with Reagan's famous view that "Government doesn't solve problems, it subsidizes them."

The implications of neoliberalism for U.S. research universities largely involves the privatization of the university wherever possible, including advancing to an even greater extent its ties to business and industry, frequently discussed in terms of corporate connections and typically involving shared research and development projects. Neoliberal ideology also may be linked to legislative decisions to dramatically cut state funding for public colleges and universities, often leading to higher tuition and fees and rendering a college education increasingly unaffordable for students from lower- and working-class families. As tuition and fees rise, essentially getting redefined as a user tax, individuals bear the brunt of college costs in a manner entirely consistent with neoliberal thinking (Rhoads, Wagoner, & Ryan, 2009).

This more entrepreneurial version of the modern research university places great emphasis on the generation of income and the key role professors play in scientific innovation, as university leaders seek to capitalize on the inventive capacities of their faculty (Geiger & Sá, 2008). In this regard, administrators often get redefined in practice as managers, who increasingly must engage in advancing government and corporate relations. University presidents tend to be seen more as chief executive officers (CEOs) in a manner consistent with the corporate world. Professors are positioned as knowledge workers to be managed by business-minded administrators, and students often are framed either as consumers, to whom higher education as a product is sold, or as marketable products to be bought by business and industry (Giroux, 2002, 2007; Giroux & Giroux, 2004; Rhoades, 1998; Rhoads & Liu, 2009; Rhoads & Rhoades, 2005).

The entrepreneurial turn has produced numerous benefits for the contemporary research university, most notable of which perhaps is its insatiable desire and talent for generating research revenue. Corresponding with such capacity is the range and impact of the many innovative ideas and inventions deriving from these same universities. The success of the U.S. research university in advancing innovation is one reason why federal R&D (research and development) support has remained relatively high, despite the economic downturn of recent years.

III. The Productivity and Dominance of the Entrepreneurial Research University

The entrepreneurial U.S. research university has prospered like never before, increasing its revenue-generating capacity to such an extent that scholars have come to define the enterprise as being dominated by "knowledge capitalism"

or “academic capitalism” (Peters & Besley, 2006; Slaughter & Rhoades, 2004). Indeed, the successful entrepreneurialism and innovation of the contemporary U.S. research university are manifested in several ways, all quite telling. First is simply the vastness of the revenue flowing to academic research. For example, for the academic year 2009 the National Science Foundation reported that U.S. universities invested nearly US\$ 55,000,000,000 in research and development. Leading the way was Johns Hopkins University with US\$ 1,856,000,000 in research expenditures, but other universities also committed vast sums of money to the research enterprise. Table 1 highlights the top ten universities for 2009, based on research and development expenditures (Britt, 2010).

Table 1. University Research & Development Expenditures (2009) (US\$)

# 1	Johns Hopkins University	1,856,000,000
# 2	University of Michigan	1,007,000,000
# 3	University of Wisconsin	952,000,000
# 4	UC San Francisco	948,000,000
# 5	UC Los Angeles	890,000,000
# 6	UC San Diego	879,000,000
# 7	Duke University	805,000,000
# 8	University of Washington	778,000,000
# 9	Pennsylvania State University	753,000,000
# 10	University of Minnesota	741,000,000

Source: Based on NSF data reported by Britt (2010)

Given the intense competition among research universities to obtain research funding from federal agencies, private industry, and philanthropic organizations, research and development expenditures are seen as a fairly good measure of their success (Geiger, 1986, 2004). The quantity of funded research and the overall size of the academic science enterprise at U.S. universities are two reasons they tend to dominate the global university rankings. For example, U.S. universities occupy 17 of the top 20 places in the Jiao Tong University 2010 Academic Ranking of World Universities (ARWU) and 54 of the top 100. In the Times Higher Education 2010-11 World University Rankings, U.S. universities fare quite similarly accounting for 15 of the top 20 and 53 of the top 100. Although many scholars raise legitimate questions about the validity of such ranking schemes, few question the influence they have on policymakers and decisions aimed at building world-class universities (Dill & Soo, 2005; Ishikawa, 2009).

Although an entrepreneurial competitive quality drives the U.S. research university, it is important to note that such institutions do not operate in an unfettered market economy. Indeed, the federal government plays a key role in providing major funding, albeit through competitive peer-review processes that in some ways mimic market conditions. For example, in 2009 the federal government funded approximately 59 percent (roughly US\$ 32,600,000,000) of all university research and development through its major funding agencies, most notably the NSF, Department of Defense (DOD), Department of Energy (DOE), Health and Human Services (HHS), National Aeronautics and Space Administration (NASA), and U.S. Department of Agriculture (USDA). The largest portion of funds goes to the life sciences (over US\$ 19 billion), particularly to medical research (over US\$ 11 billion).

A telling indicator of the successful innovation and entrepreneurialism of the American research university comes from patent data. Table 2 highlights the dramatic rise in patents filed by U.S. universities from 1974 to 2009. This sort of

Table 2. University Patents (1974-2009)

Year	Patents
1974	177
1979	196
1984	408
1989	1004
1994	1486
1999	2718
2004	3506
2009	3417

Source: Based on data from Mowery et al. (1998) and the AUTM (2010)

innovative spirit is further evident in data reported by the Association of University Technology Managers (2010), which notes that the 153 universities participating in their survey produced 20,309 invention disclosures, 18,214 patent applications, executed 5,328 licenses, and created 596 new companies. The report also notes that the universities generated over US\$ 2.3 billion in total licensing revenue (licensing revenue derives from the selling or leasing of rights to patents to companies; given that universities are not manufacturers, their scientific discoveries are often sold/leased to companies better equipped for transforming scientific innovations into marketable products). Table 3 lists the top ten universities in terms of licensing revenue for 2009 as reported by the AUTM.

Table 3. Top 10 Universities for 2009 Licensing Revenue (US\$)

# 1	Northwestern University	162,591,544
# 2	Columbia University	154,257,579
# 3	New York University	113,110,437
# 4	University of California System	103,104,667
# 5	Wake Forest University	95,636,362
# 6	University of Minnesota	95,168,525
# 7	University of Washington	87,339,905
# 8	University of Massachusetts	70,553,428
# 9	MIT	66,450,000
# 10	Stanford University	65,054,187

Source: Association of University Technology Managers (2010)

A key facet of the contemporary U.S. university under the influence of neoliberal ideology is greater connectivity to the needs of business and industry. An indicator of this trend is the fact that industry funding of university research for the year 2009 increased by 11.6 percent from the previous year (Britt, 2010); this followed a 7.1 percent increase from the year before (Britt, 2009). Industry or corporate influence is also evident through other forms of university funding, such as the creation of endowed chairs. For example, the University of California includes the following endowed chairs: Taco Bell Professor in Information Technology at UC Irvine, Bank of America Professor of Educational Leadership at UC Riverside, Northrop Grumman Chair in Electrical Engineering at UC Los Angeles (UCLA), and the Callaway Golf Chair in Structural Mechanics at UC San Diego. Indeed, the fair market value of nearly 1,400 endowed chairs across the various UC campuses was US\$ 1.6 billion in 2007 (Rhoads & Liu, 2009). This is neoliberalism at its best—one might think of it as a form of academic capitalism on steroids.

Numbers alone cannot capture the successful innovative thrust of the modern U.S. research university. One must also consider the types of discoveries that have been advanced. In this regard, Jonathan Cole's (2009) account of the success of the U.S. research university is helpful. As a companion to his book, *The Great American University: Its Rise to Preeminence, Its Indispensable National Role, and Why It Must be Protected*, Cole developed a website listing many of the significant byproducts of U.S. academic scientists. The list is too large to reproduce here and so I refer curious readers to Cole's book and his website if more information is desired (http://university-discoveries.com/v1_demo/?p=1). In short, his list of discoveries covers such

broad areas as the biological and biomedical sciences (e.g., discovery of the human immunodeficiency virus that causes AIDS at UC San Francisco in 1983), the physical sciences and engineering (e.g., discovery of a new tectonic plate, the Capricorn Plate, by a Rice University scientist in 1997), and the social and behavioral sciences and humanities (e.g., new methods developed for analyzing economic times series data at New York University and UC San Diego in 2003). The book and companion website both are quite vulnerable to criticism, mostly because Cole tends to ignore many of the negatives associated with external influences shaping university inquiry. Additionally, his list of discoveries in the social and behavioral sciences and humanities is somewhat comical, given all that he ignores. Nonetheless, as another indicator of the accomplishments of the U.S. research university, his work is useful, mainly because he captures aspects of the size and scope of this Titanic endeavor.

A quick look at my own university's annual, online magazine, *UCLA Invents*, reinforces the magnitude of discovery and innovation at top research universities. For example, UCLA lists the following to the credit of its professors and scientists for the calendar year 2009: 333 invention disclosures, 179 new U.S. patent filings, 136 secondary filings, 60 issued U.S. patents, 76 first foreign filings, 37 license and option agreements, and 430 inventions optioned or licensed. The magazine also noted some of UCLA's totals at the end of 2009: a portfolio of 1700 inventions, 581 active U.S. patents, 584 active foreign patents, and 277 license agreements. Some of its licensed products for 2009 include the following: PomElla licensed by Blaze (pomegranate polyphenols for use in foods and beverages), GDC and Matrix Coils licensed by Boston Scientific (used in the treatment of brain aneurysms), and MERCI Embolism Retriever Device licensed by Concentric Medical (a device used to remove blockages from arteries to the brain). Other top U.S. research universities no doubt offer a similarly impressive list of annual and ongoing accomplishments.

Despite such vast entrepreneurial success, close ties to business and industry have produced a great deal of concern for some affiliated with the U.S. academic enterprise. Many scholars, for example, worry that the university may be selling out for greater and greater streams of revenue without adequately weighing the long-term implications of becoming so tied to corporate interests (Aronowitz, 2000; Bok, 2003; Giroux, 2002, 2007; Giroux & Giroux, 2004; Gould, 2003; Washburn, 2005). Along these lines, Jeffrey Brainard (2010) discussed the jump in industry funding from 2008 to 2009, noting, "The increase in industry's financing relative to the federal government's continued a multiyear trend that has alarmed some academic scientists and public-policy scholars. They worry that the corporate money will inevitably spur academic scientists to skew their findings to suit their sponsors' commercial interests." Perhaps the time has come to take these concerns more seriously.

IV. Cracks in the Foundation: Problems with the U.S. Research University

Despite the many great accomplishments of the U.S. research university, there are major problems rarely addressed in both the scholarly and policy arenas. These problems are deeply rooted within the historical development of the university; indeed, the contemporary U.S. research university reveals basic fault lines linked to each major stage of its development. These fault lines are interconnected and serve to limit the contemporary U.S. research university as a source of broad social and cultural contributions to society and global endeavors.

From the Germanic period, the U.S. university borrowed only parts of the Germanic model of investigation, while ignoring other important facets. For example, the U.S. model came to place great value on the empirical investigation of phenomena (often micro-phenomena), while placing much less emphasis on the critical philosophical facets of *Wissenschaft*. This equipped the U.S. university and its intellectuals for studying elements of the natural and physical world that could be easily operationalized, but at the same time limited their ability to pursue larger more complex social, cultural, and philosophical questions. Furthermore, in placing so much emphasis on that which is observable (in accord with logical empiricism and positivism), U.S. science limited itself to examinations of existent conditions, derailing the power of the imagination to envision additional possibilities. As a consequence of embracing such a narrow vision of science, scholars who push the frontiers of the imagination, as in advancing concerns about what “could” or “ought” to be, are quickly labeled as ideologues and easily ignored by vast waves of empirical scientists and their fiefdoms. There is a fundamental problem with this stance. To borrow from Albert Einstein: “Imagination is more important than knowledge. For knowledge is limited to all we now know and understand, while imagination embraces the entire world, and all there ever will be to know and understand.”

Although the U.S. research university came to contribute in vast ways to the development of the broader society—primarily, economically, technologically, and militarily—it lacked the tools, and most importantly, the commitment to adequately critique such forms of engagement. Certainly it is true that oppositional voices exist, including for example the student movements of the 1960s, but the impact of such forms of resistance has been relatively inconsequential. Entire fields have evolved to offer criticism reflective of a fuller vision of *Wissenschaft*, such as the fields of science, technology, and society (STS), cultural studies, and critical pedagogy, but scholars working in these areas are easily dismissed by waves of revenue-generating scientists grounded in more micro-level analyses of empirical phenomena. Although the contemporary U.S. university allows space for oppositional viewpoints, the credibility and influence of such perspectives are limited by an increasingly hierarchical professoriate and

university structure, wherein power and influence are garnered largely on the basis of connecting one's inquiry to the interests of government and/or the modern corporation. The truth of this reality gets played out every day on U.S. campuses. For example, at the campus level professors with huge government grants have much greater influence over institutional decision-making than other faculty, while critical voices lacking governmental and private funding must fight for the freedom simply to maintain an oppositional posture, often struggling against promotion and tenure policies that increasingly evaluate faculty on the basis of revenue generation.

From the World War I and II periods the university emerged as a fundamental tool to be used by political leaders for advancing the nation's military capabilities. Lacking the basic ability to thoroughly critique such ties, given the problems identified above, the U.S. university became implicated in the nation's colossal war machine and all its great and not-so-great accomplishments. This phase in the development of the research university resulted in its fundamental character being purchased and then refashioned by the U.S. federal government and its imperialist interests. As is clear to many critical scholars, including the likes of Noam Chomsky (2006), Seymour Melman (1970), and Gore Vidal (2002a, 2002b), U.S. military interventionism rarely represents the interests of the nation's people and more often than not serves the interests of economic and political elites. Thus, the university and its ties to the military industrial complex represent a fundamental betrayal of the people by policymakers and institutional leaders. What critical idealists might envision as the People's University, or the Democratic Emancipatory University, to borrow from Boaventura de Sousa Santos (2006), instead becomes the Government/Corporate University, framed by a paradigm of global hegemony to be achieved through military and economic superiority. Such a paradigm is foolhardy, for it sacrifices dialogue and understanding for domination. To borrow once again from Einstein: "Peace cannot be kept by force. It can only be achieved by understanding."

The fact that U.S. universities became so closely tied to military interests is clearly evident today. All one has to do is examine the key roles military-linked research centers and military-related funding play in the overall research and development enterprise at many major universities. For example, research revenues generated by the Applied Physics Laboratory (founded in 1942) at Johns Hopkins University, the Applied Research Laboratory (founded in 1945) at Pennsylvania State University, the Applied Research Laboratories (founded in 1945) at the University of Texas, and the Applied Physics Laboratory (founded in 1943) at the University of Washington play a major role in elevating these universities to research prominence. Indeed, John Hopkins University has been the top university in terms of research expenditures for the past few decades largely on the strength of massive military-related funding obtained by its Applied

Physics Laboratory, which generated nearly US\$ 1 billion in research spending in 2009 alone (Britt, 2010). Furthermore, entire academic fields such as engineering are largely dependent on Department of Defense funding (Neal, Smith, & McCormick, 2008, p. 185). Relatedly, Paul Forman (1987) made a rather convincing case that the field of physics and its practitioners have largely been enlisted and integrated into “the nation’s pursuit of security through ever more advanced military technologies” (p. 150). And the University of California has been heavily tied to funding from the Department of Energy, through its involvement in the Lawrence Livermore and Los Alamos national laboratories, the latter, emerging from the WW II Manhattan Project, is still “considered an official ‘weapons’ lab” (Neal, Smith, & McCormick, 2008, p. 123).

In a touch of irony, UC President Clark Kerr once lectured the students of Berkeley for turning to violence as an aspect of the ongoing Berkeley student movements, noting, “The University supports the powers of persuasion against the use of force ... the constructive act as against the destructive blow” (Kitchell, 1990). The contradiction here is that at the same time President Kerr was admonishing students about the university representing a peaceful solution to social problems and political tensions, he helped to position his own university as one of the leaders in servicing the federal government’s nuclear weapons laboratories, involving the university in the direct development of weapons of mass destruction at Los Alamos. Despite Kerr’s actions, I believe his words are instructive: Universities ought to place great value on world peace and in promoting peaceful solutions to conflict; in effect, they need to recast themselves as the universities of the people, focusing less on the technological and scientific destruction of the world and looking more to social and cultural advances offering hope for global peace. This is consistent with the higher-order thinking that universities ought to represent. Hence, one of the fundamental flaws of the contemporary U.S. research university is its deep ties to militarism and its support for violent resolution to international conflict.

In raising questions about the Pentagon’s proposed Minerva Project—a Defense Department program designed to engage social scientists in field work in occupied regions such as Iraq and Afghanistan—MIT anthropologist Jean Jackson, writing in 2008, articulated some of my concerns quite succinctly:

The U.S. university system is already highly militarized, that is, many universities take in a large proportion of their research funding from military sources. This is problematic for four reasons: a) The fields so supported are distorted by focus on issues of utility to war making. Whole fields of study hypertrophy and others shrink or are never developed as researchers are drawn from one field into the other, Pentagon-desired ones. Nuclear and other weapons research related areas grow, at the expense of environmental research, for example. Moreover, theory, methodology, and research goals in such fields as

physics, computer science, and engineering after decades of military funding now operate on assumptions that knowledge about force is paramount; b) These research foci begin to structure what gets taught to students and what research projects students themselves see as the best options for their own work. A brain drain from other research directions occurs; c) The dependence on single sources of funding with their own agenda tends to reduce intellectual autonomy in ways that go beyond the selection of subject matter for research; d) The University becomes an instrument rather than a critic of war-making, and spaces for critical discussion of militarism within the university shrink.

The Minerva Project sought to widen an avenue already firmly paved—one leading directly to the university’s front door. This recent Pentagon plan sought to implicate social scientists in greater numbers in the service of military domination—essentially to join, albeit in smaller numbers, many of their colleagues from the other side of campus. The logic seems rather straightforward here—entice greater numbers of social scientists to military-oriented federal research projects, while at the same time minimizing potential resistance and criticism deriving from scholars operating in these same fields. Just as many natural and applied scientists (e.g., engineers) had once been enticed by increased “succor” from the federal government, as Geiger (1986) noted, perhaps the Pentagon could also “win over” more social scientists.

The third phase in the development of the U.S. research university served to tie the fundamental mission of the university to business and industry, thus adding the private sector to already existent federal ties. Again, lacking the ability and commitment to thoroughly critique such a development, the university became beholden to the private sector in ways that often compromise its broad responsibility to the people, including its obligations to organizations and groups less able to purchase its talent and resources. Interestingly, student activists of the 1960s saw some of the shortcomings of the multiversity and expressed their opposition in loud and impassioned tones. Mario Savio, a student leader at UC Berkeley, became one of the best known critics of the emerging multiversity and called on students to take action against what he saw as UC Berkeley’s growing ties to business and industry: “There is a time when the operation of the machine becomes so odious, makes you so sick at heart, that you can’t take part; you can’t even passively take part, and you’ve got to put your bodies upon the gears and upon the wheels, upon the levers, upon all the apparatus, and you’ve got to make it stop. And you’ve got to indicate to the people who run it, to the people who own it, that unless you’re free, the machine will be prevented from working at all!” (Kitchell, 1990). U.S. college students may benefit structurally from their organizational location, given their limited investment in the existing university, and may be better able to challenge its basic operations (Rhoads, 1998, 2009). More recent cases of student opposition to university investment in South Africa

(mostly during the 1980s) and Darfur, as well as general opposition to neoliberalism are noteworthy (Hirsch, 1990; Rhoads, 2003; Slocum & Rhoads, 2009). But here my argument should not be interpreted as letting faculty off the hook; indeed, we must take a good deal of the blame for the current rendition of the research university, and likewise, we will need to assume high levels of responsibility if the U.S. version is ever to be recast.

The student activists at Berkeley were successful in gaining increased student rights but they were unable to alter the fundamental direction of the university and its growing courtship with business and industry. The fundamental flaw of this phase is linking the university so tightly to private money and the interests of those capable of generating income for the university. In essence, the university's key resources—its best minds—became guns for hire by the highest bidder in a development that established the commercial foundation for the contemporary university, taken to new levels under the helm of Ronald Reagan and the rise of neoliberal ideology.

In some ways, the problems associated with the fourth phase of the development of the U.S. research university are simply an intensification and deepening of issues emerging during the third phase. But what distinguishes these two phases to some extent is the emergence of neoliberal ideology and the widening of the gap between the research university and its broader social responsibility. Consistent with Friedman's thinking, greed is to be a foundational element of neoliberalism in that greedy people produce innovative thinking, new ideas, and opportunities for growing wealth. Such a view, supporters argue, leads to job creation and hence financial benefits will trickle down from wealthy investors and entrepreneurs to the masses. A common saying consistent with such an ideology suggests that "a rising tide lifts all boats," although Jerry Mander (2006) argued that only yachts are actually lifted, while Robert Rhoads and Katalin Szelenyi (2011) pointed out that poor people typically do not own boats.

In the context of the neoliberal phase, the university is often tied to the corporation because of the revenue-generating potential that such linkages offer (Giroux, 2002, 2007; Lazerson, 2010; Rhoads & Rhoades, 2005). If we are to give any merit to Joel Bakan's (2004) argument that corporations have a pathological quality to them rooted in excessive greed, then under the neoliberal regime, where profit is placed over people, to paraphrase Chomsky (1999), the university becomes aligned with an aspect of U.S. society that arguably is pathologically ill. This "sick" quality of the contemporary neoliberal context is also reflected in Naomi Klein's (2007) depiction of the present-day rendition of global capitalism as "disaster capitalism," wherein the gaps between wealthy and poor grow ever wider.

Many examples of the pathological ailments of the U.S. research university exist to support my position here. There are countless examples of

university medical scientists using public-supported laboratories for drug research only to have their findings used to further the bottom line of a co-sponsoring pharmaceutical company, primarily through the eventual manufacturing of a highly over-priced “me-too” drug, comparable to others already on the market (Angell, 2004). Similarly, scholars are regularly denied opportunities to publish findings and advance scientific knowledge beneficial to all due to corporate demands for preserving secrets and/or protecting potential market opportunities (Lea, 2010). Cases exist of corporations buying influence into university academic programs so as to establish control over research decisions, such as the Novartis example at UC Berkeley, where the company gained two seats on the department’s research committee (Washburn, 2005). Also, there is evidence that corporations and/or their political supporters have attempted to interfere in the work of university law school clinics (Kuehn & Joy, 2010), undermine research on global warming by academic scientists (Halpern, 2010), and disrupt academic research on the 2010 British Petroleum (BP) oil spill in the Gulf of Mexico (Lea, 2010). There are cases of “covert payments from drug and medical-device manufacturers to physicians and medical researchers” (Greenberg, 2010), as well as physicians prescribing certain drugs to patients and then receiving benefits from the same companies sponsoring those medications (Harris, 2009; Kassirer, 2004). And then there is the case of Texas A&M University adopting a spreadsheet based reward system in which faculty promotion and salary decisions are analyzed on the basis of value-added, with “value” defined simply as money; in other words, those faculty who bring in the most tuition dollars (presumably, those who teach the largest classes) and those who bring in the most grant/research revenue, get the biggest salaries and merit increases (Mangan, 2010). Obviously, there are grave problems with such a short-sighted schema.

All of this points to a research university with fundamental cracks in its basic foundation. Short-term solutions are attempted, such as developing conflict-of-interest research policies, but at the heart of the matter is a serious inability for self-reflection and self-criticism. Add to this the reality that the cash flow is often so great that any hope of generating enough force to confront the problems is lost amidst a sea of revenue. What one sees then is how a narrowly defined view of science, of intellectual life, has helped to focus the university on the needs of industry and militarization, situating the U.S. research university as a key player in advancing the pathological ailments of the modern corporation and an out-of-control military industrial complex.

V. Implications for Global Higher Education Policy

The historical development of the U.S. research university has resulted in its interests being tied to military conflict and corporate greed versus building and

sustaining peace and furthering a collectivist vision supportive of disenfranchised and marginalized groups. These outcomes are the consequence of partial adoption of German intellectual ideals combined with hyper-empiricism resulting in the inability of the U.S. research university to critically reflect and remap its own development. Being cognizant of historical developments and their impact on the contemporary rendition of the U.S. research university can benefit policymakers, institutional leaders, and faculty seeking to chart a new course for their nation's top universities.

What is clear by any objective analysis of U.S. research universities is that they have produced dramatic results. As already noted, the research revenue generated by U.S. research universities is staggering and the scope of scientific discovery and invention is both far ranging and immense. Several lessons can be drawn from their success. First, federal funding has been strongly tied to rigorous peer review and intense competition. This has helped to create market-like conditions that arguably contribute to the innovative and entrepreneurial quality of U.S. academic science. Such procedures are worthy of study and potential emulation. Second, close ties developed with industry are not all bad; such ties need to be examined for the positives they generate, including the ways in which such connections push university scientists to seek relevance in their work. In this regard, I note a subtle difference between being relevant versus being controlled by industrial and corporate interests. I applaud those universities and university scientists able to avoid the latter, but believe this is the exception and not the rule. Third, scholars from around the world have had a major influence—by far mostly positive—on the development of the U.S. research university, and hence, internationalization must be recognized as a great strength; this was particularly important during the development of U.S. universities in the 1930s and 1940s. Finally, one cannot ignore the key role high levels of academic freedom have played in enabling U.S. scholars and scientists to explore unpopular ideas and generate a multitude of innovations and creative analyses, although certainly such ideals have come under serious attack over the years, including recent assaults from the political Right in the United States (Rhoads, 2007).

The aforementioned strengths often are overshadowed by the negatives outlined in this paper. The following key points relative to the problems of the U.S. research university must be considered before serious mistakes are made in the adoption of various aspects of the U.S. research university system. These points also serve as important considerations for attempts within the United States to re-structure the present rendition of the research university.

First, a broad and integrated view of science and intellectualism should be adopted; university inquiry should not be as narrowly defined as it presently is in the United States and should embrace the original Germanic ideals of serious intellectual pursuit across a variety of fields, including those with strong social

and cultural implications. Relatedly, philosophy and science should not be so divided, but instead should be part and parcel to deeper forms of inquiry. The imaginative capacities of metaphysical thought must be front and center, as opposed to operating only on the margins of institutional existence.

Second, critical reflective capacities must be incorporated into notions of academic science. University inquiry should not be limited to simply that which can be reduced to an operationalized hypothesis in the name of a narrow-minded and short-sighted version of science. I see this as a form of anti-intellectualism akin to Habermas' (1971) criticism that logical positivism lacks critical reflective capacities.

Third, there must be a clear recognition and pronouncement, embodied by institutional policies and practices, that the modern university embraces peaceful means to resolving national and international conflict; this is the kind of high-level thinking we ought to expect of universities and their key personnel. Relatedly, it must be made clear that the modern university's research enterprise cannot be used to support further militarization. In a sense, the shortcoming identified by my second point above has largely produced this problem. That is, the U.S. university has brought many of its top minds and highest forms of pseudo-scientific inquiry to bear on the development of the greatest military and most devastating weaponry the world has ever seen; and yet the university, given the preponderance of reductionist thought masquerading as academic science—thought that can produce testable hypotheses toward advancing weapons of mass destruction and “me-too” feel-good drugs targeting the wealthy—lacks the critical reflective capacities to question whether university resources—the peoples' resources—should be used in such a fashion.

Finally, the university must be defined as a resource of and for the people, as opposed to its slow but steady sale to private interests, including those of the military industrial complex, enacted through federal research programs; universities and their vast resources should not be bought and sold by the highest bidding corporations (and governmental programs acting on their behalf). Instead, universities, much like judiciary systems, ought to be supported by public revenues, given the need to protect and advance their vital service to the public good and in order to serve the needs of groups and organizations incapable of funding them (Santos, 2006). Related to this point, universities and their scholars ought to concern themselves with economic development, but not in a manner largely determined by the modern pathological corporation.

The challenges before nations seeking to upgrade their universities are immense. Academic research is an expensive enterprise with many demands and complex problems. If a nation's top universities are to better serve the social, cultural, and economic needs of their respective citizens, policymakers, institutional leaders, and faculty will need to more thoroughly consider the sort of

innovative spirit common at many top U.S. research universities. However, in looking to the U.S. model, reform leaders will be well served in adopting a critical stance with the goal of potentially avoiding (or reversing) some of the pitfalls that have produced such serious cracks in the foundation of the contemporary U.S. research university.

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