GROWING RESEARCH FUNDING IN EMERGING AND DEVELOPED RESEARCH UNIVERSITIES

by
Katherine G. Hutton

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Approved by:

Dr. Sarah Hopton, Thesis Director

Dr. Olga Menagarishvili, Reader

Dr. Wendy Winn, Reader

Dr. Jennifer Wilson, Departmental Honors Director

Abstract

GROWING RESEARCH FUNDING IN EMERGING AND DEVELOPED PROGRAMS AT RESEARCH UNIVERSITIES

Katherine G. Hutton

Director: Dr. Sarah Hopton

This thesis investigates the research funding patterns at ten doctoral universities across the country, classified by Carnegie as R2: Higher Research Activity institutions. Findings detail patterns in funding and research growth and the relationship between research administrators and funded projects. This mixed methods study uses quantitative and qualitative data to examine each of these universities' total award dollars received in the FY2017 and compares the top three departments funded and how funding may relate to the research administration missions of each research office. I also analyze the source of research dollars, including federal and other external sponsors, and the percentage of proposals submitted versus those awarded. Overall, this paper encompasses and conceptualizes the complicated, competitive grant process at the university level and argues that in order for administrators to increase access to research dollars, they should: understand the funding climate, stay connected to their institutions' community of scholars, and encourage scholars to conduct scholarship that drives opportunity, innovation, and change.

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Introduction

Institutions of higher learning provide the resources and training that faculty need to conduct scholarship that expands knowledge. New knowledge-creation is important to campuses, communities, and the world, as it has broadened our understanding of the human condition and how the world works. Staffed by trained scholars from a wide range of fields, universities provide faculty with the platform, training and the tools they need to conduct meaningful research within their fields and through interdisciplinary collaboration. Driven by an idea, a product, a concept, or a cause, professors and faculty conducting research are often dedicated to their project, but might lack the experience or access to funding sources needed to effectively carry out that project. In most cases, faculty research projects require outside funding which often comes from federal and state agencies, foundation grants, or fellowship programs. These funding sources are complex and pose arduous tasks for faculty, even as grant-writing is essentially a requirement for faculty to fund the research necessary to create knowledge and secure tenure. Thus, the better a research department understands granting processes specific to each granting institution, the better these departments can help faculty secure grants and the more knowledge can be created across disciplines.

The academic research department staff at research institutions play a critical role in grant awards to faculty; they staff research and offices of sponsored programs, and provide faculty researchers the tools they need to complete competitive applications and deliver on successful awards. Grant dollars, in turn, funds university research goals and enable universities – even small universities – to innovate and create, effectively advancing science, technology, and artistic achievement, important and worthy aims.

But, the complexity of the granting process, unequal distribution of staff and resources at various institutions, and mismatched missions and research goals, makes for a fuzzy understanding of just how the process really works. After I preview the granting process, explain the nuances of various granting institutions, I will then compare and contrast various financial and narrative data points (awards per category/year and institutional mission statements) to attempt to close the gap in our understanding of which institutions get the most grant dollars; which sources give the most grant dollars; which kinds of scholarship are funded; and whether staffing and missions affect these metrics.

Literature Review

In 2013, the United States led the world in overall research and development expenditures spending $450 billion on research carried out by resident companies, research institutions, university and government laboratories. In the same year, the European Union and China each spent slightly less ($350 billion) and Japan just over $150 billion (Haley 21). To maintain our status as a world leader in research and development, the United States must strengthen its core centers of research, which are principally the colleges, universities, and research institutions that generate new scientific knowledge. These institutions are uniquely capable of conducting research. Further, scholars at these institutions are charged with the responsibility of conducting research that both conserves and creates new knowledge, imparting that knowledge to students, and maintaining commitments to ethics and integrity in research (Haley 15). To fund such ambitious endeavors, public, private, large and small colleges and universities alike must seek funding for research; the more award dollars granted, the larger the research enterprise and institutional prestige grows.

Scholars do not typically navigate the complex process of granting and submission in isolation though. The conduit between faculty and grant dollars is typically the research administrator and staff, often (though not always) academics themselves, who are skilled in research methods or offer significant experience with funding agency protocols and processes. These administrators work with faculty in both pre- and post-award capacities. Their goal is to help faculty become more familiar with the complex research infrastructure unique to each granting institution, and to better understand how their role as administrators can impact the research enterprise and the outcome of faculty proposals.

With thousands of colleges and universities across the country, variance in the amount of award dollars granted would not be unusual. But, what, exactly, accounts for the variance: university structure, sponsor politics, departmental resources, individual project capabilities, or the focus and effectiveness of research administration offices? Why is it that some institutions dominate the university grant "game", bringing in hundreds of millions of dollars in research funding annually, while other institutions of similar scale and scope, may only generate enough funding for the barest of research programs?

In her book, *Grant Writing for Educators*, Beverly A. Browning calls grant seeking and awarding a "game" because "It's a competitive endeavor requiring skills, strategy, persistence, practice, and the desire to come out on top" (5). She argues, "Some schools win the grant game, while others lose. The winners take the grant game seriously, and they take a serious portion of the grants doled out by grantmakers" (5). Although institutional leaders may read this and bristle at the thought of game-playing for research dollars, many have decided grant-winning is a critical institutional goal and are willing to at least try and make the shot. But, how does an institution increase the number of shots it attempts?

Some argue that research funding disparity between institutions in the United States is exclusively due to limited resources; there's just not enough money to go around, but Henson and Browning believe that through strategy, persistence, patience, and a desire to be successful, a college or university can attract discipline faculty, encourage high-yield faculty research, increase credibility among granting institutions, and thus grow funding dollars for research. With billions of dollars in grant money on the line, and ever-increasing pools of money diverted to capital costs, this is a worthy endeavor, and one the higher education system in America is, perhaps uniquely poised to undertake. As Paul Chapin explains in *Research Projects & Proposals*, "A great deal of money is available to support scientific research in the United States, and a cultural system has evolved to manage its distribution" (1). While this system is no more complex than other cultural systems in our society, it does have its own norms, traditions and procedures, and those who wish to participate in that system, must learn its nuances. In example, the best research administration offices are organized, efficient, and focused. Thus, to increase competitiveness, smaller institutions might consider ways to increase organization, efficiency and focus among research administration staff in sponsored program offices. Although there is available data on research dollars awarded by federal and foundation sponsors and a classification for universities that conduct higher and lower levels of research, there is only limited amount on the effect and influence of those administering these dollars. As Kerridge and Scott point out in their article published in the National Council of University Research Administrators (NCURA) Magazine, "Ironically, there is little research done on research administration" (44). A dearth in available research on the impacts of administrative vision and mission might be due to the many variables that make-up university research including the variances in structural differences of institutions across the county, making it

difficult to research university enterprises and administration on a large scale. But, it's important to at least ask whether soft-skills and hard-to-qualify factors like office mission and leadership styles contribute to the amount of award dollars granted.

A Brief Overview of How Federal Funding Works

External funding for research, most commonly in the form of research grants and contracts, is essential to the health and vitality of all research organizations (Haley 20). The federal government of the United States is the largest single source of grant funds in the world funding colleges and universities billions of dollars each year in money for research. (White 35). In FY 2017, they awarded over $700 billion in grants and cooperative agreements (Grants.gov). Public and private universities alike are dependent on the federal government's support and within academic research. In fact, six agencies provide over 92% of these funds, so it is critical that administrators understand how these federal granting divisions work (Haley 22):

1) The Department of Health and Human Services (55%, the majority of which is supported by the National Institute of Health);
2) The National Science Foundation,
3) The Department of Defense,
4) The Department of Energy,
5) The National Aeronautics and Space Administration (NASA), and
6) The Department of Agriculture (Haley 22).

Though these federal agencies offer the largest pots of research money, they are also often the most competitive grants requiring rigorous proposal development. Even so, for

ambitious institutions, or those charged with high-productivity goals, like Charles Vest the previous professor and administrator at University of Michigan, visiting faculty member at Stanford, and President of MIT, federal-government-university partnerships can transform universities. "[This] has been remarkably productive, and has made us the unquestioned world leaders in research-intensive education" (26).

In his book, *The American Research University from World War II to World Wide Web*, Vest explains how, in the period following World War II, the United States led a step-change in the federal government's role in supporting basic science and research. In the 1950's, the federal government established itself as the largest source of research and development funding to colleges and universities, and maintains that title and responsibility. Today, Vest calls this university-governmental relationship the "lifeblood" of university research and graduateeducation enterprises (9). Understanding this history and developing relationships with federal agencies is vital for research administrators working to grow their institution's research enterprise.

Not all faculty research proposed is funded and not all faculty research proposals are advanced to the most competitive funding opportunities. In order for researchers to develop research projects, they must complete a rigorous proposal process that is often in-house first and includes extensive and detailed budget preparations. For their institution to advance their application over other submitters, the project must be intriguing, must influence their field and create new knowledge, and must be financially feasible. An institution can often only propose one grant from each department to these federal agencies, so there is an internal peer-review process faculty must complete *before* their proposal is advanced to the granting federal institution. Both are difficult processes that many faculty and administrators find challenging to

navigate because many universities do not provide public access to grants or grant related documents. Some federal agencies provide access to previously awarded applications, but they are often incomplete or irrelevant to the current grant call, do not include financials, and many granting institutions do not collect and catalog past recipients at all. Therefore, the most progressive and efficient research offices should keep grant applications (successful and unsuccessful) and make they available to faculty to use as a model and will catalog applications from federal agencies so they understand where grant dollars are going at the institutional level and can focus their research strategy on working to provide faculty with the supporting documents they need to make their applications competitive and, hopefully, successful.

A Brief Overview of How Foundation Funding Works

There are thousands of different sources of external support and hundreds of billions of dollars are distributed annually for research, development, scholarship education and training, and procurement (Chronister & Kulakowski 150). Beyond federal agencies, foundations and corporations play a key role in faculty research. These private, not-for-profit organizations earmark dollars for research, development and philanthropy and also provide colleges and universities across the country with millions of dollars in grant award dollars every year (Browning 7). In 2017, as an example, the private Bill & Melinda Gates Foundation directly supported grantees $4.7 billion in research funding. Included are research universities and institutions across the nation that received award dollars to conduct a range of projects: global development and nutrition research at University of California, Davis ($1.3M), global health research at Cornell University ($1.4M), K-12 education research at Texas Tech University, and malaria research at Columbia University ($1.1M) to name a few (Gates Foundation).

There are two main types of grantmaking foundations: private and public, a designation that is based largely on the tax regulations that apply to them. Independent foundations, often called family foundations, for example, are the most prevalent type of private foundation and in turn, provide colleges and universities with the most foundation-supported research dollars. Established by an individual or family through gifts or bequests, these foundations, vary in size, style of operating, and grant-making interests (Foundation Center 3).

Like independent foundations, corporate foundations often operate grantmaking programs in the arts, community development, education, or human services. However, corporate foundations receive their assets from a publicly held company rather than an individual or a family as an independent foundation would (Foundation Center 5). Because private independent foundations can have a narrow bases of support, they are subject to federal laws and regulations intended to assure that they service the public common good, which includes protecting the money allotted for research and grantmaking (Foundation Center 2).The Carnegie Corporation of New York, the Chicago Community Trust, the Duke Endowment, and the Rockefeller Brothers Fund are among the nation's top private grantmaking foundations, contributing billions of dollars together for research projects. The Carnegie Corporation of New York, for example, supports four key program areas, including Education, Democracy, International Peace and Security, and Higher Education and Research in Africa (Carnegie Corporation). The Duke Endowment focuses on supporting Higher Education, Health Care, Rural Church, and Child Care (Duke Endowment). Institutions like these are an important asset for the research administrator, who would be wise to facilitate relationships with the organization and perhaps visit with the organizational leadership to better understand the kinds of opportunities that exist and the sorts of research the institution typically funds.

The Carnegie University Research Classification System

No two colleges or universities are exactly alike: they offer different degree programs, different student-to-teacher ratios, and attract different kinds of students and have different staff sizes and administrative missions. In parallel, every universities' research infrastructure will vary as well, making it difficult to assess a university's research impact. For instance, although Appalachian State University is a moderately sized state university with a total enrollment of about 19,000 students and categorized in the highest level of athletics as a member of the NCAA Division I Sun Belt Conference, one might assume that similarly sized and athletically situated universities would also mirror Appalachian's research production (Appalachian State). That assumption would be wrong.

The University of South Alabama, in example, is also a member of the same Sun Belt Conference, a bit smaller than Appalachian with 15,000 students enrolled, but secured over $42 million *more* in research funding than did Appalachian in FY2017 (University of South Alabama). Why?

This was a question my colleagues and I asked this summer, when, while working as a research administration assistant, I was tasked with finding data that would help make sense of these disparities and help shape Florida Atlantic University's five-year growth strategy for its Sponsored Programs department.

The *Carnegie Classification of Institutions of Higher Classification* was developed in order to group institutions exclusively in terms of research. Beginning in 1970, the Carnegie Commission on Higher Education developed a classification of colleges and universities to support its program of research and policy analysis (Indiana University Center for Postsecondary

Research). Updating these institutional classification every five years, this system classifies doctoral universities, master's colleges and universities, baccalaureate colleges, associate colleges, special focus institutions, and tribal colleges by volume of research activity.

Focusing on same classification doctoral group as Florida Atlantic University, this thesis will compare research data and administration at ten R2: Higher Research Activity institutions. Analyzing fiscal year 2017 data, *Table 1* presents the research institutions and the amount of dollars in total awards received, beginning with the institution that received the most amount of research funding and concluding with the institution that received the least funding.

Research Problem

Academic research begins at the department level and it can be difficult for colleges and universities to produce the same amount of research (or more) each year. Many research offices, like FAU, construct five-year growth plans or scout peer institutions to try to grow research opportunities for faculty. Creating such opportunities is what Vest describes as "best" about American-higher education and, it's ultimately what society expects from universities (5). Even so, as Birx argues in, "Growing an Emerging Research University", such expectations are tough, particularly for emerging research universities who may be under-funded. "A challenge for any emerging research university is how to best use the limited resources it has available to address the region's and nation's current gaps in education while undertaking a comprehensive effort to transform the collective research and development enterprise in a manner that increases its competitiveness and innovation capability" (13). In other words, funding for academic research is competitive and universities must generate both opportunity and administrative support if they are going to grow their research communities. Tough for colleges small and large, administrators can wear many hats, represented through the title of The University of Central Florida's research

office presentation, “Stress & the Research Administrator: Is Research Administration Bad For Your Health?” (Shambrook & Greene). But these jobs, although they can be overwhelming, are vital in the university grant process and in helping institutions increase their capability and impact.

Figure 1 represents each university’s total annual award dollars received in a graphic that effectively presents the funding gaps for the visual thinker. Although categorized in the same research classification, it is easy to see that some of these ten R2: Higher Research Activity institutions in this sample varied by tens of *millions* of annual research award dollars received. “When funding agencies do prefer directing their resources toward larger institutions it is often because of the credibility of the particular institution” (Henson 4). So, how do smaller colleges and universities that are still classified research institutions but lack the capacity and talents of a large school increase their research credibility and thus win more award dollars?

Other questions this research considers include: how much variance in funding should one expect within the same research classification, and are these millions of dollars in difference unevenly allocated; if so, why? Finally, does the role of the research administrator influence these results and if so, what steps can be taken to increase an institutions’ research enterprise?

Methodology

The universities in this sample were selected because they were established research institutions whose award dollars were big enough to compare, available for comparison, and also because their classifications were comparable. Utilizing the Internet, I collected digital samples

(mostly PDF reports) of university financial award reports for the fiscal year 2017. These reports were gathered and downloaded from each individual university's institutional website. Most were found on Research and Sponsored Programs department websites.

This thesis focuses on those institutions that have been classified by Carnegie as the highest of the basic classifications: doctoral universities. These are defined as those that award at least 20 research or scholarship doctoral degrees a year (Indiana University Center for Postsecondary Research). Within the Carnegie classification, doctoral (R) universities are subgrouped into one of the three doctoral university levels:

R1: Highest Research Activity,

R2: Higher Research Activity, or

R3: Moderate Research Activity institutions.

This institutional classification is calculated through research activity. I chose to study doctoral universities because of my position in the Sponsored Programs department at Florida Atlantic University in Boca Raton, Florida, which is classified as an R2: Higher Research Activity institution.

In researching over 100 R2 institutions, I realized that many colleges and universities opt to keep their numbers private and do not publish their annual research financial data online, presumably because this information offers the institution a competitive advantage when playing the highly competitive grant "game". The institutions selected where also then, in part, selected because their financial award data was publicly available.

Like the awarded dollars received or the organizational structure of each university research office, these financial reports varied in design, layout, and format. Some documents were to the short and succinct, featuring only numerical data with no narrative context. Other

reports were bloated with text, graphs and narrative. Sourcing the data was unique to each institution and it was challenging to determine where this information was located on the university's website.

As noted elsewhere in this thesis, few research studies compare institutions within Carnegie classifications in terms of research award dollars. By looking at these numbers, however, and in considering the possible effects of administrative mission, I seek to add insight to the conversations and practices around how institutions can grow their research impact.

First, I first narrowed focus of analysis to each university's *total research dollars* for fiscal year 2017. This data is not based on research expenditures, or how much the university spent on research, but rather, how many external award dollars were actually received from outside sponsors in 2017.

Despite this pragmatic move, I want to note that when thinking about research through the lenses of a research administrator, it is unfair to simply compare total dollars between institutions, even within the same Carnegie classification, because each university offers a different slate of faculty researchers or proposed projects, both of which can wildly influence award numbers. In example, the University of Maine was heavily funded by the U.S. Department of Commerce and the National Science Foundation partially due to their distinctive programs that many colleges across the country do not offer. Highest funded in FY2017 was the College of Natural Sciences, Forestry and Agriculture, which encompasses its unique Marine Sciences department that brought in $9.3 million research dollars (Office of Research and Sponsored Programs). Some colleges, however, will receive zero dollars for marine researchers, not because they aren't good enough, but because they simply do not have a marine sciences departments.

So, in addition to inspecting each university's total award dollars, I also analyzed each university's *top three most funded departments* and assessed how much each of those fields/departments secured for the institution. As Birx points out, "Organizationally, universities are often designed with discipline-based approaches to education and research" (26). In any department, academic research requires both a researcher and a research administrator. Collecting data on the amount of money researchers' projects were awarded and through which disciplines and departments, my analysis attempted to measure research in terms of the researcher by their efforts, quantified in terms of award dollars received. In order to measure other possible driving forces affecting award receipt, I also downloaded, compared, and analyzed each office's mission statement versus its annual funding outcome.

To remain consistent, these mission statements were sampled from the same offices that produced the financial award reports. Evaluating the language used in each isolated mission statement was important to determine if the statements were aligned with the vision of each office and if they positively correlated (or not) with the overall success of each institution's annual award dollars. These themes were determined by comparing each mission statement alongside each other and finding keyword commonalities between at two or more schools. Analyzing this data helped to connect research administration leadership and institutional status or credibility with growth and growth potential for the university research enterprise. Overall, this mixed methods study relied on both qualitative and quantitative data my conclusions are supported through analysis and numerical comparison.

Comparative Financial Analysis

Total Award Dollars Received

Table 1 shows the amount of funding dollars each university was awarded in FY2017.

Table 1. *Total Award Dollars Received*

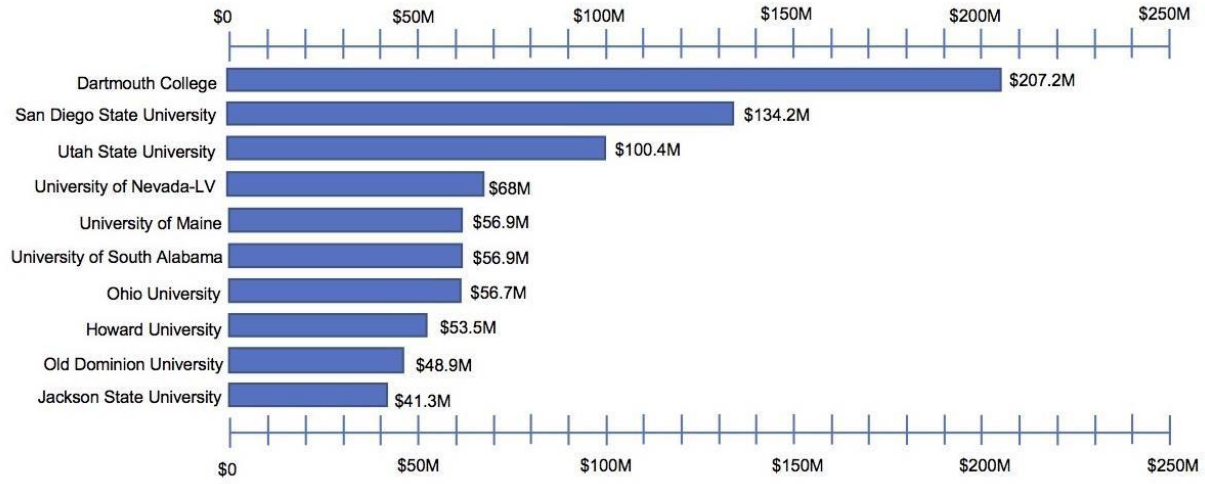
R2: Higher Research Activity Institution	Award Dollars Received in FY17
Dartmouth College	$207,251,765
San Diego State University	$134,264,146
Utah State University	$100,467,390
University of Nevada-Las Vegas	$68,095,941
University of Maine	$56,956,782
University of South Alabama	$56,985,147
Ohio University	$56,754,519
Howard University	$53,500,000
Old Dominion University	$48,998,025
Jackson State University	$41,399,589

It is clear that although the 10 sampled universities are classified in the same R2 higher research category, the total award dollars distributed among them varies dramatically. Dartmouth College, in example, earned over $165.8 million *more* than Jackson State University in FY17, even though other variables were proximal. Such a large variation in funding could be due to many different factors including university structure, sponsor politics, departmental resources, individual and project capabilities, or the focus and effectiveness of research administration program offices.

With over 3,000 4-year universities in the United States, it is important to understand that the 107 institutions classified as an R2: Higher Research Activity institutions are a part of the top 3.5% of institutions in the nation that drive academic research and innovation forward (U.S. Department of Education). All 10 of these institutions were awarded over $40 million during fiscal year 2017 and *Table 1* represents roughly 10% of the total number of R2: Higher Research Activity institutions in the country with average external funding received in this sample being $82.4 million. The median of total external funding, however, was $56.9 million, which also represents how wide of a range the differences in external funding was for research at the university level, even within the same R2 research classification.

As one can see in *Figure 1*, most of the R2 research institutions fall under the $100 million mark, but there are a few universities that received exponentially more money for research in FY2017. Could this be due to the fact that some universities, possibly due to size and other resources, like larger research administration staffs, are simply not applying for as many grants as other high-award institutions like San Diego State or Dartmouth College, are?

Figure 1. *Total Award Dollars Received Visual*



Percentage of Proposals Awarded

In order to investigate this funding variance and whether or not some institutions, like Howard University, who brought in $153.7 *less* than Dartmouth College, were simply not receiving as many award dollars because they were not able to submit as many proposals for funding, I investigated the total number of proposals submitted and total number of awards received in FY2017. Six of the 10 R2 institutions in the sample published this data in their financial award reports shown below. *Table 2* is each institutions' percentage of proposals written versus those funded. The research institutions are listed by the percentage of proposals awarded in FY17 beginning with the highest:

Table 2. *FY17 Proposals Submitted and Awards Received*

R2: Higher Research Activity Institution	Proposals Submitted in FY17	Awards Received in FY17	% of Proposals Awarded in FY17
San Diego State University	1094	783	72%
Howard University	426	302	71%
Dartmouth College	1053	730	69%
Ohio University	727	476	65%
University of Maine	575	354	62%
University of South Alabama	517	298	58%

Although not all ten institutions shared this information, the six institutions that did provided encouraging numbers for researchers and administrators in terms of the percentage of proposals awarded in FY17. Over 50% of *every* institution that submitted a proposal received funding. Five of six (or over 83%) of the sample institutions indicated that over 60% of their

submitted proposals were funded, with San Diego State University's percentage being the highest – an astounding 72% of their submitted proposals receiving an award.

The data also suggests that there isn't necessarily a correlation between how many grants are submitted (or how big the institution) and the percentage of grants submitted that are funded. For example, although San Diego State University submitted 1094 grants with 72% of them funded, Howard University submitted less than half that number (426) but only trailed by 1% in percentage of proposals funded. So, bigger is not necessarily better.

Top Departmental Funding

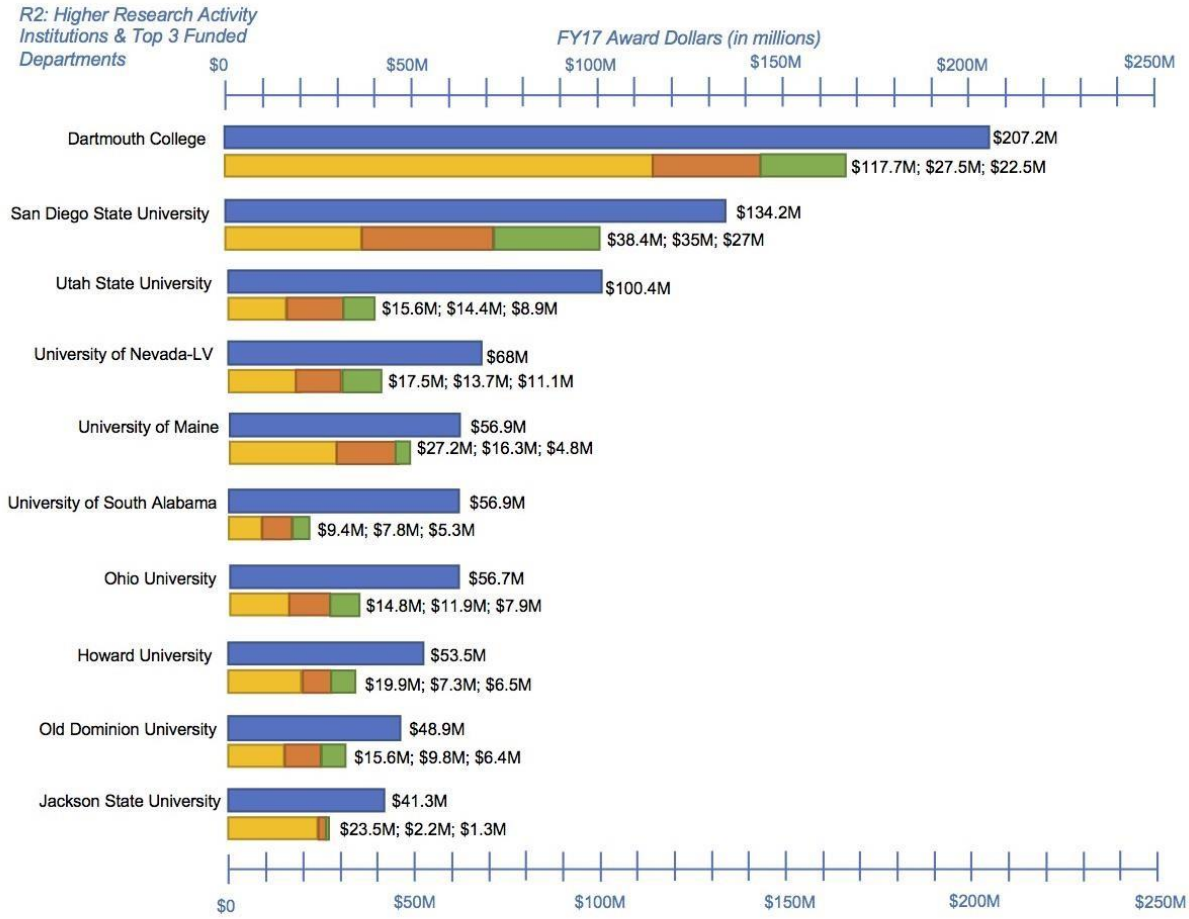
American research institutions assume a lot of responsibility in completing meaningful, ethical, and innovative research when a grant is funded. It is important for research administrators to track how many dollars are received across categories and to compare that with the university's own institutional talents and priorities to maximize a return on investment of time. Jackson State, in example, was awarded their heftiest funding federally through the National Science Foundation (NSF), the Department of Education, and the National Institutes of Health (NIH). This makes sense given these funding sources align with the focus of the institution, which has a College of Science, Engineering and Technology; School of Public Health; and College of Education and Human Development, which collected 65% of their total awards. *Figure 2* shows each of the sampled 10 R2 institutions and their total award dollars in blue compared with their three highest funded departments in yellow, orange and green respectively.

In 2014, over half of the academic research funds (59%) were expended in the life sciences, a broad discipline that includes biomedical, biological, and agricultural sciences.

Engineering received the second highest share of grant funding (17%), with other fields receiving only between 1% and 7% of academic research funds in 2014, including the computer sciences, environmental sciences, mathematical sciences, physical sciences, psychology, and social sciences (Haley 23).

Based on this trend, one would expect to see familiar figures in my sample. Per *Figure 2*, 80% of the top funded departments were in the life sciences with exceptions at Ohio University and Utah State University where the top-funded departments were in the College of Engineering and Technology and the College of Education, respectively. Seven out of 10 R2 grants in this sample (70%) included research in Medicine and the Health Sciences. Not coincidently, the National Institute of Health (NIH) is the leading federal funding agency, partnering with universities to ensure they receive the funds they need help improve and save lives, providing principal investigators an average research project grant of $520,429 in FY17 (Lauer, Haley 25).

Figure 2. *Total Award Dollars & Top 3 Funded Depts. Visual*



Dartmouth College
- School of Medicine ($117.7M)
- School of Engineering ($27.5M)
- College of Arts and Sciences ($22.5M)

San Diego State University
- College of Health and Human Services ($38.4M)
- College of Sciences ($35M)
- College of Education ($27M)

Utah State University
- College of Education ($15.6M)
- College of Agriculture ($14.4M)
- College of Engineering ($8.9M)

University of Nevada-Las Vegas
- College of Health Sciences ($17.5M)
- College of Engineering ($13.7M)
- College of Sciences ($11.1M)

University of Maine
- College of Natural Sciences, Forestry, and Agriculture ($27.2M)
- College of Engineering ($16.3M)
- College of Education and Human Development ($4.8M)

University of South Alabama
- College of Medicine ($9.4M)
- College of Arts and Sciences ($7.8M)
- College of Education ($5.3M)

Ohio University
- College of Engineering and Technology ($14.8M)
- College of Osteopathic Medicine ($11.9M)
- College of Arts and Sciences ($7.9M)

Howard University
- College of Medicine ($19.9M)
- College of Pharmacy ($7.3M)
- College of Engineering and Architecture ($6.5M)

Old Dominion University
- College of Sciences ($15.6M)
- School of Engineering and Technology ($9.8M)
- College of Education ($6.4M)

Jackson State University
- College of Science, Engineering and Technology ($23.5M)
- School of Public Health ($2.2M)
- College of Education and Human Development ($1.3M)

With the exception of the University of Southern Alabama, nine of the 10 institutions' top funded department was awarded over $14 million, as seen in *Table 3*. Colleges of Engineering and other related grants were also highly funded with eight of 10 R2 institutions showing this field in their top three funded departments. Based on this analysis, it is important for research administrators to understand not only how much they and competing institutions receive in research dollars, but what kind of research project is most consistently funded and how higher funded departments align with overall university missions, goals, and unique assets that could contribute to growth. Shown through these numbers, this study provides a partial explanation for funding disparities within American institutions in that some simply do not offer the programs that are statistically highly funded, putting them at a competitive disadvantage.

Table 3. *Top Funded Department*

Top Funded Department in FY17	**Award Dollars Received**	**R2: Higher Research Activity Institution**
College of Medicine	$117.7M	Dartmouth College
College of Health and Human Services	$38.4M	San Diego State University
College of Natural Sciences, Forestry, and Agriculture	$27.2M	University of Maine
Colleges of Sciences, Engineering, and Technology	$23.5M	Jackson State University
College of Medicine	$19.9M	Howard University
College of Health Sciences	$17.5M	University of Nevada-Las Vegas
College of Education	$15.6M	Utah State University
College of Sciences	$15.6M	Old Dominion University
College of Engineering and Technology	$14.8M	Ohio University
College of Medicine	$9.4M	University of South Alabama

Regardless, colleges large and small are receiving tens of millions of dollars in funding each year and whether institutions have consistently higher funded departments, like Medicine and Engineering, or not, all institutions share the capability to influence and impact academia and beyond in research where their faculty are specialized. Moreover, it is important that researchers and administrators continue to work together to make the grant process seamless because as Kurt McMillen states, "the institutions and individual researchers we support are an important source of innovation for society" (25).

Although the overwhelming amount of support to the life sciences, like Dartmouth College's $117.7 million awarded to their College of Medicine, may look discouraging to smaller universities, like Jackson State University whose total university award dollars ($41.3M) was less than half of Dartmouth's top funded department, there are still plenty of award dollars up for grabs in other concentrations. For example, the Department of Education administered a $69.4 billion budget in 2017 and operates programs that touch on every area and level of education (U.S. Department of Education). Further, 60% of the R2 institutions in this sample listed the College of Education in the top three best-funded departments. For Utah State University, the College of Education was its best-funded department ($15.6 million) and San Diego State University's College of Education brought in $27 million for the university. These are large, encouraging numbers, and proof that the grant game can be won by large and small institutions with the right focus, targeting, and talent.

It is critical for administrators at R2 universities and other, smaller institutions around the country to understand that this study shows how a substantial (60% or more) of total funding is awarded to a university's top three research-heavy departments. And, as you can see, some areas of research like science and technology are likely to be more heavily funded because the largest

government grantmakers, like the Department of Health and Human Services, National Institute of Health, and The National Science Foundation focus on funding these disciplines. Moreover, with exposure to resources and mentors in consistently top funded departments, faculty may be provided an easier path to finding and receiving funding. On the administrative side, larger or heavily funded departments may also have more research administration staff, proposal contract managers, and departmentally focused research faculty that can direct and expedite the proposal and award process. Overall, it is vital for institutions and research offices alike to recognize these research-heavy departments and to think creatively about how funding can be distributed by connecting scholars across interdisciplinary teams in order to grow the research enterprise across all fields.

Federal Funding

In top funded departments, successful funding opportunities seem to correlate to what funding agencies are sponsoring the programs. Although not every institution in the sample provided the amount of funding dollars that came directly from the federal government, eight of the ten did and the results, shown in *Table 4* are important in understanding where university sponsored programs award dollars come from:

Table 4. *Awards from Federal Sponsors*

R2: Higher Research Activity Institution	Award Dollars Received from Federal Sponsors	% of Total Award Dollars from Federal Sponsors
University of Maine	$46.8M	82%
Dartmouth College	$136.7M	80%
Jackson State University	$31.8M	77%
University of Nevada-Las Vegas	$45.8M	67%
Old Dominion University	$25.3	54%
Ohio University	$25.6M	45%
San Diego State University	$49.7M	43%
Howard University	$18.2M	34%

As with other variables in this study, federal funding also varies greatly even among institutions in the R2: Higher Research Activity classification. Federal sponsors funded 82% of the University of Maine's $56.9 million award budget for 2017, whereas the Howard University only received 34% of their $53.5 million allocation from federal agencies. This may be explained by the kinds of departments/programs/colleges at the different universities which may or may not align as well to federal sources of funding.

The average percentage of total award dollars to institutions that came from federal funding in this sample was approximately 60%, but it is important to understand that these federal opportunities can change from year to year, depending on many factors including politics and available agency funds. For example, congressional cuts from 2010 to 2013 resulted in the largest overall decrease in a three-year period since the end of the space race (Jahnke). Administration resources and procedures are also changing and the landscape of university

research, which may help or hinder funding. Examples include the inclusion of electronic research administration (eRA) which "provides critical IT infrastructure to manage over $30 billion in research and non-research grants awarded by grantor agencies in support of the collective mission of improving human health" (National Institutes of Health). In addition to improvements in technology and abilities to administer award dollars, new federal regulations will also affect funding climates.

Comparative Mission Analysis

Statistics, financial figures and political contexts are important to the understanding the complex conditions in which research is proposed and funded, but understanding staff responsibilities and program commitments and missions is equally important. Moreover, I anticipated finding a positive correlation between the language and practices found in the university's research administration mission statements and the dollar amount funded for research, as mission statements have long been touted as an important aspect of grant seeking achievement. As Black and Latta concluded, there typically a positive correlation between research output and mission statements (112).

Institutions who are awarded tens, or even hundreds of millions of dollars a year in research funding are constantly working to innovate and make a difference in society through a variety of projects in a variety of departments. In order to do this, however, the funding and details of each specific project must be carefully administered not only with a program officer at the respected funding agency, but through the research administration team at the university to which the grant was awarded. These offices are installed to help facilitate and grow research enterprises in the university and are vital in the grant process at any institution.

While research and development is critical to the advancement of society, the administration of the research enterprise at the university level is essential to the initial and continual management of funded dollars. In NCURA Magazine, Tamara Hatch describes the research administration role as, “the lifeline between our faculty and the agencies that sponsor their best ideas for the ultimate benefit of society” (5). Working in an intricate field at the interface between the research project and the research institution, research administrators must balance the motives for research with their institutions ability to conduct it.

Overall, not only do the faculty researchers at colleges, universities and research institutions have to work hard to create and propose a project, but research administers have to work hard to grow and manage these research departments including services in development, protection, integrity, consultation, and sponsored programs. A research administrator in two universities’ divisions of research, Rand Haley in work, *Catalyzing Research: Research Leaders and the Complex Faculty/Administration Interface* reiterates the importance of the administrator and their vital role in helping to create new knowledge which comes from effective and successful funding of that knowledge through the competitive grant process. And, if managed and administered effectively, the research administrator possesses the amazing potential to help the institutions and society as a whole to better understand our environment, further the pursuit of scientific knowledge, and improve the health and lives of people in many different ways (13).

Office of Research Missions

To capture the essence of a university research office and how their may impact funding, I analyzed ten mission statements from the sample of R2: Higher Research Activity institutions offices of research. As Black and Latta explained, mission statements are important guiding

documents, important for vision but also because just about every accrediting agency in higher education requires these statements. Aligned statements have "a clearly defined mission and set of goals that establish a clear direction, purpose, and benchmarks for success" (University of Minnesota). Misalignments within university missions statements also occur "when universities incorporate goals and objectives that legitimize them with governmental agencies, but are not mission-aligned" (101).

Table 5 shows each of the universities stated research and sponsored programs missions. Many primarily undergraduate institutions or lesser research institutions look up to R2 research institutions like those in my sample for organizational structure and planning insights, and as research and funding grows at a university, so too must their research administration infrastructure.

Every university provides different academic resources, degrees, and departments. Therefore, each office of research is naturally structured differently depending on how the university framework is constructed. As Haley explains, "Across research universities and other academic institutions, the relative size and importance of the research mission can vary dramatically," but as Black and Latta add, "unique attributes of colleges can be inferred from components of a mission statement" (16, 102).

Table 5. *Office of Research and Sponsored Programs Missions*

R2: Higher Research Activity Institution	Office of Research Mission Statement
Jackson State University	Strives to maintain a supportive environment for research and scholarly endeavors, and encourages the faculty and staff to seek external funding to support the mission of the University and the explore alternative means to advance their professional interest.
Old Dominion University	Collaborates with the university for the successful administration of sponsored programs by providing responsive and cost-effective support.
Howard University	Committed to an ongoing effort aimed at improving research and compliance at Howard while setting an agenda for cuttingedge research that is both national and international in scope.
Ohio University	Supports faculty, staff, and students in their efforts to seek, secure, and manage extramural funding in the most accurate and efficient manner.
University of Maine	Develops and implements innovative research programs that address global grand challenges and result in effective solutions that enhance the quality of life in Maine and beyond.
University of South Alabama	Supports faculty research through the attraction of nationally competitive research and other sponsored program awards.
University of Nevada-Las Vegas	Creates a campus environment that supports and promotes superior research, creative and scholarly pursuits, ensuring that
	our students and faculty can recognize their full intellectual potential.
Utah State University	Facilitates a culture of excellence in research, scholarship and creative activity that spans the lifecycle of faculty and student through operational, training, funding and compliance support.
San Diego State University	Supports and furthers the research, education, and community service objectives of the University.
Dartmouth College	Serves as a central resources to support the research enterprise by providing guidance and stewardship for the research community and the College.

Mission Themes

Table 6 details the themes present across more than one sponsored programs office. Themes included a faculty focus, support to the University, focus on extramural funding, creativity, global scope, and community impact. The percentage of the theme present in the text was determined by extracting key words used within the statements, which are underlined in *Table 5*. As Thornton writes in NCURA Magazine, "the defining of Research Administrators roles and responsibilities has never been more important" (39). Embodying this starts with an understanding of the office's values and focus.

Half of the universities from this sample of 10 focused on what could be considered one of the most important components of university funded research: the faculty conducting the research. Focusing on specifics like award dollars and extramural funding and having a global scope, 20% of these research administration offices' missions included language about working with not only research projects, but creative endeavors as well.

Table 6. *Mission Statement Themes*

Office of Research Mission Statement Themes	% with Theme	Institution Names
Faculty Focus	50%	Jackson State University, Ohio University, University of South Alabama, University of Nevada-Las Vegas, Utah State University
Supports the University	50%	Jackson State University, Old Dominion University, Howard University, San Diego State University, Dartmouth University
Extramural Funding	30%	Jackson State University, Ohio University, University of Southern Alabama
Creativity Included	20%	University of Nevada-Las Vegas, Utah State University
Global Scope	20%	Howard University, University of Maine
Community Included	20%	San Diego State University, Dartmouth College

Each theme presented in these missions are important components to a university, but as Birx argues, "many more universities across the country could, and should […] pursue increased involvement in research and development within the their local communities. Through such outreach, they will become engines of economic opportunity and innovation in a way that enlivens the educational process and builds entrepreneurial leaders" (11). Within this sample, two universities included the word "community" in their mission, which seemed to be effective. The top two funded universities in this sample, Dartmouth College and San Diego State University, incorporated "community" into their research administration missions and brought in a combined $341.4 million, which is a whopping 70% of all of the other eight universities' annual award dollars combined.. Certainly engines of opportunity in research dollars, the data from this sample demonstrates these two institutions have been powerhouses in awarded research projects, along with providing their research administrators with a mission to not only help support these great projects and researchers, but to help and support a research community as well. Parallel to Birx's guidance, these offices are focusing their administrators to support community. By stating their "support", "guidance" and "stewardship" to the research *community*, these two institutions' missions are in alignment with Birx's claim and could be an influential component of their success. In addition, this community focus in administrative mission statements could play a part in increasing award dollars and propelling university research not just at R2 universities, but at colleges across the country.

Conclusion

Research is a major aspect of a university's mission and garnering grants can be a path to prestige and growth. As Lehman pointed out, "Research conducted at colleges and universities is a big business. The research endeavors can increase the prestige and competitive standing of the

institution" (58). As smaller colleges and universities continue to compete for grant dollars, they will look to established research institutions for guidance, mission development, and perspective. The 10 R2: Higher Research Activity institutions in this study showed that although classified by Carnegie to be major research institutions that brought in at least $40 million of received awards in FY17, the total award dollars received often varies across department, institution, and granting agency and for variable reasons. Regardless of an institutions' research status, there are paths for growth and improvement.

Although grant funding can be an unpredictable process, this sample of 10 R2: Higher Research Activity institutions showed that efficiency in funding can be influenced by university structure, the politics of federal sponsorship, individual department scholarship, and the mission of research administration program offices. After inspecting award dollars received, department funding, and the mission statement of the office of research, it is apparent that the an effective university research administration should focus on federal sponsored programs opportunities that align with the university's talent and unique programmatic offerings; should monitor closely the federal political climate; and should align mission with plan and practice. This study suggests key words and themes found in the office's mission statement may correlate – consciously or unconsciously – to the kinds of grants the program seeks and how those grants are used to circulate the new knowledge created back into the community.

Overall, by inspecting a sample of highly funded universities and comparing their fiscal awards with their missions and departmental and proposal submission breakdowns, I conclude that faculty and administrators should be encouraged because more than half of all grants sought were funded across these comparable institutions; administrators can work with all faculty to target grants and funding agencies for better outcomes and less wasted work; and creative

measures like interdisciplinary teams can improve distribution of grant resources across the campus, particularly if mission is aligned with sponsored program execution.

Overall, colleges and universities do have the ability to grow their research enterprises and develop a higher level of credibility by effectively managing grants and proposals in a responsible fashion, beginning with the research administrator. This takes careful attention and although difficult, the successful management of research and sponsored programs at a college university, public or private, can be one of the most important and central elements of an entire institution. This is a competitive process that can be overwhelming for both researcher and administrator alike, but this data helps show specific paths to increasing university research impact and effectiveness, which ultimately help to drive opportunity and innovation across academic institutions.

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