

STEM Faculty and Indirect Costs: What Administrators Need to Know

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ABSTRACT

The focus of this single site, qualitative case study was on public research university STEM (science, technology, engineering and mathematics) faculty and their perspectives on, and behavior towards, indirect cost recovery. The explanatory scheme was derived from anthropological theory and incorporated organizational culture, resource dependency theory, faculty socialization studies, and political bargaining models in the conceptual framework. The informants were tenured and tenure-track research university faculty in STEM fields who were highly successful at obtaining federal-sponsored research funds, with individual sponsored research portfolios of at least one million dollars. The data consisted of 11 informant interviews, bolstered by documentary evidence.

The findings indicated that faculty socialization and organizational culture were the most dominant themes, while political bargaining emerged as significantly less prominent. Public research university STEM faculty are most concerned about the survival of their research program and the discovery facilitated by their research program. They resort to conjecture when confronted by the issue of indirect cost recovery. The findings suggest institutional administrators rebalance the emphasis on compliance and hierarchy when working with expert professionals such as science faculty. Instead, a more productive focus might be on communication and clarity in budget processes and organizational decision-making, and a concentration on critical administrative support that can relieve faculty administrative burdens.

INTRODUCTION

During my nearly fifteen years in research administration, faculty resistance to indirect costs has been a recurring theme, often bemoaned by my fellow research administrators. In my own career, I have frequently encountered faculty who hoped to reduce or avoid the “tax” of indirect costs. Higher education administrators are acutely aware of the necessity of indirect cost recovery, vital to support the research infrastructure. I have often wondered why research faculty, clearly a highly intelligent and sophisticated community, would be resistant to the application of indirect costs on their research projects.

This issue spurred the focus of my dissertation, an inquiry undertaken in completion of my doctorate in higher education administration. The research questions I sought to answer were: What is the research faculty understanding of indirect costs? What is the research faculty behavior toward indirect costs? How can that understanding and behavior be explained? Subsequently, I narrowed my inquiry to STEM public research university faculty, for two reasons. First, the majority of sponsored research funding supports the STEM (science, technology, engineering, and mathematics) fields; second, the majority of sponsored research funding is

managed by public research universities (National Center for Science and Engineering Statistics, 2013).

Rather than rely solely on my own experience, or anecdotal evidence from fellow administrators, I undertook an analysis of one research-intensive public university’s data in order to ascertain whether faculty resistance to indirect costs was indeed a consequential issue. The proxy for faculty resistance was the existence of a faculty request for waiver of indirect costs on a research proposal that was subsequently funded by the federal government during fiscal year 2011. Analysis of 454 individual sponsored research award records indicated that 17.9% of the federally-funded non-standard indirect cost recovery resulted from faculty waiver requests. Clearly, the bulk of under-recovery was due to other factors, primarily sponsor restrictions on the indirect cost rate through caps or statutory or programmatic restrictions. However, the analysis offered evidence that faculty waiver requests do impact indirect cost recovery. My question remained: why do faculty respond as they do to indirect cost recovery?

STUDY DESIGN AND METHODS

This case study was conducted at a public research university located in the eastern half of the United States. This

institution met the Carnegie classification of very high research activity or RU/VH (The Carnegie Classification of Institutions of Higher Education, 2015). The financial data to confirm very high research activity were provided from the site institutions' 2010–2014 audited fiscal years, and institutional financial reports on sponsored research costs and revenue. In fiscal year 2011 (FY11), the site institution reported approximately \$500 million in sponsored research funding, with 80% of that funding coming from the federal government. The institution's negotiated indirect cost rate agreement (NICRA) was with the U.S. Department of Health and Human Services. The indirect cost rate for basic research during FY11 was 52%. The institution reported an indirect cost recovery rate of 27.5% for FY11, and reported approximately \$65 million in indirect cost recovery.

Using publicly available data, I compiled a list of highly successful STEM tenured and tenure-track faculty who had at least one million dollars in federal sponsored research awards during fiscal years 2010–2014. Only tenured and tenure-track faculty were selected for this study. The focus was on the traditional faculty professionalization path, from doctoral student, to Ph.D. recipient, to assistant professor, and finally to tenured associate

and full professor. These individuals are expected to fulfill the mission of a public research university, and the concomitant obligations of teaching, research, and service. Many public research universities today have bifurcated faculty roles, which split off teaching duties onto contingent and adjunct faculty, and research duties onto faculty research associate positions that are non-teaching and not on faculty lines, i.e., are fully grant-funded or on "soft" support (Schuster & Finkelstein, 2006). Despite these changes in faculty positions, I wanted to be sure to reflect the professional trajectory of tenure line faculty who so far as the data reveal, still receive the majority of sponsored research funding.

The dollar threshold for federal sponsored research funding was based on the "gold standard" of the National Institutes of Health (NIH) major basic research grant, called the R01. The NIH is the top U.S. federal agency underwriting basic research support, providing more than \$30 billion in fiscal year 2011. The National Institute of General Medical Sciences at the NIH has conducted studies indicating that its most productive award recipients, as defined by cited publications, have over their careers an average of between \$1.2 million and \$2.7 million in federal research funding (Berg, J., 2010). I

decided to use the minimum threshold of one million dollars in federal sponsored research support, over four fiscal years, as the standard for determining whether a potential informant was a highly successful principal investigator and experienced grant recipient.

Total federal sponsored research funding for my 11 informants, as confirmed by institutional records, was \$46 million over four fiscal years, from 2010 to 2014. The range of total award amounts per informant ran from \$1 million to \$8.9 million, with a median of \$3.2 million. All of the funding for all informants fit the category of basic or fundamental research; none of these principal investigators conducted applied research during the period under study. This predominance of basic research aligns with institutional records which indicated that 72% of sponsored research awards from 2010 to 2014 were for basic research. With the exception of one assistant professor, all of my informants were tenured associate or full professors, and included one associate chair, one chair, one center director and one distinguished professor. The median length of time since receiving the doctorate was 20 years, with a range from 10 years to 39 years. Eight of my informants were Caucasian and three were Asian (including

East and South Asian). Eight of my informants were male and three were female. Five of my informants were foreign-born. Nine of my informants ran a laboratory as part of their research portfolio. The dominant federal funding agency for my informants was the National Institutes of Health, closely followed by the National Science Foundation, and also included the U.S. Department of Energy, the National Aeronautics and Space Administration and the U.S. Department of Agriculture.

Informant interview transcripts provided the primary data for this study and were bolstered by document analysis. Open-ended questions were used to discover major issues as seen by the informants; follow up semi-structured questions were used as necessary to expand and confirm topics. In order to be fully immersed in my data, I transcribed the interviews myself over the course of 60 hours, producing 120 pages of interview transcripts. I licensed NVIVO, a qualitative data analysis software package, and entered the data to begin my analysis. Using my conceptual framework, I entered my themes, key variables, and indicators as nodes. I then searched through the data to ascertain whether or not my themes, key variables, or indicators emerged from my transcript record.

As opposed to grounded theory, which seeks to build theory after diving into the data, anthropological theory guides that dive into the data. This form of concept-driven coding determines whether an alignment can be found between the informants' understanding and the researcher's conceptual framework. My consolidated conceptual framework, or model, was derived from anthropological theory, organizational culture studies, resource dependency theory, faculty professional socialization studies, and political bargaining models. In particular, Tierney's work on organizational decision-making in higher education (Tierney, 2008) provided the basis for my key variables. Using the conceptual framework as a guide, the themes were set against the corresponding *key variables*: external environment, internal environment, role success, affiliation, knowledge, authority, actors, and decision-making. These variables were arrayed along the indicators of higher education institution *context* and resource needs, faculty professional socialization *content* and resource values, and political bargaining *contest* and resource allocation. The assumption was that the key variables would reflect and illuminate the conceptual model and confirm, or disconfirm, the viability of the

organizing themes. In other words, would informant perspectives and reported behavior emerge as anticipated based on the conceptual constructs?

FINDINGS

The purpose of this case study was to illuminate the perspectives of public research university STEM faculty regarding indirect cost recovery, and to explain faculty behavior towards the application of indirect costs on sponsored research projects. My findings indicated that faculty understanding of indirect costs is incomplete and superficial. Institutional information regarding indirect costs is limited, as is faculty time, which contribute to weak understanding. My findings also indicated that faculty behavior toward indirect costs is basically instrumental, minimally accommodating, and rarely confrontational. Faculty response to indirect costs is premised on their belief that it isn't usually worth their time or effort to address indirect costs in any significant manner. Instead, faculty time and energy are absolutely concentrated on the survival of their research programs and the discoveries emerging from their research. They rely primarily on conjecture regarding indirect cost recovery and its utility.

Faculty professional socialization was the dominant theme emerging from the

informants. They spoke at length about learning what it means to be a STEM faculty member, and about understanding what it takes to stay on the tenure track. For the faculty, the story is not so much about resisting or avoiding indirect costs, or about political bargaining over grant funds. It is about the struggle research scientists in STEM face trying to keep their research programs afloat:

So I would say, my appointment is 80% research and 20% teaching; the 20% teaching, I still go out there and do my job and teach. But the majority of my time is spent thinking about my research program, how am I going to do it, where are the funds going to come from, how can I keep my lab running?

Part of STEM faculty socialization is not only understanding the necessity of grants for their research programs and career success, but also learning what the actual process is for seeking grant funding. That learning curve can be a difficult one, as an informant revealed:

If I look at my own history, this is my eighth year here, before that I had seven years at Stanford, so I found myself a tenure track assistant professor at Stanford. I came there after spending two years at Berkeley and one year in Paris as a postdoc, during which time I was not involved at all in any grant writing. They paid my full salary, they

never asked me to participate in any grant writing or anything. They never even showed me a grant. In fact I ended up in a position as an assistant professor not even knowing what a grant looks like.

Even though grant writing and research paper writing may support each other, the relentless pressure to bring in funding, and the anxiety when funding lags, is constantly on the STEM faculty radar. As an informant explained:

It's incredibly stressful. My NSF grant ended in June, and I had known for the entire year before that that I was running out of money. So I let people go, I didn't take on any new students, because if I don't have funds to support people for x number of years, then there is no point getting them started. And then, miraculously, I found out the next grant from the NIH was going to come through. And suddenly, the sun rises, everything is o.k. It's incredibly stressful.

STEM research faculty often wondered if anyone outside their field understands how the research world works. Faculty were deeply aware of the toll constant research funding pressure takes on their other obligations. Faculty also wondered if the professional path they followed in getting their STEM graduate degree will continue to exist:

I think there is a feeling that long term the job market for Ph.D.'s in science is worse than it used to be. When I was going through grad school, you came out of grad school with all these different options. You could go to an academic postdoc and follow that academic route, or you could get a job in industry, or you could get job in government, everybody was hiring. It didn't matter what you wanted to do, you could do it. So the idea was, say, the default was to be an academic, because that was what you knew and that was what your advisor did, so that was your model. But you could always go to industry if that doesn't work out. Now all the pharmaceutical companies are closing down their research and development units, there's been massive hemorrhaging of jobs in the bio-medical corporate sector, and I feel like there's not that many jobs in industry any more. So everybody's contracting at the same time. So what do these Ph.D.'s do? Yet, at the Federal level, you keep hearing that it's important that we keep sending more kids into STEM. There is a real disconnect.

Faculty noted that shrinking research funding, along with limited tenure-track opportunities, have altered their view of academia. One professor looked back over decades of successful research funding, and reflected on the current state of grant success rates, noting:

I feel like I'm getting close to retirement, I have a grant and this may carry me through to my sixties, maybe I'll never

have another one. But I have a daughter in graduate school, and what do I tell her? Should she go into academia or not? It is a total waste in some respects to me.

Organizational culture was invoked nearly as frequently as faculty socialization, and thus follows very closely on faculty socialization as a dominant theme. Faculty attitude towards indirect cost recovery represents one small issue in a large, complex institutional environmental picture. Faculty link indirect cost recovery to their sense of whether or not they receive critical support, or even appreciation, from the organization for bringing in the funding. One informant shared his story:

Originally I was thrown in, and I was told to teach two new courses. There was no template. So I had to put together a syllabus and everything, and that took up a bunch of my time. And I was still expected to bring in all the funds. This is something the humanities guys on this campus have no idea, even though they are Provosts and Associate Provosts on this campus, they have no idea what we have to go through. I'm facing this, I don't even think the Faculty Affairs group even understands this, on this campus. They talk a lot about science, but none of them have actually gone through this process, day in and day out. I've realized that more and more here in the last six months.

Faculty are fully cognizant of indirect costs but do not feel fully cognizant of how the organization uses the indirect costs that are recovered:

I don't understand indirect costs. And I don't know where my 52% goes. I was a postdoc at Washington University in St. Louis, and when I came here this university did not know what a K award was [an NIH career development award]. I was the first one to bring one here. And K awards have their own F&A rate. I don't know where my F&A goes. I have to empty my own garbage can, I have to vacuum my own office. Our lab has to take care of its own garbage. We have to mop our own floors. Walk down the hall, the lights are off. I bring in a huge amount of indirect, I'd like to know where it goes.

Instead, faculty see indirect cost recovery as a kind of symbol, part of the generally opaque and mystifying budgetary process that goes on at higher levels in the administration. The budget decisions land on them in the middle of everything else they do as tenure-line faculty: teaching courses, conducting research, managing a lab, managing a grant, publishing articles, mentoring graduate students. They do not understand how financial resources are allocated because it is not made truly transparent, for reasons they don't know but guess at:

Especially our new administration, they are putting a lot of money into things, like the entrepreneurship institute and the international center and the teaching-learning center, that are neither research nor teaching. It's some education type thing for students. All these sort of initiatives are coming down the pike. Nobody tells you where the funding comes for those, and considering how much funding is going for the education of students, one can only conclude that the research overhead, the return is being cannibalized. That's what everybody thinks.

Several STEM faculty were also frustrated not only by the lack of clarity but by the shifting policy pronouncements regarding institutional research funds:

I tried to save some of my start-up funds to fill in some of these [funding] gaps. But then the university decided we needed to spend down these institutional funds, because they thought the state legislature was unhappy with us carrying balances. But now apparently they want us to get our balances back up again, because somehow that helps the bond rating of the state. I wish they would just pick an opinion and stick with it. And so if you feel like you've got these monies but suddenly the Dean is coming to faculty meetings and saying well, if you don't spend it, we're going to take it away, that's not a good scenario. How are we supposed to cover those gaps?

The economic resources STEM faculty need in order to conduct their research projects relate entirely to achieving their scientific objectives:

You have to be driven to do your research, and you can't do research without funding. If you think your area is an important area, and you can articulate the purpose of your research very well, and you can be productive when you get grants, then if you're successful you produce papers and students. Then you develop a track record. It's a combination of opportunism and strategy. You have to adapt to keep your funding.

One informant explicitly described the time devoted to grant preparation as a cost of being a research scientist:

Now, the cost? With the number of proposals I'm writing these days it takes a significant amount of my time, a significant amount. There are many other things that I do so I don't know how the time adds together to the number of hours in the day. It is an unbelievable effort.

The theme of faculty socialization, and its related indicator of resource values, along with its key variables of role success, knowledge, and affiliation, was the most prominent theme discussed by the informants. Closely following alongside

was the theme of organizational culture and its related indicator of resource needs, along with its key variables of internal and external environment. The least discussed theme was political bargaining and its indicator of resource allocation, along with its key variables of decision-making, authority, and actors.

ANALYSIS

STEM faculty focus on the economic resources that support their research agenda. Organizational culture, and the context of addressing internal and external environments, drives STEM faculty to concentrate on *survival* of their research programs as a dominant concern. Their response to indirect costs is driven by the need to ensure they can maintain their research portfolios. Faculty socialization, and its content addressing role success, necessary knowledge, and professional affiliation, drives STEM faculty to concentrate on *discovery* from their research programs as a dominant concern. Their response to indirect costs is conditioned by the need to ensure they can obtain viable results from their research portfolios. Political bargaining, and its contest involving authority, actors, and decision-making, drives STEM faculty to rely on *conjecture* regarding their research program funding as a dominant concern. Their

response to indirect costs is framed by their uncertainty as to whether the indirect cost recovery actually benefits their research portfolios.

STEM faculty informants understand the need to pay for the basic infrastructure necessary to conduct research. What they do not understand is how the indirect costs derived from their sponsored research funds are actually used, nor do they understand how internal institutional budget allocations are made for research. This disconnect held true for all informants, despite their aggregate success with sponsored research funding and their extensive experience managing grants. Many are suspicious of how the allocation decisions are made, and wonder if research is truly supported or if funds are diverted to other initiatives on campus. While understanding the basic premise of indirect cost recovery, they have little surety about its utility for their research programs.

The public research university STEM faculty understanding of indirect costs, then, is a limited one. It is an understanding limited by both institutional choices and faculty choices. The institution chooses not to disseminate specifics about internal budget processes or decisions. The faculty choose not to devote any of their limited

time to pursuing information about indirect costs or about the university budget.

STEM faculty informants describe a range of behaviors toward indirect costs. Slightly more than 33% of those interviewed stated that they had requested a waiver of indirect costs on a sponsored research project. Those who had requested a waiver said they did it to save direct costs on relatively small projects, and all were successful in obtaining a waiver of or a reduction in indirect costs on those projects. The waiver process appeared formulaic to these faculty. They completed a form, submitted the request, and were approved. None described extended negotiations or even questions regarding their requests. Rather than conflict over indirect cost recovery, faculty described confusion over indirect cost recovery. Even these sophisticated investigators describe the use of indirect costs as impenetrable.

The majority of the STEM public research university faculty informants said they had never requested a waiver. Many faculty spoke about crafting budgets to minimize indirect costs where possible, such as including capital equipment or tuition remission as part of the project direct costs. Overall, however, these faculty did not describe acrimonious encounters with central administrators over indirect costs.

Instead, many called indirect costs a tax, and named it as such with the same air of resigned acceptance as one might discuss the federal income tax—a grudgingly necessary burden.

The public research university STEM faculty behavior toward indirect costs, then, is a nuanced one. As a group, they neither abhor nor approve indirect cost recovery. Resistance to indirect costs was not a dominant response. Instead, indirect cost recovery is a reality faculty work with, and on occasion, work around. Any such work around is considered with an eye to obtain the greatest amount of funds for their research agenda with the least amount of extra expended time and effort.

CONCLUSION

This study reveals that public research university STEM faculty are less concerned about why indirect costs policy exists than about how it is used. The potential of discovery, the possibility for increased knowledge and increased understanding in their field is what drives these STEM faculty. Their involvement with indirect costs policy is peripheral to that drive. When the indirect costs policy issue is raised, these faculty are most frequently accepting and yet skeptical.

Given that skepticism, it may be worth higher education administrators' time to

ensure that not only are faculty made more fully aware of how indirect cost recovery is handled, but also that the indirect cost recovery is actually used to support the basic research enterprise. The site institution's website has layers of web pages discussing indirect costs, albeit without the specifics as to how the consequent indirect cost recovery is distributed. Clarity regarding distribution would be step one. However, communication about indirect cost policy alone is not sufficient to obtain faculty understanding. Ensuring faculty obtain direct administrative support, on a daily basis, in managing their sponsored research projects is the more consequential step two. Faculty skepticism is not unwarranted. The site institution, like many public research universities, is under pressure from state legislatures and state officials to prove the utility of the university in advancing state economic development (Harris, 2012). In particular, technology transfer and entrepreneurial activities are extensively promoted (Case, Coleman, & Deshpande, 2013). The site institution's website contains an exhaustive list of initiatives focused on university-industry partnerships, translational ventures, start-up boot camps, commercialization support, technology development, and other innovation and entrepreneurship activities.

Faculty may reasonably wonder where the funding to support such activities is coming from, especially given the lack of transparency in the budget process.

The premise holds that institutional budget allocations can reveal underlying institutional values. Therefore, if indeed the indirect cost recovery is used primarily to support basic research, then the actual allocations are worth revealing. Higher education administrators may find public research university STEM faculty will request fewer waivers if they are reassured that the indirect cost recovery supports their research agendas. However, if much funding is being redirected to other initiatives, to foster better public relations with external constituencies, or to advance administrator profiles, then the faculty suspicions will be confirmed. If basic research support is being starved, then ironically there will be fewer and fewer discoveries that can foster innovation and lead to much-sought technology transfer and potential commercialization.

The site institution trumpets the annual increase in total research funding, while the faculty informants speak of the need for

more administrative support, to save their time for conducting research. Increased research funding should lead to increased support for the research faculty. As an informant noted, "It's as if you are trying to raise fish, you have to keep adding water to the pond. If you just try to increase the density of the fish without adding water, that won't work."

Basic research needs dull, ordinary, basic support. If higher education administrators truly want to support the serendipitous slog that is science, then they need to do all they can to relieve the extraordinary administrative burden that currently undermines science and scientists. That 42% of principal investigator's time is spent on administrative activities, rather than on their actual research, is a shocking enough finding (Rockwell, 2009; Schneider, 2014). This redirection of expertise can be fixed. Just as in the teaching arena, the focus should be on what leads to student success, the focus in the research arena should be on what fosters faculty success. Institutional administrators can advance research faculty success by rebalancing a focus on compliance with a focus on support.

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