

A stylized world map in shades of blue, overlaid with a network of white dots and connecting lines, suggesting global connectivity. The map is centered on the Atlantic Ocean, with North and South America on the left and Europe and Africa on the right. The network of dots and lines is more dense in the Northern Hemisphere.

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Junko Shimazoe

Journal of Research Administration Special Issue on

DIVERSITY & INCLUSION

Dear Colleagues,

We are pleased to invite you to submit a manuscript for a special issue on diversity, equity and inclusion (DEI) for the Journal of Research Administration. This issue will highlight the essential role that research administrators often play to enhance DEI among faculty, administrators, and staff.

We are looking for submissions that provide a representative sampling of the many ways in which research offices and research administrators have taken effective actions to enhance the recruitment, retention, and promotion of women and those from diverse and underrepresented groups at their institution. These actions can be in Central Administration, at College or Departmental levels, or in other organizational units. They may include policies and practices, special initiatives, programmatic efforts, combinations, or other avenues. We are particularly interested in efforts that impact representation in STEM fields, or those that include lessons from effective efforts to enhance DEI in other units and/or that have institution-wide implications.

If your institution has developed a successful DEI initiative in which research administrators have played a critical role, we truly hope you take this opportunity to share it with the readers/members of JRA/SRA so that research administrators across the globe may learn from your efforts and incorporate successes into their own organizations.

If you are interested in submitting a manuscript and/or have any questions, please contact JenniferTaylor@TnTech.edu.

In order to have your manuscript considered, please submit by the beginning of August 2021.

FROM THE EDITOR'S DESK





Please send manuscripts to journal@srainternational.org

From the Editor's Desk

Nathan L. Vanderford

University of Kentucky

The *Journal of Research Administration* (JRA) is the premier scholarly publication for the field of research administration and management. We publish timely work that covers all facets of our discipline. The journal is an important education and career development platform. Our authors share best practices and innovative means of performing research administration and management work in our fast-paced, ever-changing environments while also enhancing their own careers through the process of publishing peer-reviewed scholarly journal articles.

In many regards, 2020 was a difficult year as we dealt with the challenges brought to us by COVID-19. Undoubtedly, COVID-19 brought both professional and personal challenges to all of you—it certainly did for me. Despite the global pandemic, however, authors continued writing and submitting articles at a steady rate, and our editorial board remained busy working alongside the authors to prepare new articles for publication. During these challenging times, it has been refreshing and energizing to see the work of the journal continue and thrive.

In the current issue, we are publishing five original articles and a voice of experience essay. It is very exciting that we continue to publish articles that come to us from all over the world. The journal's international reach is a testament to how research administration is a vital part of the global interconnection of research in general. In that spirit, in this issue's voice of experience essay, Simon Kerridge from the University of Kent discusses threads of the global nature of research administration and management in his article titled "Research Administration Around the World. In Developing Research Culture: An Outcomes Perspective," Michelle Mae Olvido shares her investigation of the development of research culture among seven institutions in the Philippines using the Gestation-Expansion-Maturation Theory. Abdelilah Salim Sehlaoui and colleagues describe factors associated with faculty at a primarily teaching college who are pursuing research funding in their article titled "Motivating Factors and Obstacles behind Grant Research: The Case of a Teaching-Focused State College." In the article "Development of a Clinical Research Consortium Position Interview Panel within the Department of Veterans Affairs Health Care System," Marcus Johnson led a group of colleagues that developed a manager interview panel that

aided in selecting clinical research managers in the United States (U.S.) Department of Veterans Affairs health system. In "Research Integrity Officers' Responsibilities and Perspectives on Data Management Plan Compliance and Evaluation," Bradley Bishop and colleagues report on their findings from interviews with U.S. research integrity officers on their roles and perspectives related to data management plans. Finally, Junko Shimazoe from the Japan External Trade Organization describes human and organizational behavior of research managers and administrators related to organizational engagement and professional growth in his article "Research Managers and Administrators in Conflicting Organizational Cultures: How Does Their Human Capital Help Professional Survival in Knowledge-Intensive Organizations?" I hope you enjoy reading these articles.

In adopting a common standard in scholarly publishing, I am excited to formally announce that beginning later in 2021 we will start pre-publishing articles online soon after they have been formally accepted. This early publication service will work as follows: Once accepted, an article will be copyedited, proofed by the authors, and then posted on the JRA's webpage within the framework of the issue in which the article will eventually be published. New, full JRA issues will continue to be published according to our regular fall and spring schedule. We believe this will be a great service to our authors as their work will be published online soon after acceptance in a discoverable and citable form. We also believe that this will further entice potential authors to consider JRA for their publishing needs.

Beyond this current business, it is with mixed emotions that I share the news that this marks my last issue as editor-in-chief of the journal. In June, I will return to being an editorial board member as someone else takes over the journal's leadership. My six years of leadership with the journal, first as deputy editor and then as editor-in-chief, has been deeply rewarding. It has been a personal pleasure working with the editorial board and SRAI staff to publish manuscripts authored by gifted research administrators from around the world. It was a very humbling experience to be the editor as the journal celebrated its 50th year of publishing in 2019. When we re-published the first issue of the journal to celebrate our anniversary milestone, it was incredible to see where we started and how far we have come as a discipline. It was also informative to see how we continue to work to improve some of the same areas of our field even after 50 years, including enhancing our profession's diversity and inclusivity.

The editor's job truly is a labor of love. The editor has the privilege of working with authors who are oftentimes publishing their very first scholarly article or with those truly remarkable research administration scholars who publish frequently. It is truly very rewarding to see each article transform into its final form as it moves through the

peer review and publication process. Each letter of acceptance and the subsequently published article is a milestone for the authors and their institutions, the peer reviewers, the journal as a whole, and the broad field of research administration. I am deeply indebted to the many authors who decided to publish their work with the journal over the years. Thank you.

The JRA is in a strong position today; as mentioned above, we are receiving a steady stream of outstanding manuscripts written by colleagues from around the world. To get to our strong position, in addition to authors submitting impactful articles, it takes a smooth operating village to run the journal. Over the years, I have been blessed with a very talented leadership team with Deputy Editor, Dr. Jennifer Taylor, and Associate Editor, Holly Zink. I thank Jennifer and Holly for their hard work and dedication to continuously improving the journal. The journal's editorial board represents a collection of dedicated, hardworking, and talented colleagues that guide each submitted article to its final published form. It has been such a joy working with the board members and getting to know them professionally and personally. I also thank the Author Fellowship Committee, including Amy Cuhel-Schuckers, Deborah Derrick, Carson Harrod, Alicen Nickson, Simon Kerridge, Jorja Kimball, and Holly Zink, and all the Author Fellow Advisors for their tireless work to assist the Author Fellows as they develop and publish their first scholarly articles. The Author Fellowship Program has genuinely had a transformative impact on its participants and the journal overall. Many thanks are also given to the incredible behind-the-scenes work of former SRAI staff member Dilyana Williams and current staff members Gina Cuevas and Jim Mitchell. SRAI staff are critical to the publication of every issue of the journal. I owe extraordinary gratitude to Dilyana and Gina. Their outstanding organizational skills, dedication, loyalty, and high spirits are the cornerstones of moving JRA forward with each article and each issue. Likewise, Jim's careful assembly of each article into the final published issue is a true work of art. I also thank SRAI for trusting me with the stewardship of JRA; it has been a great privilege. Lastly, and very importantly, I thank former Editor-in-Chief, Tim Linker, for his mentorship and friendship over these last six years. The journal is in its current strong position today because of Tim's leadership and vision.

I look forward to working with the new editor, and I do not doubt that the journal will continue to grow and thrive.

Lastly, and as always, if you are a non-SRAI member and wish to have the journal delivered to you via email, please sign up through the online system at <http://www.journalra.org>.

ARTICLES



Research Administration Around the World

Simon Kerridge

University of Kent

Research is international, so is Research Administration*!

As we start the third decade in the third century of our calendar, I appear to be entering the “third age” of my life (I am hoping for a good few more to allow, perhaps, more time to reflect).

While, undoubtedly, research administration emerged over 60 years ago (Kaplan, 1959), probably first in the U.S., it has now developed in many other parts of the world—however, not always by that name. For example, in most of Europe the term “research management and administration” is more common, and “research advisor” is also used. Whereas in Africa, “research management” is prevalent.

It is perhaps more useful to look at the scope of what we do—what is research administration? We could look at the knowledge required for certification, such as by the U.S.-based Research Administrators Certification Council (RACC, 2020). Or, perhaps better is to look at the approach taken, for example, by the U.K. Association of Research Managers and Administrators (ARMA, 2011) with their Professional Development Framework. Or, to look at the competencies required to undertake these tasks, a theme picked up in the last issue by Williamson et al. (2020) as they explored the Professional Competency Framework (PCF) established in Southern Africa. Some recent work from Portugal (Agostinho et al, 2020) has introduced the term “Professionals at the Interface of Science (PLoS)” to encompass broader areas of activity, and this has been built on by Santos et al (2021) to specifically include those who work in research funders and policy organizations.

It seems that, like so many things in life, Research Administrators are difficult to pigeonhole. Personally, I would vote for “Research Management and Administration” or “RMA” as the name of our profession. But, I suppose I am biased as I’m from the U.K. and RMA is part of the national association title. Although other parts of Europe have

taken a similar nomenclature, with the Danish, Dutch, European, Finnish, Icelandic, Norwegian associations being, respectively, DARMA, ARMA-NL, EARMA, Finn-ARMA, IceARMA, and NARMA. Further afield, in Brazil, BRAMA is the Brazilian Association of Research Managers and Administrators; and RMAN-J is the Research Manager and Administrator Network Japan. But, there are counter examples, and I suspect that internationally the debate will continue long after my third age has passed (and, yes, I am hoping for a fourth, at the very least).

Nevertheless, whatever our titles and perceived professional nomenclature, we are all as Stackhouse (2008) defines it, undertaking work that "... embraces anything that universities can do to maximise the impact of their research activity. It includes assistance in identifying new sources of funds, presenting research applications and advice on costing projects and negotiating contracts with external sponsors. It incorporates project management and financial control systems. It also involves help in exploiting research results—through commercialisation, knowledge exchange and dissemination to wider society", although, as noted above, we are not to be found only in universities! While there is a lot of variation in structure and scope across countries, often due to the size and nature of the institution, there do appear to be broader differences between regions of the world. For example, in North America, it is very much seen as a professional role, whereas in Africa, it is often a role taken on as part of academic duties. Similarly, the perceived breadth of the profession can be region-specific—in some parts of the world, research student administration is seen as in scope, in other areas it is not. You can read more about these differences and much more in the excellent, although I do say so myself, article by Kerridge & Scott (2018).

It can be argued that these differences in research support are due to the history and environment in which research has developed and is supported in different regions. Far from being a homogenous bunch, we adapt to the environment in which we find ourselves, and as Kaplan notes there is a certain ambiguity to the role. This can often mean that although we are all doing the same thing, we often speak different "languages" and have different drivers. In order to best support our researchers, we need to better understand how our research management and administration counterparts work—and what better way than to experience it? I have been fortunate to attend many international conferences and have taken the opportunity to visit various research institutions around the world, sometimes for extended visits (I wholeheartedly recommend it, you always learn something new). Failing that best option of immersing yourself in different cultural contexts for a few days or longer, the next best thing is to read about it. On that note, you might be interested in the forthcoming results of the largest ever survey of research management and

administration around the world, the INORMS RAAAP-2 Survey. You can keep up to date at <https://inorms.net/activities/raaap-taskforce/raaap-survey-2019/> or watch this space.

So, while much research being undertaken is clearly international—and becoming more so, research management and administration (or whatever you might wish to call it) is perhaps lagging behind a little. As professionals, we need to broaden our horizons in order to provide the best support possible. If our “clients” are working internationally, then so should we—or at the very least, we need an understanding of the additional issues involved in (supporting) international research. There are many things in your national context that you probably take for granted (if you will excuse the pun), but things may well be different for your overseas peers in their national context – the ensuing misunderstandings can cause real issues. If you do not have the opportunity to network internationally, then the very least you should do is keep abreast of developments by reading about them. So, I hope you enjoy this internationally-flavored issue of the Journal of Research Administration!

And, finally, on a related note, perhaps you have considered writing an article, but never quite got up the courage to do so. There is no time like the present; research management and administration is an under-researched field, why not contribute? Help is at hand, while the fifth cohort of the JRA's Author Fellowship Program has just started (see: <https://www.srainternational.org/resources/journal/author-fellowship>). The sixth will be open for applications towards the end of the year, so start preparing now. It is your opportunity to be paired with an experienced peer advisor to help you along the way to scoping, writing, and submitting an article—and best of all, the program is international, so you just might be paired up with someone from another part of the world.

Simon Kerridge, BSc, DProf, is the Director of Research Policy & Support at the University of Kent in the U.K. and (amongst other things) is a member of the Journal of Research Administration's Author Fellowship Program committee. ORCID: 0000-0003-4094-3719.

I would like to thank Holly Zink for her insightful comments on an earlier draft of this piece. *and yes, I do mean Research Management and Administration!

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Developing Research Culture: An Outcomes Perspective

Michelle Mae J. Olvido

Cebu Normal University

Abstract

This paper sought to describe the evidences of the development of research culture from gestation to maturation as a result of the input of human capital and resources. Anchored on the Gestation-Expansion-Maturation Theory of the Development of Research Culture, a narrative inquiry was conducted with key informants from seven reputable teacher education institutions in Region VII. Interview transcripts were coded with the aid of NVIVO 11.3.2. The findings reveal six overarching themes on the return of investments or outputs of an institution's research culture with its corresponding attributes and characteristics. The development of research culture is an investment and is therefore evidence-based consisting of observable and measurable outputs in terms of performance and product. Gestation is achieved with production that consists of conducting research and writing manuscripts. Expansion happens when research outputs are disseminated through paper presentations and article publications. Maturation in terms of outputs lead to creation, which refers to influencing policies and being able to introduce technology geared towards contributing to development and innovation.

Keywords:

research culture, investment, performance, product

Introduction

University rankings have been used to assess the quality of higher education. Assessing universities encompasses both academic and research evaluations (Boholano et al., 2014). Samarasekera and Amrhein (2010) identified the Academic World Ranking of Universities, QS World University Rankings and Times Higher Education Rankings as

the most widely accepted international rankings. One shared characteristic of these three rankings is the prioritization placed on research productivity. This affirms the argument that when research is defined as generating new knowledge, it becomes a distinguishing characteristic of a university (Marchant, 2009).

Times Higher Education in partnership with Thomson Reuters assesses universities based on their performance on the following areas: "Teaching", "Research", "Citations", "Industry Income" and "International Outlook". The criteria on "Teaching", "Research" and "Citations" are given a weight of 30% in the overall ranking score while the areas of "Industry Income" and "International Outlook" are given 2.5% and 7.5% weights respectively. The criteria on "Teaching" cover the learning environment while "Research" encompasses volume, income and reputation. "Citations" refer to research influence (Times Higher Education, 2015). These criteria reveal how research in the world rankings of universities is given emphasis and assessed through observable and measurable outputs.

No Philippine university is included in the Top 400 List of the World in the Times Higher Education World Rankings. The challenge of upgrading the research performance of institutions of higher learning is faced by the country. The Commission on Higher Education (CHED) issued Memo 46, s. 2012 that calls for the typology of higher education institutions. This quality assurance system puts into place horizontal typology wherein a higher education institution can be classified as a professional institution, college or university, recognizing that particular types of HEIs will respond fittingly to particular global and national challenges (Commission on Higher Education, 2014). Therefore, there is a need to invest in the development of research culture and the monitoring of research productivity.

Research culture, according to Evans (2012), refer to the shared values, assumptions, beliefs, rituals and other forms of behavior geared towards the acknowledgement of the value and significance of research practice and its outputs. Research undertakings are considered vital and meaningful in the overall operations of the academic community. Activities like sitting as a panel member in an oral defense, supervising and mentoring researchers, writing research papers and presenting them in the national and international conferences are agents for enhancing research culture (Narbarte & Balila, 2018). However, activities are not enough. The existing studies on research culture of educational institutions reveal that for it to claim the presence of a strong research culture, there should be clear indicators of valued research practice and output. Stahmer, Aranbarri, Drahota and Rieth (2017) even challenges institutions to come up with comprehensive research plans and inquiry to ensure that goals from basic science to application can create an impact in the community.

The researcher has observed that these outputs do not come all at once suggesting that the development of a research culture occurs in certain phases. In the Philippines, Wong (2019) reports that there is a need for capacity-building to spur productivity which is characterized simply as the conduct of research and the writing of a research report. However, due to growing demand to meet international standards for universities, higher education institutions are looking for ways to produce quality research for international publication and citation (Mirasol & Inovejas, 2017). Studying the research outputs gives insights on the maturity of the research culture.

This paper proposes that the development of research culture can be attributed to quality outputs in terms of research practices and products that vary in degree as a Teacher Education Institution (TEI) consistently undergoes phases from initiation to maturation. Furthermore, this presents research culture as that which undergoes different stages of development: 1) Gestation (initiating stage), 2) Expansion (developing stage) and 3) Maturation (flourishing stage). Gestation is the period of providing the necessary conditions that would serve as the foundation of the TEI's research culture. When an institution reaches a period of stability and steady increase in quality research activity and output, it has reached Expansion. Maturation of the research culture is reached when the TEI consistently takes on research activities and produces quality outputs and it reaches a period of the establishment of its standing in the academic community. Figure 1 reveals how these stages of development are achieved through a consideration of various factors. The development of research culture can be attributed to people, resources and research activities.

Development begins with the foundational period of the TEI's research culture or Gestation. In this phase, the institution asks: What does a Teacher Education

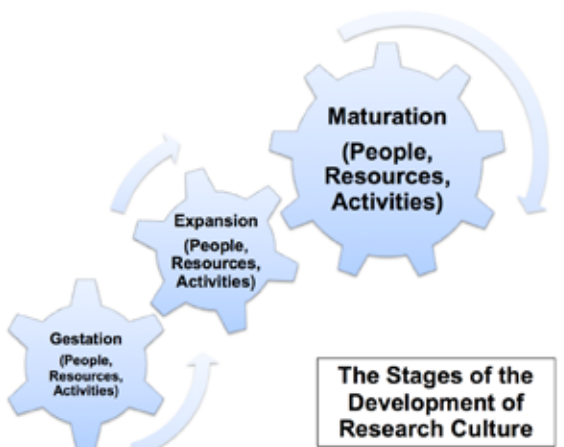


Figure 1

The Gestation-
Expansion-Maturation
Stages of the
Development of
Research Culture

Institution need in order to have a good foundation for a strong research culture? When an institution reaches a period of stable and steady increase in quality research activity and output, it is said to reach the stage of Expansion. The question to answer now becomes: What does a Teacher Education Institution need to build on the good foundation set for a strong research culture? This is the period wherein existing practices (policies, programs, and the like) are nurtured and other elements are added in order to continually expand. Maturation of the research culture is reached when the TEI consistently takes on research activities, produces quality outputs and reaches a period of the establishment of its standing in the academic community. It is at this point when the question takes on the form of: What does a TEI need to build credibility in the academic community as a reputable enduring research institution? In the development of research culture, an institution can regress if some factors are not nurtured or sustained. Although people, resources and activities spur the development of research culture, outputs are the indicators whether what has been done is effective in spurring research productivity. This paper seeks to describe research practices and output present in each stage in the development of research culture in TEIs.

Methodology

Qualitative research methodology—specifically, a narrative inquiry—was used as method of investigation as the development of research culture happens over a period of time as a form of narrative in the context of the experience of a Teacher Education Institution. Using purposive sampling, seven reputable TEIs in Region VII were selected, four of which are state universities while three are private higher education institutions. Semi-structured interviews were conducted with the Vice President for Research or Research Director (whichever is applicable) and Dean of the College of Education with the goal of capturing how research culture is developed in their context. Permissions were sought from the heads of agency and the participants of the study and informed consent was requested. As part of its ethics protocol, the researcher explained the purpose of the research and in what ways the gathered information will be utilized. All the names of people, institutions, events, and other data that might be used to track the informants have been coded to ensure confidentiality. Data was gathered in SY 2015-2016 in TEIs in Region VII that have a College of Education with at least Level II accreditation.

To analyze the data, thematic analysis using Braun and Clarke's (2006) approach was done to capture the development of research culture in the context of TEIs. First, the researcher went into the familiarization of data which involved transcribing the

interviews in verbatim, reading and reviewing the data, taking down initial ideas. Second, initial codes were generated and analyzed for themes. Third, themes were reviewed in relation to the coded extracts (Level 1) and the entire interview (Level 2), generating a thematic map of the analysis. The researcher did these three times with the aid of NVIVO 11.3.2. All the names of people, institutions, events, and other data that might be used to track the informants have been coded to ensure confidentiality.

The researcher identified significant statements from the answers relating to the evidences of research culture. Meanings were formulated from the statements focusing on the attributes and characteristics of these evidences in every stage of development. Themes were created from the meanings to map out the development of research culture. These themes were reviewed and the researcher identified the “narrative” that can be drawn out from them. Mind maps were drawn until as last step, themes were finally defined, named and reported in the next section of this paper.

Results

An analysis of the interviews revealed six overarching themes on how research culture as an investment is characterized in the TEIs. The codebook containing the complete list of significant statements and formulated meanings has fifteen pages. For the purpose of this paper, only vignettes of the interviews are cited and a summary of formulated meanings and significant statements is appended (Appendix A-C).

Operating on the assumption that the development of research culture is evidence-

Research as an Investment: Output

Stage	Milestone	Performance	Product
Gestation	Production	Conducting Research	Writing Manuscripts
Expansion	Dissemination	Presenting Papers	Publishing Articles
Maturation	Creation	Influencing Policies	Introducing Technology

Table 1
Milestones and Key Action Points on the Outputs of Research Culture as Returns of Investment

based and consists of observable and measurable inputs and outputs, these themes are reported in milestones and key action points (see Table 1). However, it is important to consider that these themes are not to be taken separately but are interconnected aspects of the development of research culture.

Gestation

At its most basic, research culture development begins with production as outcome. The Teacher Education Institution goes into conducting research (see Appendix A, Table 2) as supported by ten formulated meanings with 34 significant statements. Seven of the 14 participants highlighted that the faculty is trained to do research which is supported by the Input milestone in terms of capacity building. In this case, however, the informants highlight how these trainings result to the conduct of research. P4 states,

"We're trying to envision that after the series of trainings, at the end, it can produce already the proposals which can be submitted to the research council or which can be submitted as well for funding."

The conduct of research is not only expected from the faculty but also from the undergraduate students (P3, P7, P8, P9 and P10) to the graduate school (P3, P12). Some of the informants made mention that their faculty are now involved in commissioned (P1 and P11) and institutional (P1, P8 and P11) research because it is part of their function (P1 and P4) or out of their own initiative (P9, P13, and P14).

The interviews revealed interesting insights on this milestone as well. P1 and P9 mentioned how hiring new and young faculty members should be given consideration. P9 revealed that,

"We had a research on that way back 2005-2006.... We only had a few at around 10-15% (Gamay ra kayo to'ng gaconduct ug research, 10-15% raman tingale to) but now it has increased. And (mao gale na ingon ko) as I said, the young ones are doing it."

This supports the contention that those who are already in the system or have been teaching in the university for a long time may not so readily accept doing research in contrast to their younger counterparts. However, one administrator has shared that teachers in HEIs are assumed to have some background in conducting research since the entry requirements include a Master's degree, which almost always requires a thesis before graduation. P5 states,

"First of all, you have to consider, we're talking about HEI ha, that no teacher could teach without Masters...So what I'm saying is, we will start with what they have. Teach them how to write, rewrite their thesis for publication."

In any case, once faculty members are hired in the institution, asking them to write is not sufficient unless there is a sustainable system that ensures quality outputs (P13).

Side by side with the faculty's conduct of research should be the writing of manuscripts (see Appendix A, Table 3) or research reports. With 29 significant statements and 12 formulated meanings from all 14 informants, this key action point highlights that the faculty must be trained to write research papers (P1, P4, P5, P9, P13, P14). It is a skill in itself (P9 and P12) and the written works are proof of research culture (P2 and P3) especially in terms of accreditation (P8). These trainings on writing should be backed by policies (P4), as the faculty should feel that they are supported in their research endeavors (P7 and P13). In addition, these capability building activities should not be limited to teaching the faculty how to write proposals (P4) but also giving them sufficient time to write (P4, P6 and P11) in the pursuit of knowledge (P2). P13 shared that,

"There were already research trainings as well however the design of those trainings did not include any follow-up. It leaves a certain kind of feeling of what's next? The trainings were not sustainable."

Some key insights in this key action point include the presence of core research faculty (P1, P13) which refers to faculty already conducting research and writing papers long before they were required by the university, while some write because it is a requirement (P8, P9, P10, P12). This highlights the need for a needs-based approach to capability building that will lead to research productivity. A single approach to training faculty members may not maximize existing skills present in the institution's manpower. Another finding was that two informants mentioned that school leaders must have manuscripts (P2 and P14). As stressed by P2,

"Another advice that I can really share is the deans or those who will be heading the different units or departments must really have the knowledge of doing research. (They) must also be doing some published materials and outputs so they can also share and empower to others the knowledge, the initiatives of also doing research."

Conducting research studies and writing manuscripts summarizing the results are two of the most fundamental outputs of research culture in terms of performance

and by-product. But if one goes to the purpose of knowledge generation, these are not enough for maturity to be achieved and so expansion of the basics must be worked on.

Expansion

A Teacher Education Institution with faculty members conducting research studies and writing manuscripts summarizing the results of these academic undertakings can now expand in that dissemination is pursued as an output. This milestone can be manifested through presenting papers (Appendix B, Table 4) and publishing articles (Appendix B, Table 5). Thirty-four significant statements led to 16 formulated meanings for this stage in research culture development.

Paper presentations are considered indicators of research culture (P1, P3, P7, P10 and P13); research findings ought to be reported (P2 and P5) to all levels (P9 and P12), even to the international arena (P9 and P10). Two of the informants specifically highlight the need to support faculty presentations (P5 and P13) in a sustainable manner (P13), even those who present of their own initiative (P19, P13 and P14). Granting incentives (P4), provision of venues for presentations (P3, P7, P8, P12), and support for foreign travel (P10) are some of the ways to show this support.

Presenting research outputs is a skill that is equally important to be learned (P13) because it can be a platform for networking (P3 and P14), empowerment (P7, P12, P13), and powerful role modeling (P13). When screening papers for presentation, the review process should be given sufficient attention (P13). The rigor involved in the selection of papers for presentation is an evidence of quality assurance (P11 and P12). This is clear in the experience shared by P13 that,

*"...when faculty members finished presenting their research; they would come back and share their experiences. In many ways, this motivated the faculty. In the case of ***, I think modeling was really very powerful in building the research culture."*

Dissemination is not only limited to paper presentations but includes publication of research articles. Six informants believe that a mature research culture necessitates the publication of research articles (P2, P4, P8, P10, P12, and P13). An institution should set publication targets (P2 and P14) to further aid research dissemination. (P5 and P14). Although there are those who acknowledge that publication is a requirement for a university (P2, P7), it remains a challenge for school administrators (P2, P3, P5, P14) as it requires a higher level of skill set (P11) and the quality of the journal where

the articles are published matters (P4 and P5). It is even suggested that the university have their own journal (P2, P10 and P11) and be able to sustain its operations (P2, P8 and P11).

To increase the number of publications, it is suggested that outstanding student work can be included (P3, P9, P12) and graduate school research be written in publication format (P5, P8). It can be incentivized (P3) or through the initiative of the faculty (P7 and P9). P5 identifies the presence of mentors to be helpful in the challenging task of publication in this statement:

"You really have to get people from the outside to teach us that because the people inside also grow used to the idea of the old."

It is noteworthy that the academic leaders chosen to be informants of this study highlighted the value of quality publications (P4, P5, P11 and P13) to aid building the reputation of the researcher (P15 and P14). As P11 puts it,

"They need to do more and more quality research. That's the only way. They have started already so they need to satisfy the quality of their work because after making the research, after they have already the paper from the research conducted, we need to satisfy the journal already. The journal is this quality, like Category A, Category B. It has to be reviewed rigidly. And then not that point only to stop, we need to go further. We have to be accessed internationally."

Benchmarking on international standards (P11 and P14) and ensuring the placement of quality assurance mechanisms (P11 and P13) are some of the identified ways of achieving this goal.

Maturation

Eight out of the 14 informants agree that for a university to have a mature research culture, the utilization of research should be evident (P1, P2, P3, P4, P5, P10, P12, P14). In this stage of research culture development, the milestone is Creation, which translates to evidences in influencing policies (Appendix J, Table 26) and introducing technology (Appendix J, Table 27) as key action points. This reveals that ultimately, in terms of outputs, a teacher education institution is considered to have a mature research culture if it can prove that it has contributed to new knowledge (P2) especially in their field of discipline (P3 and P7) in a way that it helps solve problems (P2) and improves the teaching-learning process (P2, P7, P13 and P14). In the mention of the teaching-learning process, the peculiarity of having informants coming from the TEIs comes out.

In terms of influencing policies, this can be manifested in the inclusion of research in all the activities of the institution (P12 and P13). Research will not be able to permeate all the other functions of the institution if it is not backed by policy. Another measure of influence is citation (P7 and P11), which is used by many as indicator of a mature research culture. The informants highlight that development does not only start with really good research (P3) but that the mindset of contributing to the development of the community and one's discipline should be inculcated in the minds of the researchers (P5, P13). P13 stated,

"Research should be responsive to the changing needs and demands of the society."

For a mature research culture, the outputs of research undertakings must reach international recognition (P7) and improve practice in the same manner that practice improves research in a discipline (P2). All of the ideas in this theme are summed up by P3,

"That is how I think we can say there is maturity in the research culture. When certain theories of education are associated with the school. That is why I said patents, ideas, theories. Theories that are now associated with the school. For example, would be if there are intellectuals and gurus that are associated with the school, the institution. The theory or the philosophy or whatever now exudes and now brings the name of the school outside as a respected kind of thinking or thought that is really the mature research culture."

In addition to this, although not a popular thought in this group of informants, is the idea that a mature research culture introduces technology. With only 18 significant statements and 6 formulated meanings, this may be taken to mean that TEIs are not naturally geared to producing patents and utility models. The prevailing idea is that research should translate to something that is useful to the community (P1, P2, P10, P12, P14). P2 explained,

"Teachers need to be instilled in their responsibility that it's not just for classroom, it's also for the community and for global practice also. That's when the knowledge is shared to everyone in the community. It's when there is an innovation of new knowledge."

As product, research should result in patents in a mature research culture (P3, P10, P11, P12, and P14). P3 said this of their institution's research culture,

"It's not mature yet. There is still a room for, a lot of room for improvement. Maybe, just maybe, this is my take on a full maturity for a research culture is number one, when research translates to development. Meaning, development of systems, procedures and you really see the application. And so, related to research would be patents, development of patents. Right now, they have to establish the intellectual property office. Right now, we don't have the IPO office yet."

It should be noted that there should be the provision of research infrastructure to support patenting (P11, P12).

One key insight shared by the informants, as a manifestation of a mature research culture is that even at this stage, researchers are reminded that research should anchor on what is happening in the actual field (P14) and with due consideration with coming up with something novel (P11). Research, as P11 believes, should be undertaken with utilization in mind. This means that building a research culture entails continually learning from the field in order to be able to identify areas of contribution and to have a much clearer view of what is considered novel in the academic community and industry.

If one looks at the data closely, an observation would be that only seven of the 14 informants have contributed to this theme. This may imply that there are TEIs that see the contribution of research more for the improvement of policies, systems and practices than actual technological contributions. Also, as observed by the researcher, some informants see that a mature research culture ends at being able to publish their papers. The answers of the informants give a clue as to what level of research culture development their institution is in. Most of those who struggle in producing papers think that being able to publish is maturity but those who are able to publish pursue something more.

Discussion

In looking into the outputs of the Teacher Education Institution (TEI) over the period of research culture development, interviews revealed that the milestones move from Production to Dissemination until the TEI goes into Creation (see Figure 2). In gestation, the TEI begins to manifest the existence of its research culture in terms of performance and product. Production involves conducting research and writing manuscripts. As the research culture of the university reaches the expansion stage, it now moves from doing research and writing research papers to the dissemination

of results. Dissemination is not only done within the university or college but to other educational stakeholders through presenting papers and publishing articles. The shared results of conducted researches can be used in influencing policies and introducing technology. It is when their outputs are relevant and are useful to the academe, community, and industry or when the university or college goes into creation, that it can be said that maturation has been reached.

STAGES	MATURATION	Institution	INPUT	Creation	OUTPUT
	EXPANSION	Collaboration		Dissemination	
	GESTATION	Capacity-Building		Production	
		INVESTMENT			

Table 1
The Milestones of Research Culture as an Investment

In terms of return of investment, production involves conducting research which translates to how institutions pursue institutional and commissioned research, hire technologically-literate and research-competent faculty members, recognize research as a function of a TEI faculty, require students to conduct research and consider sustainability of systems in place for conduct of research. This would require an investment in the human resources of the institution and careful planning on the part of the institution. It is noteworthy as well that literature indicates that teacher educators increase their research productivity and build their own identity as fully fledged researching academics when they are given opportunities to work with more experienced colleagues in a supportive academic environment (Hill & Haigh, 2012).

Complementary to this key action point is writing manuscripts which require institutions to support the faculty in writing research proposals and papers, prove the presence of research culture through written work, accreditation and policies that facilitate research activities, have core research faculty and researching school leaders, write in the pursuit of knowledge and require research from the faculty. The technical writing aspect of research is considered by many as a special skill set that needs to be learned by a researcher in order to get his findings across in an effective manner. The institution in turn should invest in their faculty and help them learn this skill. In a study on research culture, findings suggest several policy implications for institutions of higher learning. These include the need to have a strong faculty development program and enhanced research collaboration to promote and enhance the research culture in higher education institutions (Quimbo & Sulabo, 2014). It should be noted that it is through the reports written of research activities where evidences of rigor and scientific contribution can be evaluated.

In the Expansion Stage, Dissemination involves presenting papers, as indicator of the presence of research culture. Part of quality assurance, it is a powerful form of role modeling and a tool for empowering and motivating researchers. Institutions need to inculcate the idea that findings must be reported and encourage the conduct of research presentations in all levels and to various audiences. It should also support paper presentations through incentives, provide a venue for such activities, fund research-related travels in a sustainable manner, and encourage the faculty members to form professional networks. Presenting findings and reporting research activities give opportunities for learning for the faculty and could be effective in building their confidence in conducting research. This highlights the communal aspect of developing research culture. Tynan and Garbett (2007) affirm the value of teams in their study, highlighting the need for collaboration in the higher education research landscape that may have put too much emphasis on individualism and competition between researchers.

As a product, the conduct of research is expected to translate to the publication of articles. Similarly, this is spurred because it is considered as a requirement of the faculty, a challenge for the administrators, prerequisite for the establishment of a researcher's reputation and an indicator of a mature research culture. The challenge here includes the ability to sustain your own journal and publication targets benchmarking on international standards, address the requirement of a higher level of skill set, necessitate quality research, and facilitate publication through mentoring. The findings also ask that one look into the quality of the journals where the articles are published and train students to publish their work. These findings stress the importance of the role of management in the development of research culture.

Pratt, Margaritis, and Coy (1999) identified decentralized management in the higher education institution's structure and strong leadership at the dean level to be vital considerations for the maturation of a research culture.

Dissemination as a milestone differs largely from production in that it is in this stage when an institution acknowledges that research is meant to contribute to a much greater cause. Quality assurance in research is reinforced in presentations and publications as it provides not only a way of sharing significant findings, but it provides a system of check and balance. It adds protection to the academic integrity of the work done. However, the 45 significant statements and 18 formulated meanings in this category reveal that dissemination is not the ultimate goal of research but is a vehicle for impact which is addressed in Maturation.

The highest level of development is indicated by the institution's ability to create. Creating includes the ability of research outputs to influence policies. This is considered an indicator of a mature research culture. The challenge for the institution is to make research a part of all its activities and provide evidence for research utilization and contribution. The focus is the institution's ability to significantly contribute in solving problems in the field of discipline. It is important to remember that research improves practice and practice improves research. For Teacher Education Institutions, a focus on contributing to improving the teaching-learning process is also recommended. Overall, it can be said that the level of impact of the research is a reflection of how grounded the choice of research problem is to what is really happening in the field of study.

Together in this milestone is the key action point of introducing Technology. This is also considered as an indicator of a mature research culture. Key insights that needed to be studied if an institution is serious about becoming a reputable institution for research is to invest in the ability to provide infrastructure supportive of patenting. All these efforts need to anchor research on realities in the field of discipline. Right from the very start, one needs to undertake research with 'utilization' in mind, which translates to something useful in the community. The challenge of creation also includes the ability to produce something novel. In this age, innovation and ingenuity are given premium even in the academe. To be able to reach this level takes high levels of commitment in the work setting that, according to Edgar and Geare (2013), is a core feature of high functioning departments in a university in terms of research productivity.

Conclusion

The development of research culture is an investment and is therefore evidence-based consisting of observable and measurable outputs in terms of performance and product. Gestation is achieved with production that consists of conducting research and writing manuscripts. Expansion happens when research outputs are disseminated through papers presentations and publications of articles. Maturation in terms of outputs leads to creation, which refers to influencing policies and being able to introduce technology, geared towards contributing to development and innovation.

Any institution that seeks to build a strong research culture should have a clear monitoring and evaluation system of research outputs as part of their investment plan for this academic endeavor. The return of investment should be identified in order to check the effectiveness of practices and recommend redirection of initiatives if evidences suggest otherwise.

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Michelle Mae J. Olvido

Cebu Normal University
olvidom@cnu.edu.ph

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Appendix A

Summary of Formulated Meanings for Production

Table 2

Formulated Meanings for Key Action Point - Conducting Researches

FM Code	Formulated Meaning	#	Sources
CR01	Hiring of young faculty members is vital	2	P6, P9
CR02	Presence of commissioned researches	2	P1, P11
CR03	Presence of institutional researches	4	P1, P8 (2), P11
CR04	Recognition of research as a function of the faculty.	2	P1, P4
CR05	Researches are done through faculty initiative	3	P9, P13, P14
CR06	Students are required to do research	6	P3, P7, P8, P9 (2), P10
CR07	Sustainability of systems should be considered	2	P13 (2)
CR08	The faculty is assumed to have some background of doing research	1	P5
CR09	The faculty is trained to do research	9	P2, P4 (2), P6, P9, P11, P13 (2), P14
CP10	The graduate school is focused on research	3	P3, P12 (2)
TOTAL		34	

Table 3

The Milestones of Research Culture as an Investment Formulated Meanings for Key Action Point - Writing Manuscripts

FM Code	Formulated Meaning	#	Sources
WM01	Accreditation is proof of existence of research.	1	P8
WM02	Policies facilitate the research activities	1	P4
WM03	Presence of core research faculty	3	P1, P13 (2)
WM04	Research is a requirement	4	P8, P9, P10, P12
WM05	School leaders must also have manuscripts	2	P2, P14
WM06	The faculty is trained to write research papers	6	P1, P4, P5, P9, P13, P14
WM07	The faculty needs to feel they are supported in their research endeavors	3	P7, P13 (2),
WM08	The faculty should be given sufficient time to write	3	P4, P6, P11
WM09	Writing in pursuit of knowledge	1	P2
WM10	Writing research is a skill	2	P9, P12
WM11	Writing researches start with writing proposals	1	P4
WM12	Written works are proofs of research culture	2	P2, P3
TOTAL		29	

Appendix B

Summary of Formulated Meanings for Dissemination

Table 4

Formulated Meanings for Key Action Point - Presenting Papers

FM Code	Formulated Meaning	#	Sources
PP01	Encourage international presentations	2	P9, P10
PP02	Encourage presentations from all levels	2	P9, P12
PP03	Faculty presentations should be supported	2	P5, P13
PP04	Findings have to be reported	2	P2, P5
PP05	Paper presentation is a skill to be learned	1	P13
PP06	Presentation of papers is an indicator of research culture	5	P1, P3, P7, P10, P13
PP07	Presentations are part of quality assurance	2	P11, P12
PP08	Presentations can be incentivized	1	P4
PP09	Presentations provide a platform for networking	2	P3, P14
PP10	Provide a venue for research presentations	4	P3, P7, P8, P12
PP11	Quality control is vital in paper presentations	1	P13
PP12	Research dissemination is meant to empower	4	P7, P12 (2), P13
PP13	Research presentations can be undertaken through faculty initiative	3	P9, P13, P14
PP14	Supporting international travels for research presentations can be motivational	1	P10
PP15	Systems to establish sustainability should be in place	1	P13
PP16	The act of presenting papers is a powerful form of role modeling	1	P13
TOTAL		34	

Table 5

Formulated Meanings for Key Action Point – Publishing Articles

FM Code	Formulated Meaning	#	Sources
PA01	A university should have its own journal	3	P2, P10, P11
PA02	An institution should set publication targets	2	P2, P14
PA03	Benchmark on international standards	2	P11, P14
PA04	Graduate school publications are advised to be written in publishable format.	2	P5, P8
PA05	Journals should be sustained	3	P2, P8, P11
PA06	Outstanding student work can be published	3	P3, P9, P12
PA07	Publication is a challenge for school administrators	4	P2, P3, P5, P14
PA08	Publication is a requirement for a university	2	P2, P7
PA09	Publication requires a higher level of skill set	1	P11
PA10	Publications can be incentivized	1	P3
PA11	Publications can be pursued through faculty initiative	2	P7, P9
PA12	Publications establish researcher reputation	2	P5, P14
PA13	Publications is an indicator of a mature research culture	7	P2, P4, P8, P10, P12, P13(2)
PA14	Publications necessitate quality research	1	P11
PA15	Quality assurance mechanisms should be in place for publication	4	P11(3), P13
PA16	Research is made useful through publication	2	P5, P14
PA17	The presence of mentors aid in publication	2	P5(2)
PA18	The quality of the journal where the articles are published in matters.	2	P4, P5
TOTAL		45	

Appendix C

Summary of Formulated Meanings for Dissemination

Table 6

Formulated Meanings for Key Action Point –Influencing Policies

FM Code	Formulated Meaning	#	Sources
IP01	Citation is an indicator of a mature research culture	3	P7 (2), P11
IP02	Development starts with really good research	1	P3
IP03	International recognition is important	1	P7
IP04	Research improves practice and use of research in practice improves research in the discipline	1	P2
IP05	Research in the academe should contribute to the improvement of the teaching-learning process	4	P2, P7, P13, P14(2)
IP06	Research is done to contribute new knowledge	2	P2, P5
IP07	Research is part of all the activities in the institution	2	P12, P13
IP08	Research translates to solutions to problems.	1	P2
IP09	The development mindset needs to be inculcated	2	P5, P13
IP10	The school is identified with significant contributions to the field of discipline	3	P3, P7(2)
IP11	Utilization of research should be evident	11	P1, P2(3), P3, P4, P5, P10(2), P12, P14
TOTAL		31	

Table 7

Formulated Meanings for Key Action Point – Introducing Technology

FM Code	Formulated Meaning	#	Sources
IT01	Patents is an indicator of a mature research culture	6	P3, P10, P11 (2), P12, P14
IT02	Research infrastructure should support patenting	2	P11, P12
IT03	Research should anchor on what is happening in the actual field	1	P14
IT04	Research should be undertaken with utilization in mind	1	P11
IT05	Research translates to something useful to the community	7	P1, P2 (2), P10(2), P12, P14
IT06	The challenge in patenting is novelty	1	P11
TOTAL		18	

Motivating Factors and Obstacles behind Grant Research: The Case of a Teaching Focused State College

Abdelilah Salim Sehlaoui
Sam Houston State University

Elizabeth Gross
Sam Houston State University

Pimrawee Ruengwatthakee
Sam Houston State University

Abstract

Faculty motivation to seek external funding includes the ability to conduct research and offer innovative programs and bring prestige and support for universities. However, faculty may decline to participate in the grant-seeking process. In order to better understand the reluctance of faculty to pursue grants, faculty in the College of Education at a Southern state university were asked the following questions in a case study: 1) What motivates you to pursue external funding? 2) What factors may pose an obstacle for you to engage in grant writing? and 3) What recommendations do you perceive as needed for you to engage in this activity? The findings indicated that the main motivating factors are freedom in conducting research (88%), freedom in research topic selection (84%), and ability to hire student workers and other faculty and staff to assist in research (77%). Among the obstacles, time was found to be the most challenging obstacle (80%). Many faculty members also agreed that lack of technical guidance (45%) was a common obstacle. Several suggestions were shared to support faculty grant writing. These include implementing policies to incorporate and value grant writing in the tenure process, conducting needs assessment, and creating faculty liaisons for the college.

Keywords:

Grant Writing, Higher Education, Faculty, External Awards, Barriers to Grant Writing, Positive Reasons to Pursue Grants, External Funding

Introduction

Grant writing has historically been a pursuit among academic as well as non-academic institutions in order to fund their projects and research activities. Reasons for this vary from permission to pursue specific scholarly interests to creating, piloting, and implementing an entirely new scientific method or procedure (Lawrence, 1995). This is true not only in Science, Technology, Engineering, and Mathematics (STEM) fields, but the social sciences have also acknowledged the advantage of grant funding to support research activities. There are many sources of funding, governmental as well as private. In order to obtain support from grants, researchers have to communicate to grant funders that the money will be well-spent and that the recipient will report to the funding agency regarding the research as well as the stewardship of the funds.

Research and writing have traditionally been essential to tenure-track faculty in order to continue in the academy (Boyer & Cockriel, 1997), and this of course remains true today. The rewards of grant research stem not only from monetary support, but they also extend to the financial health of colleges and universities where faculty serve. For these reasons, the pursuit of external funding, while always being important, has gained an impact in the academy in light of budget cuts and increased emphasis on efficiency (Daniel et al., 2006). Grant-sponsored research activities allow faculty to have summer release time from teaching duties, hire graduate students to help with research activities, and acquire valuable resources for this creative scholarly activity.

Unfortunately, there are many hurdles to the attainment of a grant award. Because external funding is an added boost to faculty careers as well as to the university's prestige, it is essential to bring these blocks and challenges to light. While this is part of good business practice, the type of needs assessment survey used in this study has not been conducted before at this college. This case study explores the motivations and obstacles for faculty pursuing funding. Its purpose is two-fold. First, it aims to describe the most challenging obstacles and most motivating factors that faculty in a non-research-focused College of Education in a Southern public university perceived as important in engaging in grant research writing. Second, and based on this needs assessment, the paper will make some recommendations and share resources and support that the College of Education can offer to its faculty for them to engage in this scholarly activity. To achieve this purpose, the paper will include a brief review of the literature, share quantitative and qualitative data results, and offer recommendations for further research in this area.

Literature Review

Need for Grant Research

According to Marsh and Hattie (2002), faculty members play a crucial role in the functioning of colleges and institutions of higher education. Other researchers (e.g., Bai et al., 2012) found out that the research culture in a given institution is enhanced by faculty scholarly projects. These researchers propose that the process of applying for and securing external funding not only affects institutions of higher education, but it also affects faculty development. According to Walden and Bryan (2010), producing scholarly work could be viewed as engaging in research, writing articles for publication, and sharing research findings with students and colleagues. However, in today's climate where budget cuts are affecting funding for faculty and students' professional development, seeking external funding becomes more and more an integral part of our scholarly activity (Hemmings & Kay, 2010). Due to budget cuts and fiscal challenges, external funding is now a major source of support for higher education institutions (Prince et al., 2007; Smith, 2016). Research in this area (e.g., Gitlin & Lyons, 2004) has documented the fact that many institutions of higher education are encouraging faculty to engage in grant writing because external funding not only enhances faculty research activities and career, but also brings prestige to these institutions. For universities to increase external funding for research along with increasing research productivity, it is essential that faculty members be motivated to engage in grant research and seek funding to support it (Chval & Nossaman, 2014). The pursuit of external funding could impact the process of faculty becoming better teachers, researchers, scholars, and practitioners who contribute new knowledge to their disciplines and bring greater visibility and prestige to the institution.

Major Obstacles to Grant Research

O'Connor et al. (2011) reported that most untenured faculty who are teaching at the College of Education could not balance teaching and conducting research because of an overload situation. These researchers explain the many barriers that impede the balance. These include continually preparing new classes every semester, heavy teaching loads, having a large class size, and having other administrative responsibilities. O'Connor et al. (2011) stated that "universities need to equip faculty members with support strategies for successful and thoughtful upward movement as opposed to being caught in an unbalanced drift" (p. 7).

One significant drawback or obstacle to grant writing, according to Walden and Bryan (2010), includes inadequate support available to submit proposals on time. They

also emphasized that "writing research grant proposals is a major means of seeking funding for research at institutions of higher education" (p. 86). However, it should be noted here that the levels of support to submit proposals on time may vary widely by institution and by type of institution. For example, research-intensive institutions, with adequate funding to support grant research, may not face such obstacles.

Another area of need that was identified by Walden and Bryan (2010) relates to a lack of grant-writing skills, which again may vary from one institution to another. Research-oriented institutions will certainly have more resources and professional development opportunities to address this area while non-research colleges may not. Walden and Bryan (2010) explained that:

While all faculty members have at least some academic writing experience, experience with grant writing may be limited to non-existent for some faculty. Academic and grant writing represent two distinctive genres of writing, each necessitating differing approaches (p. 86).

In addition to exploring obstacles that face faculty in this area, researchers in the field of grant research writing have also addressed what motivates them to engage in grant research activities.

Motivating Factors for Grant Writing

Smith (2016) found that full-time tenure-track and tenured faculty perceived autonomy and self-actualization as important intrinsic motivators. Data findings from her research showed that autonomy in the allocation of time, reducing teaching loads, choosing research topics, and choosing research objectives are all perceived as significant intrinsic motivation to faculty pursuing external funding. Extrinsic motivators to pursuing external grants were financial rewards including summer salary, travel, equipment, and materials and supplies. Indirect costs and hiring student workers are perceived as important to faculty motivators to pursuing external funding. Again, these findings may or may not apply to research-oriented institutions where faculty may have more institutional support to engage in grant research and, therefore, may hold different perceptions.

Walden and Bryan (2010) investigated the College of Education faculty's perceptions of motivators and barriers to grant writing at a public research one university. Tenured and non-tenured faculty indicated several significant motivators. These were related to the opportunity to research new information, having graduate assistants to assist for pre- and post-award grant management, securing financial support for

conferences and professional development, and having more flexible time.

Thus, to provide adequate support to faculty, institutions of higher education need to have a clear understanding of the factors that contribute to faculty motivation to seek external funding. Understanding the motivating factors, as well as the obstacles that prevent faculty from engaging in grant writing will provide valuable information for colleges and universities to design effective professional development, provide resources, and create policies that support faculty members to engage in this creative scholarly activity. Research findings in this area vary from one institution to another, depending on so many variables, which include size and type of institutions, available resources, and policies. However, there has been a consistent finding that calls for the need for more support for faculty in their endeavors to pursue external funding (Boyer & Cockriel, 1997; Grant & Shin, 2011; Smith, 2016; Walden & Bryan, 2010). Since each institution is unique and given the documented need for faculty support, the purpose of this case study was to answer the following three questions:

1. What motivates the College of Education (COE) faculty to pursue external funding?
2. What factors may pose an obstacle for COE faculty to engage in grant writing and related research?
3. What recommendations, resources, and support does COE faculty perceive as needed for them to engage in this scholarly activity?

To answer these research questions, we examined existing anonymous data that has recently been collected by the College of Education within each department. Quantitative and qualitative data analyses was used to explore the patterns that emerge from these data. Based on results from this study, the researchers provide a set of research-based recommendations, strategies, and resources to support grant research and inform related professional development activities.

Method

Setting and Contextual Background

The setting and institution where this research was conducted is located in the state of Texas. The target state university, which has been classified as a “Doctoral Research University” by the Carnegie Commission on Higher Education, began as a purpose-built Normal School and for more than 130 years, the university has been

preparing teachers to serve the needs of a diverse student population. It is the oldest school of education west of Mississippi. The College of Education (COE) currently serves more than 1,400 undergraduate and 900 graduate students each year. The COE boasts an 83.2% retention rate for teachers, which is higher than the state average. Additionally, the pass rate for teacher candidates on their certification exam, the Texas Examinations of Educator Standards (TExES), is consistently above 90%. The College of Education produces more doctoral degrees than any other colleges in the university, averaging 44 graduates from five degree programs. The COE provides a Bachelor of Science in Education for undergraduates, which encompasses over 25 certification areas for future educators. It has 15 master's degree programs, and five doctoral degree programs. COE currently serves over 75 school districts across the state of Texas, in a mutually beneficial partnership group comprised of an educator preparation program and independent school district partners. Approximately 45% of students are the first in their families to attend college and 60% are qualified as "at-risk." The student population is 24.7% Hispanic, and 18.1% Black or African American. The mission of this college is teaching-focused, and the university is not an R1 institution.

Participants

The survey was sent to 80 faculty members and 49 responded, with a rate of 61.2%. The participating COE faculty members' demographics are summarized in Figures 1 and 2. The COE includes five departments: Curriculum & Instruction; Language, Literacy, and Special Populations; Library Science & Technology; Counselor Education; and Educational Leadership. Faculty members represent 12 different program areas. Ninety percent (90%) or 44 of them are full-time faculty members; five of them are clinical faculty. Seventy percent (70%) hold a Ph.D and 30% an Ed.D degree. Tenured and tenure-track COE faculty members are three courses per semester instead of four, as these faculty members receive one course release for conducting research. Faculty members are encouraged to plan for course buy out through grant funding if they are awarded. There is no release time for grant writing or for chairing dissertations.

Figure 1

Faculty Demographics

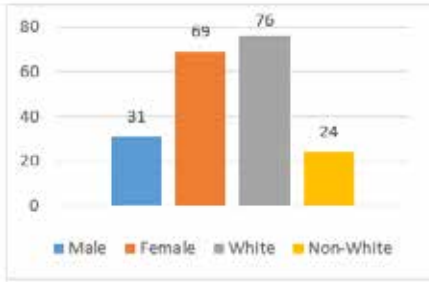
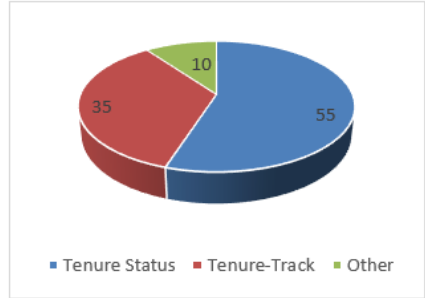


Figure 2

Faculty Status



Research Design

A case study of non-experimental existing data research design was selected to examine the relationship between different phenomena without any direct manipulation of conditions that are experienced or identifying cause and effects (McMillan & Schumacher, 2010; Privitera & Ahlgrim-Delzell, 2019).

Yin (2009) describes case study research as: "... an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident" (p. 638). In other words, the subject of the research is comprehensively studied as an example of a real-life phenomenon, within the context in which it is happening.

The researchers obtained permission to use existing data collected by the College of Education administration through a survey instrument. There was no random assignment of participants and no control groups. The online survey was sent to all COE faculty members. Participants' motivation and their perception of potential obstacles in engaging in grant research were assessed based on their responses to the survey. The survey questions covered the following areas:

1. Number of external grants submitted and awarded;
2. Amount of each grant in dollars by year;
3. Grant awarding agency's name; and
4. The discipline, purpose, and title of the grant.

Participants were also asked to describe and rank-order 25 items as motivating factors in pursuing external funding. The 25 items included things such as having more

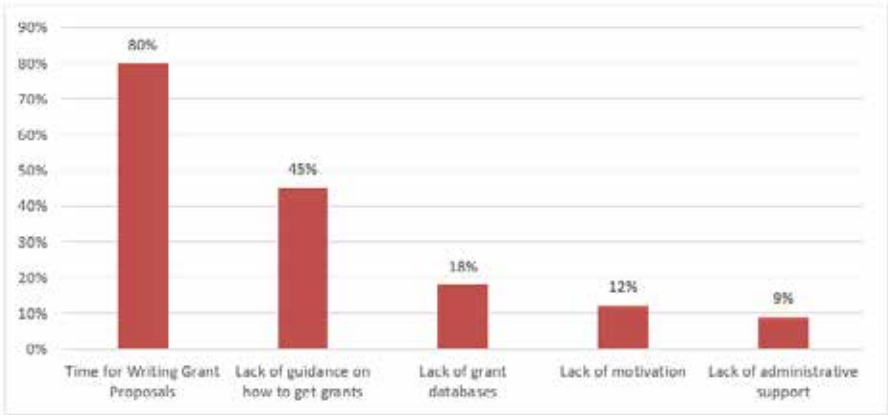
flexibility in the allocation of time to receiving financial support for student workers or other staff. The survey also included an open-ended question where participants can describe factors that may pose an obstacle for them to engage in grant writing and grant-related research as well as any other comments. Quantitative and qualitative data analyses were used to explore the patterns that emerged from these data to answer the three questions that this case study focuses on. Qualitative data were analyzed using a domain and thematic analysis, based on the research questions, by generating categories and then themes from the answers given (Ely, et al., 1991; Miles & Huberman, 1994). Descriptive statistics were used to describe, analyze, and summarize quantitative data (Privitera & Ahlgrim-Delzell, 2019). Based on results from this study, the researchers provided a set of research-based recommendations, strategies, and resources to support grant research and inform related professional development activities.

Results

1. COE Faculty Perceived Obstacles

Five obstacles were reported by COE faculty to be barriers to engaging in conducting grant research and securing external funding. These include time to write grant proposals, lack of guidance on how to receive grants, need for grant databases that would match faculty research interest and grant opportunities in their area, lack of intrinsic motivation, and need for more administrative support. Among these obstacles, time to write grant proposals was found to be the most challenging obstacle (80%). The majority of faculty found it difficult to strike a balance between conducting grant research and other regular responsibilities and finding time to write grant proposals. Many faculty members also agreed that lack of technical guidance (45%) was another obstacle they faced in engaging in grant research. Moreover, need for grant databases that would match faculty research interest and grant opportunities in their area was described as an obstacle by 18% among faculty; lack of intrinsic motivation was reported by 12% of COE faculty members, whereas, need for more administrative support was reported by 9% among them. These were identified as factors that caused faculty to avoid conducting grant research or seeking grant research opportunities. Figure 3 summarizes these results.

Figure 3
Most Challenging Obstacles to Grant Writing



Qualitative data corroborate the above results. The following are some representative quotes from faculty comments regarding time as a major obstacle. One faculty member stated:

Buyout time is critical to grant implementation and needs to be honored. Time is a major factor for me, crushing teaching loads, and service on committees leaves little time for grant work. My committee/college workload is so heavy between that and teaching there is no time.

The issue of time as it relates to certain disciplines where finding adjuncts or faculty who can cover teaching loads for regular faculty becomes another challenge for some faculty. One faculty member stated: "It is difficult to find the time it takes to write a grant. Then if you are funded, there is an issue of who is covering the courses that you might not be available to teach."

Another theme that emerged from the qualitative data analysis relates to the creation of a grant research database that would match faculty research interest and grant opportunities in their area. A representative quote for this perceived obstacle was shared with one of the faculty members who explained it as follows: "I need help from the office of grant research to identify grant proposals that match my skills well in advance of their due date." Other faculty members complained from other perceived obstacles such as "limited knowledge of the process," "lack of grant writing experience," and "need for help with grant writing." As one faculty member put it "I

think just having guidance on how to actually write the grant proposal is helpful. One big challenge for me is not knowing where to start from, not having the background to get grants and lack of knowledge in locating, obtaining, and managing grants."

It should be noted here that qualitative data also helped clarify some obstacles towards grant research writing, related to the obstacle of administrative support, as one faculty member explained:

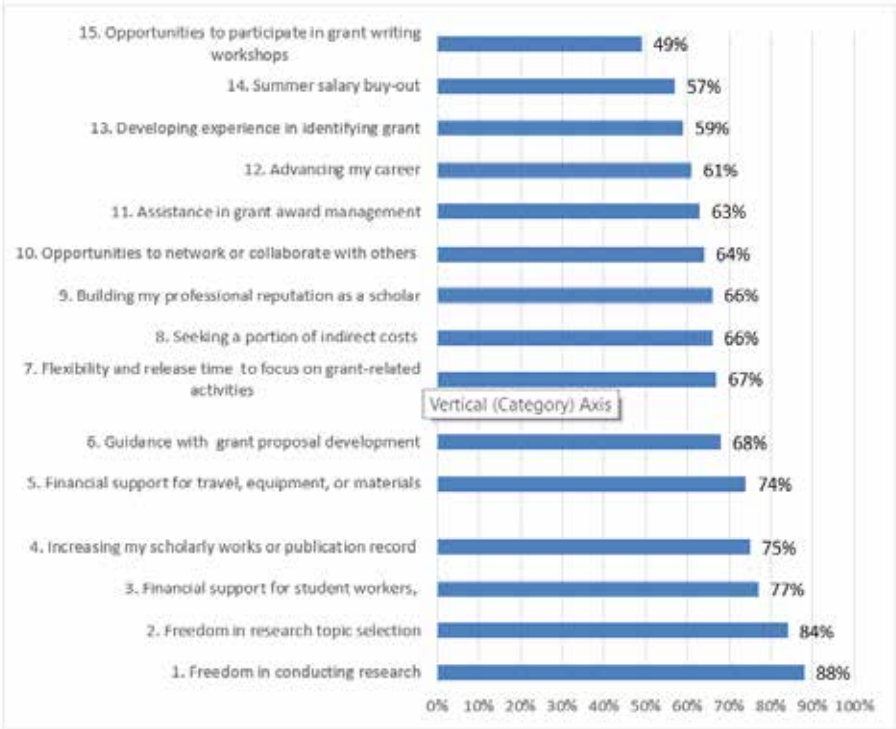
There is no reward for grant writing either and it's time consuming, so why do it? We aren't rewarded for getting external grants in this college, since our faculty evaluation system and our tenure and promotion system do not include grant writing as a criterion in these assessments.

Finally, faculty members who mainly teach undergraduate courses or work mainly with online programs explained in this representative quote that one of the obstacles is the "...need for graduate student research assistants. However, when you work primarily in the undergraduate program or online, you are not supported with graduate research assistants."

2. COE Faculty Perceived Motivating Factors

Figure 4 shows two motivating factors for engaging in external grant research that were considered most important by COE faculty members. These were freedom in conducting grant research (88%) followed by freedom in grant research topic research (84%). The majority of faculty also perceived offering financial support to student workers or graduate assistants (77%), increasing their publication record (75%), and to receiving financial support for traveling and other materials (74%) as a good motivating factor. Faculty members' motivation factors can be classified into two superordinate categories: extrinsic and intrinsic motivators. Extrinsic motivators include factors such as numbers 14, 3, 4, and 8. Intrinsic motivators include numbers 15, 13, 12, 11, 10, 9, 7, 6, 4, 2, and 1. Both types of motivators received a high rating ranging from 49% to 88%, as shown in Figure 4.

Figure 4
Most Challenging Obstacles to Grant Writing



In spite of the perceived obstacles and challenges that face COE faculty, some members do engage in seeking external funding. Figures 5 and 6 summarize COE faculty responses when they were asked to list the number of grants submitted and awarded as well as the dollar amount awarded. During the 2015 academic year, 18 grant proposals were submitted, and two were funded. That was an 11% rate of success. However, in 2016, the rate went to 100% when all seven proposals submitted were funded. In 2017 and 2018, the rate was 31% and 75%, respectively. In short, and as shown in Figures 5 and 6, COE faculty submitted a total of 49 proposals, and 20 of them were funded during the last four years. That is an average of 16 proposals per year and a success rate of 40% on average for the College of Education. Figure 6 shows that the total dollar amount submitted for external funding during the last four years was \$51,576,252, and the awarded amount was \$18,538,073 dollars.

Figure 5

Proposals Submitted and Grants Awarded last Four Years

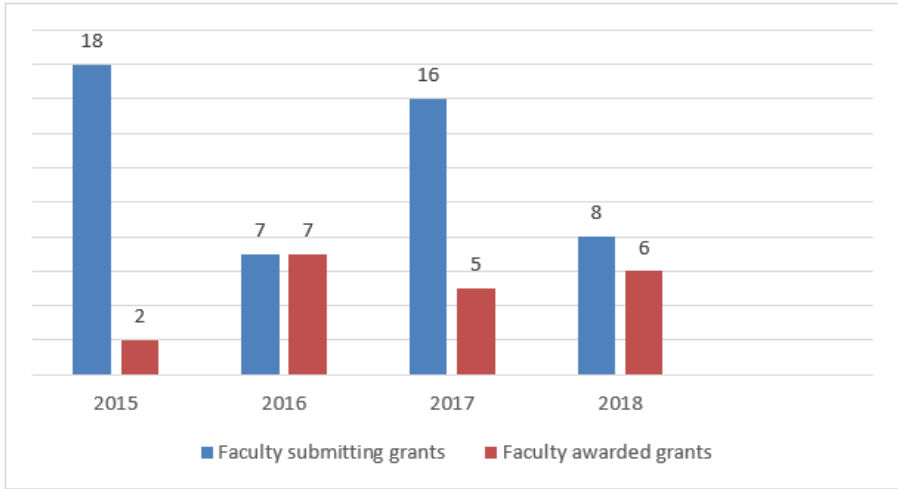
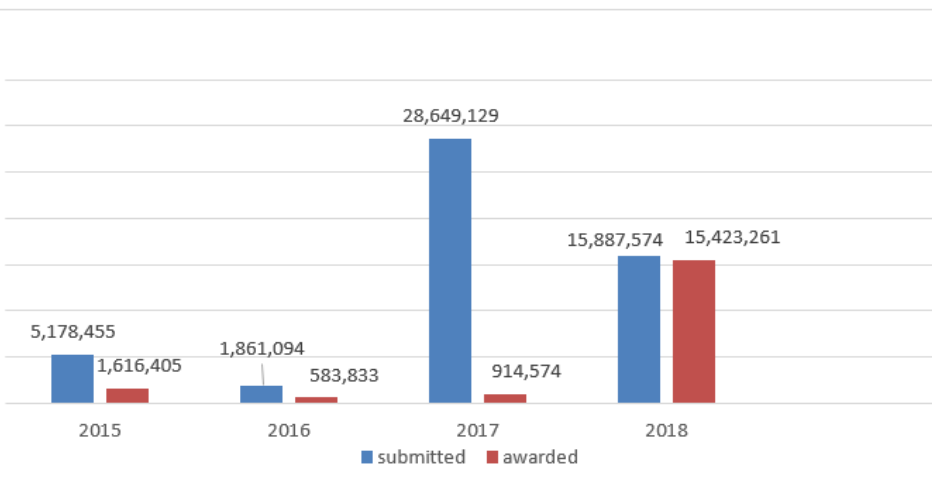


Figure 6

The Amount of Proposals Submitted and Grants Awarded Last Four Years



Discussion

The institution at which this case study was conducted regards teaching as a high priority while considering research (not necessarily grant-related research) and service as important components in faculty evaluation. Teaching remains an essential activity and as part of COE faculty members' identity. Research is seen as important, and all tenured and tenure-track COE faculty members are required to engage in this scholarly activity, which may not be related to grant-research. The COE sees research as part of faculty duties, and it is generally awarded and supported. It should be noted here that while engaging in non-grant-related research seems to be less risky, grant-seeking activities, on the other hand, are fraught with risk because success is not guaranteed. However, grant-writing has recently begun to receive more attention as a way to facilitate the work of the faculty, college, and university.

The data results regarding the number of grants submitted and awarded by COE faculty may be interpreted in various ways. One possible interpretation may be that a minority of faculty members have continued to develop their grant-writing skills over the years, which resulted in more success. These faculty members who do spend the time and research to apply for and successfully achieve grant awards tend to go for the largest monetary awards. In fact, in 2017, the COE was awarded a major Support Effective Educator Development (SEED) program grant with \$8.9 million from the U.S. Department of Education to further support the college's existing 4+1 TEACH program. The COE will be able to apply for a renewal extension in the following two years for over \$4.6 million from federal funding sources, bringing the total projected federal funding for the program to more than \$13.5 million. Another possible interpretation is that the overall educational climate in the state in terms of policy changes and available opportunities in certain discipline areas may have contributed to the surge in the number of grants funded. Change to the COE climate in terms of creating an infrastructure and task force to support faculty in this area at the college level may also contribute to changes in results. Other ways of interpreting these data are that COE faculty may have simply started to focus on large scale grants instead of small ones. While this is a good strategy, writing smaller grants might spread the wealth across faculty, encourage collaboration (Daniel et al., 2006), and increase financial stability within the college (Santos, 2007).

This study aimed to answer three essential questions regarding faculty pursuit of grant funding for research. COE faculty members acknowledge the benefits of external funding and understand the importance of pursuing grants. Their response to the question "What motivates College of Education faculty to pursue external funding?" corroborated what previous research in other contexts has discovered. The

greatest motivators for these participants were

1. Freedom to conduct research, and
2. Freedom in research topic selection.

These factors were found to be intrinsic motivators by other researchers such as Smith (2016) and Walden and Bryan (2010). Pursuing external funding may provide autonomy in the allocation of time (Smith, 2016). The factor of lack of time to write grant proposals was perceived as a major obstacle by COE faculty. Other obstacles reported in this study seem to interact with each other. For example, to address the issue of time, COE faculty members may be provided with more administrative support, effective professional development activities, strategies for how to balance time and duties, incentives, and more administrative support, especially for faculty members who may feel isolated or unsupported. This can only happen when institutions of higher education are using an inclusive and culturally responsive approach in their leadership style (Sehlaoui, 2019).

Other areas where faculty believed grant funding was helpful was in providing money to hire student workers, who can then also be involved in the research process, which has been acknowledged in the literature (Walden & Bryan, 2010). In the undergraduate realm in STEM, for instance, it is not unusual, and greatly encouraged, for undergraduates to be co-authors on published research (Linn et al., 2015; Lopatto, 2010). This is an important aspect of the university experience that faculty would like to share with students. It should be noted here that both the COE and the university seem to provide opportunities for faculty and undergraduate students to engage in grant research. External funding may provide release time from course preparation and teaching as well as other duties involved with course delivery. This frees faculty to conduct research in a way that will both promote career and increase writing opportunities.

Regarding Question 2 (What factors may pose an obstacle for College of Education faculty to engage in grant writing and related research?), COE faculty identified a cluster of issues. The results tend to show that one of the main issues for these respondents to pursue extramural funding is lack of time for grant proposal writing. The development of proposals, as well as the writing and preparation, are so time-consuming that they prevent faculty from engaging in grant research activities (Dooley, 1994; Smith, 2016), especially now that chances of having a proposal funded have become more competitive. The results here show that faculty continue to struggle with the time it takes to research available grants, where to look to find them, how to gain support in the writing tasks associated with them, and the like (Henson, 2003).

Finding the right grant for a particular project was also identified as an obstacle to the pursuit of grants, but only a small percent (18%) of faculty reported this obstacle. This finding seems to be supported in the literature as well (Boyer & Cockriel, 1997). It should be noted here that the target university has both an Office of Research and Sponsored Programs (ORSP) and an Office of Research Administration (ORA). The ORSP has 12 staff members including the VPR. The ORA office consists of three staff members. Both offices provide workshops and technical services to all faculty members in the institution, including COE faculty.

In response to Question 3, (What recommendations, resources, and support does College of Education faculty perceive as needed for them to engage in this scholarly activity?), faculty perceived a more intentional support in the form of guidance in grant seeking, as well as grant writing, as most helpful. For many reasons, the grant-seeking process is difficult without guidance (Porter, 2006). Even when presented with possible grant funding, faculty may not know how to align their research interests with the constraints of the grant. Based on qualitative and quantitative results reported in this study to answer question 3, both tenured and tenure-track faculty need help to raise their level of preparation readiness in engaging in grant research (Shuman, 2019).

Grant writing is not done in the same style as a scholarly paper (Porter, 2005, 2017). Grants must be written in a persuasive way and without industry jargon so that readers who are not familiar with a specific discipline can still understand the aim of the proposal. Some faculty members in this study expressed a lack of administrative support, which is noted in the literature as well (Smith, 2016; Wimsatt et al., 2009). These faculty members believe there is a need for support and help in writing and winning grants for their research interests (Banta et al., 2004) and they seem willing to be part of the process.

Conclusion

This study, like any other research, has its own limitations. This study was conducted at one institution and was limited to only one college within that university. As noted earlier, findings from this case study may differ within the academic units in the same college as well as between and among colleges in the same institution. Findings from this study may also differ within programs in the same department as well, based on the variables of faculty rank and gender. Future research may explore these variations. The convenience sample used may not be indicative of all colleges of education. Since there had not been intentional activity to explore faculty grant-research activities

and increase grant funding before this research was conducted, it was of interest to understand the thoughts and perceptions of the COE faculty members. This case study provided a baseline for future grant-seeking support activities.

The study could be conducted in other colleges in the same university or with other colleges of education in other universities for comparison purposes. A follow-up in-depth interview could have been used too. Different aspects of the grant-award process would benefit from closer scrutiny in order to better understand at what critical points faculty need support, and what support they feel will best benefit them. Besides, successful grant awards can be studied to get a better understanding of best practices, and then disseminating this information to newer researchers in the form of workshops, one-on-one coaching sessions, and the like. Continuous evaluation of this process can then allow faculty a better map for the achievement of successful grants with less investment of time and effort to create a successful grant proposal.

Based on data results from this study, the following recommendations may contribute to addressing some of the perceived obstacles reported by COE faculty. These can be summarized as follows. Institutions of higher education and colleges of education should:

1. Develop policies such as incorporating and valuing grant research as part of merit and tenure evaluation criteria for faculty in non-research-oriented public institutions. For example, rubrics and assessment systems used to evaluate the area of scholarly activity could assign certain points or percentages to grant proposals submitted and different points to grants awarded as well as percentage points for those being managed or directed. Academic units could also incorporate goals and objectives in their overall strategic plan that cover cost for grant research professional development opportunities and seek support from their institutions to attain them.
2. Streamline processes and procedures to facilitate faculty engagement in grant research as well as their management of grant administration. Based on feedback received from the needs assessment data in this case study, the COE offered workshops that addressed this aspect of grant research. The Office of Grant Research and Sponsored Programs as well as the Office of Grant Administration in collaboration with the COE Grant Research Director, organized training sessions to interested faculty in the college to address this aspect of grant research.
3. Strategically plan to continue to support faculty efforts in this area and include it as part of the institution's strategic plan.
4. Continue to conduct needs assessment that will inform the planning and design

of professional development activities and support for faculty grant research and creative scholarly activities in this area. While this seems to be part of good business practice, some non-research institutions may not conduct these surveys regularly.

5. Create a college-level grant liaison team from faculty members who represent each department in the college to be used as an instrumental strategy in achieving the College of Education's goals in this area. The COE created a COE Grant Research Liaison Team (GRLT) representing each of its academic units. The team meets monthly to brainstorm ideas for professional development opportunities, provide collegial support, and create a positive grant research culture to help faculty engage in this creative scholarly activity.
6. Based on needs assessment data obtained from the study, a website was constructed to provide COE faculty with databases that match faculty research interest with grant opportunities, COE-based resources that target grant research in the sciences of education, and web-based professional development opportunities that target the identified areas of need.
7. Use an inclusive and culturally responsive approach by making sure that minority faculty members are engaged and supported in this area, including representation in the GRLT committee.
8. Use strategies to raise the preparation readiness level of faculty to engage in grant research. These strategies will consist of meetings of members of the GRLT members with different program coordinators and individual faculty members to plan ahead of time for upcoming grant competitions and assist faculty with raising their level of preparedness.
9. Offer effective professional development opportunities that address topics for basic pre-award-related aspects of proposal development to advanced workshops that would support faculty throughout the pre- and post-award grant management. Based on data results obtained from the case study, the COE GRLT organized various workshops throughout the academic year that address the areas of needs identified. For example, and for the first time, the COE was able to create a Grant Research Activity and Creativity Day (GRACE Day), where COE faculty members were invited to share their grant projects and learn from each other. GRACE Day was offered in multiple formats such as oral presentations, panel discussions, video podcasts, and dialogue or poster sessions.

Research culture in a college or a university is enhanced by faculty scholarly projects. These include the pursuit and achievement of grant awards. Faculty gain financial, as well as scholarly success, which increases career achievement and battles the effect

of budget cuts. The successful pursuit of external funding could impact the process of faculty becoming better teachers, researchers, and scholars. This process needs administrative and technical support to be successful. This is especially important for non-research institutions that aspire to strengthen and support the area of grant research. It should be an intentional act to achieve the goals that will not only increase faculty scholarship, but will also help support the reputation of the college as an academic institution and improve its infrastructure to serve the needs of students and society. This case study was an attempt to describe the most challenging obstacles and most motivating factors that the College of Education faculty perceived as important in engaging in grant research writing.

Abdelilah Salim Sehlaoui

Professor of TESOL and Applied Linguistics/Director of College of Education Grant Research, School of Teaching and Learning, Sam Houston State University

1908 Bobby K Marks Drive

P.O. Box 2119, College of Education, Sam Houston State University

Huntsville, TX, 77341

Telephone: (936) 294-3969

Email: asehlaoui@shsu.edu

Elizabeth Gross

Assistant Professor of Library Science and Technology Library Science and Technology, Sam Houston State University

Pimrawee Ruengwatthakee

Literacy Program Doctoral Student, School of Teaching and Learning, Sam Houston State University

Correspondence concerning this article should be addressed to Abdelilah Salim Sehlaoui, Professor of TESOL and Applied Linguistics/Director of College of Education Grant Research, School of Teaching and Learning, Sam Houston State University, 1908 Bobby K Marks Drive, P.O. Box 2119, College of Education, Sam Houston State University, Huntsville, TX, 77341, asehlaoui@shsu.edu.

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Development of a Clinical Research Consortium Position Interview Panel within the Department of Veterans Affairs Health Care System

Cyenthia Willis, RN, BSN, CCRP ¹

¹ VA North Texas Health Care System

Kandi Velarde, MPH, CCRC ²

² VA Salt Lake City Health Care System

Karen Bratcher, RN, MSN, CCRC ³

³ VA Palo Alto Health Care System

Debra Condon, MSN, RN, CCRP ⁴

⁴ Minneapolis VA Health Care System

Marcus R. Johnson, MPH, MBA, MHA ^{5,6,7}

⁵ Durham VA Health Care System

⁶ Gillings Global School of Public Health, The University of North Carolina at Chapel Hill

⁷ Department of Public Health, Brody School of Medicine, East Carolina University

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Abbreviations

CSP	Cooperative Studies Program
ORD	Office of Research and Development
VA	Department of Veterans Affairs
VAMCs	VA Medical Centers
NODES	Network of Dedicated Enrollment Sites
PD	Position Description
HR	Human Resources
MIP	Manager Interview Panel
ADO	Associate Director - Operations
NPC	NODES Program Consultant

Abstract

The landscape of clinical research is continuously evolving, focusing now on the scientific assessment of efficacy balanced with patient safety, along with advancements in technology and informatics. These considerations necessitate the acquisition and retention of experienced staff that will be able to meet the demands associated with these new focus areas and can provide support for administrative duties, regulatory duties, study participant management, and data collection at individual research sites. Furthermore, the identification of Clinical Trials Administrators that can function independently and collaboratively within a large, integrated healthcare system clinical research consortium can be a challenging task. Currently, there is a limited amount of publicly available information on strategies that have been employed to identify these types of candidates in this type of setting. The primary aim of this project was to determine if the development of a virtual interview panel, or Manager Interview Panel (MIP), would be effective in screening, interviewing, and ranking applicants for a vacant Associate Director - Operations (ADO) position at one of the Node sites in our clinical research consortium. The findings may inform individuals or groups in research administration and leadership roles seeking to improve the candidate selection component of their respective hiring processes, particularly for those groups that are a part of clinical research consortiums and have study sites that are geographically dispersed and not in close proximity to one another.

Keywords:

Management; Hiring; Clinical Research; VA; CSP

Background:

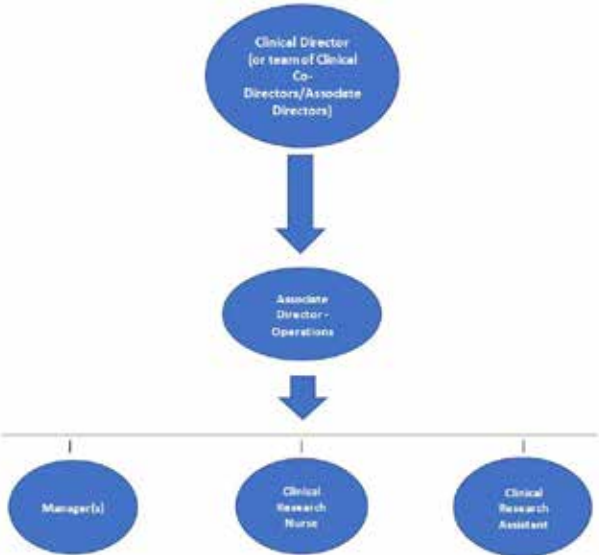
The landscape of clinical research is continuously evolving, focusing now on the scientific assessment of efficacy balanced with patient safety, along with advancements in technology and informatics (Bhatt, 2010; Khan & Weng, 2012; Fiordelli et al., 2013). These considerations necessitate the acquisition and retention of experienced staff that will be able to meet the demands associated with these new focus areas and can provide support for administrative duties, regulatory duties, study participant management, and data collection at individual research sites (Owens Pickle et al., 2017). Furthermore, the identification of Clinical Research Administrators that can function independently and collaboratively within a large, integrated healthcare system clinical research consortium can be a challenging task. Individuals in these positions must have senior management experience in a clinical research environment and should have extensive experience in strategic planning and resource management (personnel, space, facilities, etc.). They must also have prior experience that demonstrates their ability to provide oversight, leadership and mentorship to clinical research professionals, ensure appropriate resources and support for clinical research efforts, and an ability to promote teamwork and cultivate a strong network of clinical research professionals. Lastly, they should be knowledgeable with regards to regulations that are employed in clinical research settings, e.g. the International Conference on Harmonization (ICH), Health Insurance Portability and Accountability Act (HIPAA) and Good Clinical Practice (GCP) (Lindström-Gommers & Mullin, 2019; Jackson, 2020; Friedman, 2006; Guerrini et al., 2019). Ideally, the candidate would also be certified in research through a credible association.

Currently, there is a limited amount of publicly available information on strategies that have been employed to identify these types of candidates in this type of setting, and the majority of literature in this area has a primary focus on the recruitment of clinicians for clinical research positions (Johnson et al., 2018; Unertl et al., 2018; Raftery et al., 2009; Rahman et al., 2011). Therefore, establishing a best-practice method for the hiring of this position is vital. The Department of Veterans Affairs (VA) is the United States' largest integrated healthcare system and provides comprehensive care to more than 9 million Veterans each year (2020). The Cooperative Studies Program (CSP), a division of the Department of Veterans Affairs (VA) Office of Research and Development (ORD), was established as a clinical research infrastructure to provide coordination and enable cooperation on multi-site clinical trials and epidemiological studies that fall within the purview of VA (Huang et al., 2010). The CSP established the Network of Dedicated Enrollment Sites (NODES) as a consortium of sites that are dedicated to generating systematic site-level solutions aimed at enhancing clinical

research activities (Condon et al., 2017; Bakaeen et al., 2014; Johnson et al., 2018; Velarde et al., 2018). NODES provides innovative approaches to address barriers related to clinical trial execution, including hiring of qualified clinical research staff. Each Node site is led by a Clinical Director (or team of co-directors/associate directors), an Associate Director - Operations, and other clinical research support staff, e.g. Clinical Research Nurse, Clinical Research Administrator, and Clinical Research Assistant (see Figure 1). Brief descriptions of these roles can be found in Appendix A.

To effectively execute clinical research activities at the site level, special emphasis should be placed on identifying and hiring exemplary Program Managers, identifying those with a tenacious spirit and perseverance capable of overcoming numerous barriers to facilitating clinical research (Ni et al., 2019; Institute of Medicine, 2009, 2010). The primary aim of this project was to determine if the development of a virtual interview panel, or Manager Interview Panel (MIP), would be effective in screening, interviewing, and ranking applicants for a vacant Associate Director - Operations (ADO) position at one of the Node sites in our clinical research consortium. The findings may inform individuals or groups in research administration and leadership roles seeking to improve the candidate selection component of their respective hiring processes, particularly for those groups that are a part of clinical research consortiums and have study sites that are geographically dispersed and are not in close proximity to one another.

Figure 1. Node Site Organizational Structure



Methods

Management Interview Panel (MIP) Development

Interview panels provide varying perspectives and help eliminate biases in the decision-making process around the selection of candidates for a position. They can also be comprised of members from varying backgrounds and experience depending upon the position being hired (Hardavella et al., 2016). Some companies may find it beneficial to construct an interview panel using staff from a variety of roles such as a financial officer, administrative officer, a staff member in a comparable role, or a Human Resources (HR) officer, while another organization may only use one interviewer (generally the one that will be supervising the posted position). Traditionally, job interviews have been conducted in a face-to-face setting; however, in recent years, telephone interviews and Skype™ interviews have become more commonplace (Higgins, 2014). The method we decided on was a phone interview, initially, due to the fact the MIP team members were located at various VA Medical Centers (VAMCs) across the United States, and it would have been cost-prohibitive to utilize a face-to-face approach during the initial round of interviews.

As a general consideration, each Node site has its own unique hiring practices based on 1) preference for either nurse or non-nurse clinical research positions, and 2) contract services through external entities, i.e., VA affiliated non-profit organizations, academic medical center affiliates, etc. Some interview panels are comprised of personnel from HR, clinical specialty groups, e.g. nursing, medical sub-specialties, etc. (as applicable). Generally, sites work collaboratively with their Human Resource department performing background and reference checks. Prior to implementing this approach in other settings, it would be beneficial to determine what the precedent is for developing interview panels at the respective organization. While the use of an interview panel may serve as a useful resource during the candidate selection process, this is only one aspect of the recruitment process. Additional steps will include working with an organization's HR Department to complete background investigations, verify previous or current employment, and conduct personal reference checks identified by the candidate (United States Office of Personnel Management, 2020a).

The MIP was comprised of several ADOs and the NODES Program Consultant (NPC) who provides education and training to NODES staff and site study members across the program. The composition of the MIP was critical to the success of this approach as all interview panel members either currently serve or have served in the ADO position and had extensive management experience. Furthermore, three of the four interview panel members have served in the ADO position since the inception of the NODES Program (October 2012), and the fourth member has been with the

program in that position for more than four years. Having their perspective on the panel was critical as they all have knowledge and experience with regards to the skills and competencies that an applicant needed to possess to be successful in the ADO position.

Preparatory Phase

The preparatory phase entailed numerous steps and consisted of four primary components as described below: 1) Interview Question Development, 2) Job Posting/ Applicant Pre-screening, 3) Date Setting, and 4) Interview Packet Distribution.

1. Interview Question Development

The interview questions used for this initiative were derived from example interview questions taken from the VA Health Care Performance Based Interviewing website (2018). These questions were then restructured to meet the needs of the research area and NODES management. The MIP utilized reflective enquiry from previous work experience in the respective position to finalize these questions based on several key factors: past, current and anticipated program challenges or barriers; NODES program-wide strategic goals and future directions; and generalized professional characteristics deemed highly beneficial for clinical trials management. The majority of these questions were open-ended and required the candidate to respond with prior situational experiences or working knowledge as is typically found in performance-based interviewing approaches (Ostrom et al., 2016). Once the questions were drafted, they were then sent to both local (the hiring Node site) and national NODES leadership for additional feedback and final approval. The questions were weighted, dependent upon the importance of the competency and/or responsibility as it related to the position. The final product was a comprehensive 14-question interview tool that broadly covered six behavioral categories (see Figure 2). Interviewees were asked a variety of situation-based questions surrounding technical skills, critical thinking, stress management, budget resource allocation, leadership, staff recruitment and retention (see Figure 2). Examples of questions asked of candidates were: 1) describe

Figure 2. Interview Question Domains



a situation where they felt responsible for getting others to make a change, 2) describe their own leadership style and what leadership style that they most preferred, and 3) what was their approach to delegating work to employees and ensuring that these tasks were completed?

2. Job Posting/Applicant Pre-screening

Many private/industry organizations may not consider the geographical location of the candidate as an important factor. However, USAJOBS.gov is the primary employment website used by all federal agencies within the United States federal government, including the Department of Veterans Affairs and reaches potential job seekers across the nation. It is a robust employment website platform with one billion job searches conducted on the website annually; and more than 14,000 jobs posted monthly (United States Office of Personnel Management, 2020b). In order to further expand the reach of the job posting to potential applicants, the position was also posted on Indeed®, an external (non-federal government) employment-related search engine for job listings (Wheeler et al., 2003).

The NODES Program Consultant conducted pre-screening of the candidate applications. The objective of the review was to identify candidates that met the requirements described on the PD. A few of the major criteria accessed were the candidate's education, experience, relevant certifications, work history (job turnover/longevity within the past five years), and the geographical location where the candidate resided at the time of application submission. This was an important consideration since relocation would have likely been an important factor for the candidate.

3. Date-Setting

Initial contact with the candidates was made after development of the interview tool was completed and the MIP was established. The NPC reached out to the interview team members and collaboratively selected one day that all members could dedicate to conducting interviews; all candidate interviews were conducted on this single identified date. Of note, six candidates were selected during the pre-screening phase to move forward in the interview process, and therefore, six candidate interviews were conducted on this date. Once the interview date was confirmed and the time frames for interviews were determined, the candidates were contacted to schedule their interviews. Each candidate was initially contacted by phone and if there was no response within 24 hours of this call, an email was generated and sent to them. The MIP had a 100% success rate for reaching all candidates and confirming interview times. A total of 40 minutes was allotted for each interview.

4. Interview Packet Distribution

The NPC sent out the interview packets to the MIP team members prior to the scheduled interviews. The packets included the interview questions, a candidate ranking/scoring tool, and the candidate's resume or CV. The packets were sent one week in advance so that the MIP had ample time to review the information and address any potential concerns with other members of the group prior to the interview.

Interview Phase

The Interview phase was comprised of a phone and face-to-face interview with the candidate and is described in greater detail below.

Interviewing Process

The MIP briefly met prior to each phone interview to confirm the interview procedure and discuss any considerations related to the candidate that were of potential importance. The flow of the interview was established as such that each member of the MIP asked a series of three questions, and then this pattern was repeated by the other members of the MIP until all the interview questions were completed. The NPC facilitated the interviews by welcoming the candidate, introducing the MIP team members, and providing them with a brief overview of the interview structure and process, prior to initiating the series of interview questions.

Each member of the MIP engaged with the candidate by asking their assigned questions. There was enough time for the MIP to discuss the candidate's application before and after each interview. Between each candidate interview, the MIP reviewed the previous candidate's responses to the questions before proceeding to the next interviewee to ensure detailed attention was given to the candidate's responses, and each question was rated using an accumulative scoring grid with a scale of zero to five. Each interview panel member scored their questions individually.

Each interview concluded with the NPC informing the candidates what the next steps of the hiring process would be and that they would be notified if a subsequent face-to-face interview was desired. Candidates not selected by the MIP to move forward in the interview process were contacted by the VA affiliated non-profit organization to inform them they were not selected as a candidate. Once all the interviews were completed, the MIP reviewed the scoring grids and tallied their scores for a cumulative total. The top two ranked candidates (based on the cumulative interview score totals) were identified and a recommendation from the MIP was provided to the local site NODES Director. The NODES Director then conducted a final face-to-face interview

and made the ultimate decision on which candidate would be selected for the position. The local NODES Director, to whom the ADO would report, coordinated and conducted a face-to-face interview and a final selection was made. Figure 3 provides an overview of the entire MIP process.

Figure 3. Manager Interview Panel Process



Outcomes

The process of using NODES ADOs from various VA Node sites is new for the NODES program. It has the potential for success due its collaborative approach, the beneficence of ADOs with expertise in clinical research and management currently in the same role, and utilization of remote interviewing for the initial set of phone interviews. This approach offered a cost-effective avenue for both the candidate and interview panel to engage with potential job candidates from different regions. This strategy resulted in the following:

» Two top-ranked candidates were identified for a second face-to-face interview with the local/site NODES leadership and a candidate selection was made in a timely manner.

» The MIP process offers an innovative approach that utilizes:

- Experienced Clinical Research Administrators (NODES ADOs) Associate Directors - Operations as interviewers
- Comprehensive interview tools that can assess a job candidate's knowledge, skill, and competencies as they relate to clinical research and management
- Increased communication and collaboration between the interviewers
- Early identification of ideal position candidates
- Expedited candidate selection

The selected candidate has been in the position for greater than six months now and is a contributing team member to both the local Node site and the national NODES program. The selected candidate is also receiving mentoring by other ADOs in the program to ensure their continued growth and success in the position. The new ADO has provided the following feedback on their new role: "Since accepting the ADO position in June 2019, I feel my knowledge and confidence in overseeing and managing the local/site CSP study portfolio has grown tremendously. I contribute most of the transition success in the position to the fact that I'm able to reach out to other ADOs as a resource. The wide range of experience and range of expertise these ADOs have offers a collective and vast pool of knowledge."

Discussion

The ability of a clinical trials unit to successfully plan and execute research activities is highly contingent upon identifying and hiring a proficient and collaborative Clinical Trials Administrator. While the concept of interview panels is not new, leveraging the shared experience and knowledge of a national program network's panel members that currently serve or have served in the ADO position within a large integrated healthcare system is unique. The creation of a MIP facilitated an expedited and efficient approach to hiring and selecting the most highly qualified candidate for a site-level Senior Level Manager (e.g. ADO) position.

One of the major benefits of a clinical trials consortium is that this natural collaboration enables members to work willingly and respectfully toward the goal of hiring a skilled and experienced candidate to join their team. Capitalizing on the use of telephone interviews since MIP team members were located at various VA Medical Centers (VAMCs) in different states, was cost-effective. Phone interviews also assisted in expeditiously identifying the best candidates early in the hiring process. The interview process itself provided ample time for interviewing of the candidate immediately and a follow-up discussion of the scores. In addition, the timing of these discussions and

scoring completed by the MIP allowed for real-time assessment of the interviewee responses, decreasing the likelihood of forgotten or altered interpretations. The MIP team created the interview questions, coordinated and conducted the interviews, and submitted the top candidates for the next phase of the hiring process (face-to-face interviews) within six working days. Once the candidate was selected and assumed the role of ADO, the MIP would also serve as familiar resource and be available for additional mentorship, as needed.

Since this process has only been employed once, to date, an identified weakness of this approach is that the MIP has not had the opportunity to duplicate this method for the ADO or other NODES positions (i.e. Clinical Research Nurse, Clinical Research Administrator, Clinical Research Assistant, etc.), thereby the generalizability of this strategy is undetermined. Secondly, in the absence of face-to-face capabilities, the interviewers miss the opportunity to observe facial expressions and body language which may provide added feedback regarding the candidates' behavior or overall composure; thus, making it difficult to assess if the applicants are providing honest responses (Suttle, 2019). The addition of a video conference call (e.g. Skype™) would have alleviated this limitation. Though, it is important to note that the local NODES Director, to whom the ADO reports, ultimately conducted an in-person interview in the final interview phase. Lastly, it is challenging to ascertain if there is a positive chemistry between the interviewers and a candidate, which suggests the likelihood of a long-term working relationship, without the face-to-face exchanges between these parties (Scott, 2019).

An additional consideration that would aid in a virtual hiring approach would be the implementation of an online assessment for candidates to screen and gauge skillsets directly related to the position. For instance, questions targeted toward assessing attitude, subject knowledge, and aptitude in relation to clinical trials administration could be evaluated using an online questionnaire. The advantages of a virtual test would be ease in scalability, convenience, and easy access for users (Joshi et al., 2020). Within the VA environment, online data capture tools such as Research Electronic Data Capture (REDCap™) or SurveyMonkey® could readily be utilized for assessing high-potential candidates with more efficiency. While there are many virtual platforms that can be used in this hiring approach, these two platforms have routinely been used within the VA setting and could easily be incorporated into this approach (Harris et al., 2009; SurveyMonkey® Inc., 2020).

In conclusion, the utilization of the Management Interview Panel (MIP) was an effective hiring approach that allowed our team to screen, interview, and rank applicants for the ADO position at a Node site. The employment of this tool resulted in the successful

hiring of an applicant for this position. It is anticipated that the Node sites will expand to include up to ten additional sites, thus making it critical to evaluate and implement a similar approach for selecting qualified candidates. Additional work is needed to determine the effectiveness of this strategy for other positions in our organization, and for other applicants, in order to determine the generalizability of this approach for our program and for other organizations as well. Assessing the potential performance of a candidate for a position in a clinical research setting is complex due to a myriad of factors associated with the nature of research positions (Johnson et al., 2020). Therefore, the identification of strategies that can be employed to increase the likelihood of the selection of the most ideal candidates for these types of positions will likely be beneficial to the clinical research community, and can potentially have a positive impact on the hiring process in other types of industries as well.

Disclaimer

The views expressed in this article are those of the authors and do not necessarily represent the views of the Department of Veterans Affairs or the government of the United States.

Authors' Note

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Cyenthia Willis, RN, BSN

CSP NODES Program Consultant
VA North Texas Health Care System

Kandi Velarde, MPH, CCRC

Associate Director of Operations, Salt Lake City
VA Salt Lake City Veterans Affairs Health Care System

Karen Bratcher, RN, MSN, CCRC

Associate Director of Operations, Palo Alto
VA Palo Alto Health Care System

Debra Condon, MSN, RN, CCRP

Associate Director of Operations, Minneapolis
Minneapolis VA Health Care System

Marcus R. Johnson, MPH, MBA, MHA

CSP NODES National Program Manager
Durham VA Health Care System
508 Fulton Street (152)
Durham, NC, 27705, United States of America
Telephone: (919) 452-1464
marcus.johnson4@va.gov

Correspondence concerning this article should be addressed to Marcus R. Johnson, MPH, MBA, MHA, CSP NODES National Program Manager, CSP Epidemiology Center-Durham, Durham VA Health Care System, 508 Fulton Street (152), Durham, NC, 27705, United States of America, marcus.johnson4@va.gov.

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Research Integrity Officers' Responsibilities and Perspectives on Data Management Plan Compliance and Evaluation

Bradley Wade Bishop, PhD

Associate Professor

School of Information Sciences, University of Tennessee

Robert Nobles, DrPH, MPH, CIP

Vice President for Research Administration, Emory University

Hannah Collier

Graduate Research Assistant

School of Information Sciences, University of Tennessee

Abstract

This paper presents findings from interviews with US Research Integrity Officers (RIOs) on their overall responsibilities as well as perspectives on Data Management Plans (DMPs). DMPs are formal documents describing the roles and activities for managing data during and after research. DMPs are now a required research criterion by many funding agencies globally. A purposive sample of Research Integrity Officers (RIOs) from the top ten US private and public universities were recruited for interviews using an open-ended questionnaire related to their job duties and perspectives on data management plan implementation and evaluation. Responses from 12 participants were transcribed, anonymized, and coded in NVivo. RIO backgrounds, duties, and perspectives varied. The mode number of staff/faculty people dedicated to the RIO role at these institutions was a halftime appointment. All RIOs had some responsibilities related to Authorship, Publication, and Inventorship and Integrity and Information with 11 participants also responsible for offering some Responsible Conduct of Research (RCR) training. Most RIOs assumed that Principle Investigators are responsible for DMP compliance during sponsored projects as well as the long-term data management after a project ends. None of the twelve participants has received any Research Data Management training. Given the sea change in research practices, RIOs should have more training as data-intensive research emerges and DMPs

become commonplace.

Keywords:

Research Integrity Officer, Data Management Plan, Responsible Conduct of Research, Research Data Management.

Introduction

The purpose of this paper is to understand US Research Integrity Officers (RIOs) overall job responsibilities and perspectives on data management plans (DMPs). This study addresses literature gaps for both RIOs' responsibilities in general and their perspectives on DMPs. In 2011, the National Science Foundation (NSF) began requiring DMPs, and by 2016 all federal funding agencies began requiring similar documentation for any data generated from federally funded research activities (Holdren, 2013). DMPs are formal documents describing the roles and activities for managing data during and after research. Several US science funding agencies require researchers to submit a two-page document concerning data curation with data, including a variety of digital objects to enable reproducibility (e.g., notes, code, software, and so forth).

Given the relative newness of DMPs, there are research holes that this study fills related to the implementation and evaluation of DMPs from the research administration perspective.

A RIO is a position at US research institutions that fosters a Responsible Conduct of Research (RCR) environment, as well as someone who responds and marshals research misconduct allegations. The experiential learning of on-the-job training with many administrative academic positions is invaluable and unavoidable, but for RIOs some specialized training does exist through the Office of Research Integrity's (ORI) RIO Boot Camp (n.d.). The new paradigm of data-intensive science and DMP requirements adds another range of topics RIOs will encounter. In order to inform future RIO education and training, this study pursued interviews with leaders who were currently in RIO positions. The study also makes a valuable contribution to inform administrators of their typical roles and contribute to knowledge about this understudied servant for research integrity.

Literature Review

A recent perceived lack of confidence in science prompted Congress to mandate

the NSF to explore issues related to reproducibility and replicability as well as how these issues impacted the public's trust in science (National Academies, 2019). The report highlights some underlying matters that may contribute to a lack of confidence in science, such as a clear misunderstanding of the concepts of consensus and uncertainty. For example, in one survey a large swath of Americans thought "scientists are divided" on the human causes of climate change (37%) and on evolution (29%) (National Academies, 2016). One study showed that when scholars provide uncertainty information this actually leads to readers' distrust and confusion of science since it lacks absolute certainty (Frewer et al., 2003).

Although the perceived lack of confidence stems from these misunderstandings of science, there are other underlying issues in the National Academies report that could impact trust, such as research misconduct. Research misconduct is the leading cause of retracted publications (Campos-Varela, & Ruano-Raviña, 2019). Other research found that research misconduct is being significantly underreported, but unlike the broader distrust issues of science, research misconduct is addressed within the research enterprise (Titus et al., 2008). A myriad of Federal Research Misconduct Policies exist to ensure mechanisms are created for investigations of most federally funded research (<https://ori.hhs.gov/federal-policies>). These current policies derive from 1989 regulations that every research institution receiving U.S. Public Health Service funding must assure to ORI that their institution has policies and procedures to investigate allegations of Misconduct in Research and this has expanded as a requirement for funding from many federal agencies (PHS: 42 CFR 50, 1989; HHS: 42 CFR 50 & 93, 2005).

In 2000, the U.S. Office of Science and Technology Policy adopted a definition of research misconduct to include these three behaviours: (1) Fabrication of results or data; (2) Falsification of data through changing or omitting data or results such that the research is not accurately represented in the research record; or (3) Plagiarism (FFP), (Mayer & Steneck, 2011). These behaviours clearly diverge from any concept of research integrity, but norms for responsible conduct vary from field to field and defining good citizenship for even these seemingly clear areas of research misconduct can be difficult (Steneck, 2007). To find some commonality across domains, cultures, and countries at the Second World Conference on Research Integrity, the Singapore Statement was created to provide ethical guidance which research organizations, governments, and scientists can use to develop policies, regulations, and codes of conduct to scope research integrity (Resnik & Shamoo, 2011). The four principles and fourteen responsibilities could be summed up in one word—honesty. Research integrity may serve as a set of honest practices to inoculate scientists from research misconduct; however, central to today's research are data and techniques (i.e.,

machine-learning) that are unable to self-assess their trustworthiness. Whether future research misconduct results from the actions of machines or humans, those investigating allegations work under the common job title—RIO.

Research Integrity Officers

Research Integrity Officers (RIOs) handle research misconduct allegations and promote ethical practices at research institutions (i.e., RCR). This role evolved as a result of the federal requirements to provide a system to investigate misconduct allegations. Interestingly, the RIO position was not mentioned by name in these federal regulations and what the job entailed emerged out of a necessity to address these guidelines (Wright & Schneider, 2010). In response to this knowledge gap, ORI-sponsored RIO Boot Camps in 2016 and held them annually until 2019 to bring RIOs and their legal counsel together for a best practices exchange. A RIO typically responds and performs an assessment on research misconduct that is classified as plagiarism, fabrication, and falsification. Data are central to at least two of the possible misconduct behaviours (i.e., data fabrication and data falsification). In addition, with more publishers requiring data deposit with manuscripts, even plagiarism may involve some exploration of data. Those individuals in the role of RIO may serve in other research capacities at their institutions, but their primary purpose is to ensure compliance with regulations by administering research misconduct allegations and cases.

Research Data Management

Big data presents large-scale challenges as researchers try to navigate massive quantities of data, work across disciplinary boundaries, and keep pace with the requirements of DMPs and preservation needs (Jaguszewski & Williams, 2013). Fields of science focused solely on computation have emerged or expanded, but the training of scientists in Research Data Management (RDM) best practices lags, which may lead to unintentional research misconduct. To help address these problems, the 2019 National Academies report recommends that NSF and other funders create code and data repositories that allow for the long-term preservation of digital artifacts. This is welcome news to the field of data curation, which for over a decade has worked to build this exact infrastructure anticipated by DMP requirements and research trends. In response to DMP requirements, academic institutions, libraries, publishers, and scientific and professional associations from all disciplines have made strides to make data more findable, accessible, interoperable, and re-usable (Wilkinson et al., 2016).

A DMP is a structured, formal document describing the roles, responsibilities, and activities for managing data during and after research (Bishop & Hank 2020). With

the push for more public-facing scientific research and accountability, many funding agencies (86% of UK Research Councils and 63% of U.S. funding bodies) require DMPs within the initial funding application (Smale et al., 2018). Through Horizon 2020, European Union-funded research must make all data accessible to anyone, free of charge, in addition to ensuring Open Access to all peer-reviewed scientific publications relating to its results (Koumoulos et al., 2019). Several academic journals now also require researchers to make public the data and digital outputs associated with a publication (The Royal Society, 2017; PLOS, n.d.).

Despite these external pressures to create and follow DMPs, the compliance with these requirements has lagged. For example, one study evaluated 119 DMPs and found that 51% did not identify the individual(s) responsible for data management, which is consistent with prior research findings (Van Loon et al., 2017). Retraction Watch (2019) reported that 32.5% of the 1,082 retracted publications in one year were the result of data problems (<https://retractionwatch.com/>). One study found that DMP audits resulted in an overall positive impact for researchers through improved data management (Ali, 2019). This lack of adequate DMP implementation or evaluation throughout the research lifecycle may lead to a lack of compliance down the road undermining the intention of DMP efforts. When NSF considers funding tools, training, and activities related to Research Data Management and journal editors consider ways to ensure reproducibility for publications, RIOs need to anticipate the changes to researchers' workflows and gain awareness and training to understand both the responsible conduct and potential research misconduct stemming from DMPs.

Method

This study used a semi-structured interview questionnaire, informed by RCR topics for responsibility questions, and used a modified Data Curation Profile (DCP) protocol for the DMP-related questions. This study received Institutional Review Board (IRB) approval prior to data collection (UTK IRB-20-05623-XP). Informed consent forms included open data language: "This means once responses are anonymized, the data will be openly shared, but only after all possible steps are taken to increase anonymity." The transcripts are available through the University of Tennessee's open repository, the Tennessee Research and Creative Exchange (TRACE). After IRB approval, a purposive sample of Research Integrity Officers (RIOs) were recruited by contacting the RIOs from the top ten National Universities (all private schools) and the top ten Public Schools as listed in the 2020 U.S. News and World Report Rankings (<https://www.usnews.com/best-colleges/rankings/national-universities>). Of the total 20 RIOs contacted, only three RIOs from top universities (private) and nine RIOs

from top ten public schools were interviewed via Zoom and in person (February through March 2020). The National Universities Rankings include those institutions that emphasize faculty research and since they have larger research expenditures, they are more likely to also have more researchers with the required DMPs and RIOs. In fact, ten of the twelve institutions had greater than 640 million total R&D expenditures in the most recent data aggregated (National Center for Science and Engineering Statistics, 2017). This sampling frame of top national universities was used in a parallel study of data librarians at these institutions to conduct a gap analysis on DMPs' implementation and evaluation.

The interviews consisted of 24 open-ended questions related to RIO duties and perspectives on DMPs implementation and evaluation. The job responsibility questions were informed by U.S. RCR topics (Steneck, 2007). The job tasks of a RIO at research institutions (universities, hospitals, private research companies, and so on) are required by law to have policies that cover various aspects of their research programs if they accept federal funds. The DCP questions were created to capture the step-by-step data lifecycle from scientists for digital curation, but the same approach works for any participant's understanding of data during and after research (Witt et al., 2009). This questionnaire borrows the order of questions on data, storage, costs, and training, to determine what, if any, knowledge RIOs have about the current status of Research Data Management at their institutions. The interview schedule consisted of the following questions:

Responsibilities and Overview

1. Which of the following list relate to your responsibilities?

- Authorship, Publication, and Inventorship
- Integrity and Information
- Conflicts of Interest
- Regulatory Basics for Human and Animal Subjects
- Human Subjects Research and Data
- Use of Human Biological Materials
- Societal Responsibility
- Other:

2. Have you ever used a data management plan in your research misconduct assessment, inquiry, and/or investigative processes?

3. How many people work in your research integrity office?

4. What is your scope of coverage (i.e., certain parts of the university)?

Data Management Plans

5. Do you have any oversight of data management plans?

6. Who is responsible for data management plan compliance?

7. How are data management plans evaluated for compliance?

8. If you were creating an office of integrity, what would be the ideal oversight structure and process for data management plans?

Storage

9. Does your institution have any ownership or disposition of data policies?

10. Does your institution support any institutional repositories for data?

11. Who is primarily responsible for the long-term management of the data for sponsored projects?

12. Who is primarily responsible for the long-term management of the data from research misconduct assessment, inquiry, and/or investigative processes?

Costs

13. How are data management efforts for sponsored projects at your institution funded?

14. What budget allocated exists for long-term data management beyond the life of projects and grants?

15. What budget allocated exists for long-term data management of the data from assessments, inquiries, and/or investigative processes?

Training

16. Does your office provide RCR training?

17. Does your office provide data management training?

18. Have you received any Research Data Management training?

- If yes, what types of data research management training did you receive?

Background

19. What is your current job title?
20. How many years in total have you been working in your current job?
21. How many years in total have you been working with research data (including relevant higher education)?
22. Please indicate your credentials and degrees.
23. Please provide any other educational or training you have received that is applicable to performing your job.
24. Do you have any other feedback about this project?

Interviews were transcribed, anonymized, and indirect identifiers were removed prior to analyses. Grounded theory application of open, axial, and selective coding in NVivo captured their job tasks and perspectives on Research Data Management. For nearly all the questions the responses were dichotomous (e.g., yes/no) and followed with few examples to explain why yes or no. Categories and broad themes were grouped for responses that had synonymous intertwined meanings into the same code (e.g., "I am charged with the research integrity program for all current and former persons of the (...) affiliation" (P2) and "entire university" (P5) were both coded 'Coverage-entire_university'). Given the lack of variance in responses (or potential responses), only a single coder was used and no reliability statistics were calculated. Yes and no responses indicated awareness or responsibility for several questions without a biased way of interpreting them.

The limitations of this study include its sampling, the interview questions used, and coding bias. Although not a representative sample, the participants were all from highly ranked universities with large research expenditures. A different sample with other RIOs from other institutions could have provided different responses. The RIOs participating in this study were either research office staff or very senior faculty, which could vary across institutions depending on how research administration is organized and resourced. Still, regardless of background and education there were clear trends in the responses from all RIOs. DMPs and more broadly the concepts of Research Data Management might fall outside of historic RIO training, and each individuals' research background, if these occurred prior to the big data-paradigm in sciences and related requirements.

The interview questionnaire was piloted with two RIOs and revised for clarity of the questions. The interview questions worked off an assumption that all RIOs had similar job tasks and some awareness of Research Data Management efforts on their campuses. Since this was an exploratory study, with no prior research in this specific

topic to inform the questions, the interview questions asked were answerable during pilot testing, but in practice some required more probing than anticipated for a clear response (e.g., “it kind of depends on what you mean by a data management plan” [P12]).

Finally, as a former RIO and current educator of Research Data Management, inherent biases in the interviews and coding occurred. One example is the assumption that participants understood each question related to DMPs. For example, if a participant asked for clarification on any term, such as an institutional repository, they were given an example. Yet, if a participant responded with a confident yes or no to any question, it was assumed they knew what the topic was and further probing did not occur. During coding, the transcripts are static with an inability to follow up with further questions. Future work may be informed by the following results to refine a questionnaire for a survey to produce more generalizable data.

Results

The results summarize all responses to the open-ended questions concerning RIOs’ responsibilities and institutional overview, perspectives and understanding on DMP compliance and evaluation, and RIO backgrounds. The qualitative data provide some insight into these RIOs with related discussion included in each section.

RIO Responsibilities and Institutional Overview

Table 1 presents the responses to job responsibility questions, which provides an overview of typical RIO work of these participants.

Table 1
RIO Responsibilities

RCR Training	Yes	No
Authorship, Publication, and Inventorship	8	4
Integrity and Information	12	0
Conflicts of Interest	5	7
Regulatory Basics for Human and Animal Subjects	8	4
Human Subject Research and Data	8	4
Use of Human Biological Materials	4	8
Societal Responsibility	6	6

Several RIOs provided other responsibilities, with three mentioning Exports Controls, two stating Radiation Safety, as well as one each for Controlled Substances, Animals, Biosafety, and lab practices. Three discussed training as a responsibility in this part of the interview. One RIO discussed a research rigor and reproducibility initiative that included training. Similarly, two held oversight roles for RCR training at the university for students and faculty.

The RIOs estimation of how many people worked in the research integrity office varied greatly. The mode for this answer is .5 FTE and was mentioned by five participants with an average of 2.83. One outlier mentioned ten people, but there is a chance they listed all individuals in the Office of Research that might support the research misconduct efforts and RCR. One RIO was responsible for misconduct reports for the entire university and affiliated hospitals, but the other 11 only were responsible for the misconduct reported at their university. Although not expressly asked, all RIOs mentioned reporting to a Vice President, Vice Provost, or Vice Chancellor of Research or if they served primarily in one of those roles, as five participants did, that their supervisors were Presidents, Provosts, and Chancellors of Research.

Data Management Plans

When asked if they had ever used a DMP in any research misconduct assessment, inquiry, and/or investigative processes, ten RIOs said no. In practice, none used a DMP with one saying they reviewed data and another saying that they would if necessary. Three RIOs responded to this question concerning their own digital curation practices. For example, organization is key to ensuring clean processes and “assuring chain of custody, version control, review status, metadata, flagging of individual documents” (P7) is an expectation for this work. Table 2 provides an overview of the responses to who bears responsibility for DMP compliance. All RIOs knew that DMP compliance was not their responsibility.

Table 2
Responsible for
DMP Compliance

Responsible for DMP compliance #

Principle Investigator	8
Chief Compliance Officer	1
IRB	1
Sponsored Programs	1
Nobody	1

The next two questions asked how DMPs were evaluated for compliance and what the ideal oversight structure and process for DMPs should be. Eight RIOs did not know how DMPs were evaluated. One responded, “we are counting on the PI to certify them” (P5), but one each of the remaining participants ascribed this duty to the compliance officer, funder, or the library.

Many of the ideal structures for DMP oversight responses presented by RIOs showed a balance of working with faculty time constraints and the fiscal realities of each institution. Seven participants suggested additional DMP support including best practices, workshops, and tools, just as NSF suggests and scientific organizations and academic libraries have been offering for years. “I think it’s mostly about tools and making sure people know about those tools, and then having controls on those tools and mandating the use of those tools” (P2). There has been little marketing and outreach for existing tools, but one RIO was spot-on that without a mandate, researchers will not use certain tools. Three RIOs suggested new evaluation procedures such as “fully staffed group for quality assurance/quality improvement, where part of their annual audit plan is going out and testing some of the data management plans, and say, ‘You said you were going to do this.. show us!’” (P1). Conversely, two participants thought each department should handle DMP compliance because of disciplinary differences that align with current decentralized oversight structure for all research. Finally, one RIO suggested the academic library because they already serve a liaison-type role across units.

Storage

Table 3 provides responses to the storage section of the interview.

Table 3	Storage questions	Yes	No
	Does your institution have any ownership or disposition of data policies?	12	0
	Does your institution support any institutional repositories for data?	11	1

The next storage question asked who is responsible for the long-term management of data from sponsored projects. Ten participants, like the responsibility of the initial DMPs, responded PIs are also responsible for long-term management. Five of those that indicated the PI mentioned others that could contribute to solving this problem. Four other RIOs mentioned the libraries as part of a solution, but as one pointed out “they have to carve it out of their existing slice” of their budgets (P7). The information

technology (IT) as potential helpers were mentioned by four participants. Three mentioned that departments might help as faculty move and retire. Two participants had the Vice Provost/President for Research or someone in sponsored projects managing this issue.

The final storage question asked who is responsible for the long-term management of the data from research misconduct assessment, inquiry, and/or investigative processes. All twelve RIOs stated that the RIO themselves were responsible for their own data from assessments, inquiries, investigations, with one stating they could consult with the university archivist if need be.

Costs

The funding questions related to how each institution (1) supports data management efforts for sponsored projects, (2) budgets for the long-term data management beyond the life of projects and grants, and (3) preserves data from assessments, inquiries, and/or investigative processes, presented a question out of scope for the RIOs. Although two participants said they did not know, ten RIOs assumed that sponsored projects or some other university-level entity supported data management for projects and grants. Seven RIOs did not know who funded long-term RDM efforts. Two stated that no one funds that, but one participant thought individual PIs would cover those costs and another presumed each department could finance data curation efforts.

RIOs all had a much better handle on responding to the question about their own data management practices and budget. Ten said that there was no separate line item for RIO storage. Two RIOs did indicate that data storage is sometimes needed, and funds are available when needed.

Training

Table 4 shows the different campus approaches to RCR training.

Table 4 Responsible Conduct of Research Training Models	RCR Training	#
	RIO-driven	3
	Research Office-driven, but not RIO	3
	Campus-wide RCR group	3
	RCR course for all graduate students	1
	General online RCR modules only	1
	All RCR education done at department level	1

Participants were also asked if they had given any data management training with six participants reporting no and two stating yes. Four other participants said that data management training was done on campus, but not by the RIO or via RCR. One participant each mentioned library services or computer science as somewhere researchers might go for that training.

All RIOs were asked if they had received any research data management training. Seven said not formally but learned as a part of their career as a researcher or at conferences. Five participants said they had not received any RDM training.

RIO Backgrounds

The job titles varied due to some RIOs who served in several roles with RIO as one of several nested job titles of participants. For example, five Associate Vice Provosts/ Presidents/Chancellors of Research also served as the RIO when needed. Three participants also mentioned their faculty appointments as professors or chairs of departments as their other roles. In six instances, the Director of Research Integrity or Research Policy also served as the RIO and these were the participants that did not have other duties or faculty status.

The average number of years working in the role of RIO was almost 6 years. The range of experience was from one and a half to 16 years. Seven had five or fewer years with a few outliers having 8, 10, and 16 years in that role. The average number of years RIOs had been working with research data was 26.6, which is much higher than time as a RIO because participants were asked to include all relevant higher education. The range of experience with research data spanned from seven to 50 years. Seven of the 12 RIOs were very experienced with over 24 years of experience albeit mostly with data from their own domains.

Six participants had a PhD as their highest level of education, with Biology (4); Civil and Environmental Engineering (1); and Biochemistry (1). These participants also held master's and bachelor's degrees in their areas with one having an additional public health master's degree. Two participants had JDs, with one JD also having many other health-related credentials—a Master's in Public Health, Certified in Healthcare Compliance (CHC), Certified in Healthcare Research Compliance (CHRC), and was a certified Clinical Research Associate. The other JDs had bachelor's degrees, which were in psychology and entomology. Two participants had MBAs and suggested the project management strengths helped run their investigations and rely solely on faculty for domain expertise (P1). One RIO had a master's in genetic counselling with an undergraduate degree in microbiology and molecular genetics. Finally, one RIO

had a bachelor's in science in biology as their highest degree with a Clinical Research Coordinator certificate.

In response to the question concerning other education or training that was applicable to performing their jobs, 11 RIOs mentioned the ORI-sponsored training RIO Boot Camps. Nine participants mentioned other education (e.g., conflict management), other RCR trainings and conferences (e.g., National Council of University Research Administrators), and experience as a faculty member resolving issues, all of which helped them perform these jobs. One participant had a unique background as a lawyer practicing criminal defense, which they state gave them "transferable skills... strong analytical skills, strong communication skills, being able to develop strategies to interact with people, particularly in this context with faculty to develop strategies to keep them in compliance, let's put it that way" (P8). There were no further mentions of other useful education or training and no participant had additional feedback on the study.

Discussion

This discussion provides some context with past research on RIOs and a few suggestions for future work based on the common responses. The RIO perspectives and understanding of DMPs may have implications for the future of research data management and trust in science given their integrity role.

RIO Responsibilities and Institutional Overview

The responses to job responsibility questions provide an overview of typical RIO work and all participants indicated that Authorship, Publication, and Inventorship and Integrity and Information were a responsibility. Those first two responsibilities directly relate to the behaviours defined as research misconduct, FFP, and it may be assumed a part of any RIO's job.

The same is not true for other responsibilities as local contexts determine how resources and responsibilities are assigned. The job of RIO varies most in these potential responsibilities—Conflicts of Interest, Regulatory Basics for Human and Animal Subjects, Human Subjects Research and Data, Use of Human Biological Materials, Societal Responsibility. For example, seven RIOs said that Conflicts of Interest was not a part of their role because others in their office of research handled that specifically, but five did consider that as part of their job. Some responsibilities did fall under the purview of eight RIOs (i.e., Regulatory Basics for Human and

Animal Subjects and Human Subject Research and Data) and four said no unless it is misconduct related that work falls to “other parts of the office that handle them” (P10). The inverse was true for the responsibilities related to Use of Human Biological Materials, with eight no’s as other offices handled those aspects of research and four yes’s. The RIO is central to RCR and research misconduct on their campus, so it is unclear why all of these topics were not unanimous. Perhaps, some RIOs have not had enough experience for these topics to come up in their work, or as later questions reveal, some RIOs focus solely on managing allegations of research misconduct.

For Societal Responsibility, the responses were split with a good deal of misunderstanding about what the associated job tasks might be for that. Indeed, this aspect of RCR is difficult to operationalize into daily or weekly tasks, especially for those only on a half-time appointment. The other responsibilities provided by RIOs reflect their institutions’ research areas—exports controls, radiation safety, controlled substances, animals, biosafety, and lab practices. If not a role for the RIO, with new requirements and data-intensive practice for most research the area of Research Data Management compliance and evaluation should be considered by all Offices of Research.

Although the RIOs responses to the number of people working in their office varied, five participants indicated .5 FTE. For even these highly-ranked universities with large research expenditures, a half-time RIO suffices to watch over a multitude of research projects across disciplines and researchers at all career levels. Still, the average was much higher at 2.83; that may indicate some Offices of Research more fully support all RCR and research misconduct efforts. The question was difficult to answer for some, but even though it is difficult to scope a RIO’s work, the variety of responses indicate the human resource investment into these tasks is not uniform. A few RIOs did state “we don’t have any problem accessing extra support from our IT folks” (P8) and “we assemble a faculty committee that would work under the supervision of their RIO and the dean to carry out their inquiry investigation . . . and desire the faculty committee to have content expertise” (P10). Clearly, when more resources are needed RIOs indicated they are provided. In all cases, each RIO’s coverage was the entire university with one adding the affiliated hospitals. The breadth of potential research misconduct that is never alleged or the volume of unfounded allegations deemed not research misconduct are understudied. Without reliable metrics on these aspects of the research misconduct, it is not possible to project what would be adequate resources for RIOs and RCR activities. These figures through other studies are needed to inform adequate staffing and increase the research integrity of campuses. It would be ridiculous to have .5 FTE to manage and respond to allegations of other types of misconduct that occur on campuses, and with such large research expenditures

these institutions should invest in the prevention and oversight necessary to protect the integrity of these substantial investments.

Data Management Plans

In an era of big data, and nearly a decade since DMPs were required by NSF, the absence of DMPs in any research misconduct assessment, inquiry, and/or investigative processes is telling. This is likely due to researchers not updating DMPs once funded. One RIO said that they would use one if it was related to research misconduct. Another RIO stated they used data, which may or may not have derived from a DMP specifically, but said we “review data as a result of findings of misconduct or findings of questionable research practices or other things like that” (P4). RIOs should know to ask for DMPs as they could be used as a roadmap for the data generated and indicate points of contact and steps in processes where misconduct or falsification could occur. A DMP describes the roles and activities for managing data during and after research that would help any inquiry or investigation. Also, there appeared to be some confusion over the terminology: “it kind of depends on what you mean by a data management plan” (P12). This may reflect those faculty or staff assigned this administrative role without actual awareness of this relatively recent research requirement. With additional study of data curation behaviours across disciplines, RIOs could know what information organization practices to expect in different fields and when to spot risky data curation approaches. RIOs were very confident in their own digital curation practices, which is paramount to any investigative position. Personal information management and data workflows for RIOs could be standardized across the profession. Data standards (e.g, naming conventions, controlled vocabulary, and so forth) would help in aggregating data for reporting purposes and assist during onboarding of new RIOs.

The responses to who was responsible for DMP oversight varied, with the majority indicating the Principle Investigator (PI) would be responsible with presumed university support. As participant 1 put it, “that’s kind of a void right now, and that’s one where I would say, ultimately, the researchers. But we also always tend to add, we as the universities tend to add a lot on the researchers, so I think the real answer is yes, that it’s their responsibility, but it’s our responsibility to help them do that or find means/ways to do those things”. One participant summed up the need to dodge this potential area of non-compliance and misconduct succinctly: “you know what it is, it’s an unfunded mandate, and nobody has time” (P5). This forthright statement should resonate with anyone that has had to write or implement a DMP, but ignoring the data piece of the research lifecycle prevents reuse and reduces reproducibility. From

the seat of a RIO, poor DMPs or non-implemented DMPs complicate investigations related to data fabrication and falsification.

It is understandable that most RIOs did not know how DMPs were evaluated as this work is far from the RCR arena. Funding agencies, proposal reviewers, and researchers themselves see a DMP briefly and once funded, there is little incentive to revisit or reassess the document. One participant responded, “we are counting on the PI to certify them” (P5), but one each of three RIOs ascribed this duty to the compliance officer, funder, or the library. For now, DMP compliance and evaluation is up to PIs without any oversight from the funding agencies or locally at institutions. Academic libraries are poised to assist, with many hiring multiple data librarians since DMP requirements became many funders’ expectations. We do not expect RIOs to ever have a role in these processes, but this study indicates through a small sample that DMPs are not currently on the radar for RIOs even as they may relate to RCR instruction, if not inquiries/investigations.

Despite this tertiary role for RIOs and DMP oversight, the participants did have imaginative solutions for this piece of research administration. As NSF suggests more DMP support including best practices, workshops, and tools match the calls from many scientific organizations and academic libraries. One RIO was very detailed in a plan for DMP assessment saying that they would “pull out a sample of about 33%, depending on the numbers, and spread those across departments to see what we find, and we would have a monitoring tool that we would go out and we would monitor to see... then depending on that initial sample base would dictate the types of education and future monitoring that we would deem required” (P11). With more centralized control of data or these types of audits, the falsification and fabrication misconduct investigations would be streamlined. This appears in one RIO’s suggestion for “an advisory office, aware of what federal expectations are for these that could be advisory to the PIs” (P10).

Ultimately, an ideal structure differs for each institution even among these similar research universities. The preventative efforts of RDM and RCR training will also benefit from a research data infrastructure built to deter research misconduct (i.e., built-in safety measures and warnings for misuse of data). Perhaps, RIOs have some educational role if not in actual oversight.

Storage

All twelve RIOs said that their institution has intellectual property policies where each university owns the data produced there. A review of those policies was not

conducted and beyond the scope of this study, but data disposition is another avenue to explore related to Research Data Management. To assess awareness of where the data are stored, participants were asked if their institutions support any institutional repositories (IRs). Eleven said yes, but RIOs varied on their familiarity with them. One participant said they had an IR, but it was not free. Only one said no, but there is a chance they were not aware of IRs as most institutions in the U.S. have them. For example, participant 8 said “there are policies and procedures related to which data go where and get backed up in, in those repositories” and these types of responses might indicate more training is needed of the data lifecycle of present data-intensive sciences on basic data curation terminology. One RIO suggested that funders provide a repository finder as many data repositories already exist by discipline and researchers would not need to use the university IR. In fact, similar tools do exist in some disciplines. Currently, the American Geophysical Union’s (AGU) Repository Finder has a searchable database of 222 repositories (<https://repositoryfinder.datacite.org/>).

The final storage questions related to who is responsible for the long-term management of data from sponsored projects and research misconduct assessment, inquiry, and/or investigative processes. The majority assumed that PIs would be responsible for not only the DMP during a project, but the only clear choice for long-term data management. Half of the ten that mentioned the PI as the responsible party suggested others at each institution that may help. Academic libraries and the data librarians that work in them are positioned to take on these roles but might not be connected to the research enterprise. It might be possible for RIOs as part of RCR training roles to actively involve librarians to appropriate their expertise. Others in IT roles could also be brought in to augment training on campuses. One way to address any unfunded mandate is to have centralized bodies, like academic libraries and IT offices, within a university absorb the new costs. This may impact the quality of data sharing and call for a reallocation of overhead to supplement data curation costs. As faculty move on and/or retire having departments or persons in offices of research hold data might be an undue burden and not necessarily the proper infrastructure for Research Data Management. At institutions where the researchers do not retain ownership of data, it is odd that the university does not seem to know where their data are located or might be held in-perpetuity (or lost). These broader research administration concerns are beyond the scope of most RIOs, but in research misconduct investigations it may be useful to have some prospects in how data sharing and data management occurs or may occur on their campuses.

On the contrary, all twelve RIOs stated that the RIO themselves were responsible for their own data from assessments, inquiries, investigations, with one stating

they could consult with the university archivist if need be. With clear regulations for records management related to research misconduct, RIOs know exactly how long storage is expected (i.e., 7 years). Similar regulations are needed for each discipline and every institution to inform the preservation of research data.

Costs

The costs questions were beyond the concerns of RIOs and all costs incurred for storage and other curation efforts do not relate to current RCR topics. Ten of the RIOs assumed that sponsored projects or another university-level entity would assist in the long-term data management beyond the life of sponsored projects and grants. The concern of some was apparent that costs would exceed the budget of each project and some university funds would end up supporting Research Data Management efforts with comments like “my understanding is that grants rarely cover all of it” (P3). Ultimately, all data curation beyond the life of project and grants forces data preservation costs onto other entities. Retiring faculty may be given the option to leave their research data, but also asked to cover the curation costs either paid by the individual, department, or funder as long-term management requires cleaning to make data interoperable and enhancing data for discoverability and reuse. As digital objects become the norm for research practices, costs considerations should increase to avoid a total loss of the huge investments in careers of data collection.

Ten RIOs said that there was no separate line item for RIO storage. Statements such as “I mean other than my own effort and cabinet here” (P8) indicate some gap in digital preservation approaches might impact future access. Still, others point out that “once the inquiry or investigation is done, we’re not looking at it anymore” (P10). These responses match those of data storage in that RIOs know their own data and associated costs.

Training

In response to the specific RCR training question, three RIOs explained that their office did offer training that was RIO-driven with one participant stating, “I teach three classes, and I mean, entire classes, not lectures” (P5). Eight others said their office did give RCR training and RIOs were involved, but not as lead organizers. The RCR training described follows with the number of RIOs that described each framework: RCR training is done by someone from the research office by visiting departments, but not the RIO (3); a campus-wide RCR group that offers more discipline-specific training upon request, but not coordinated through the research office (3); a required

RCR course for graduate students (1); or general online RCR modules not created by the institution (1). The required course for students is one way to ensure all have some consistent exposure to RCR from people outside their department, but each institution has their own approach. Only one participant said they were not involved in any RCR training at all with all RCR-education decentralized and nothing across campus. For the most part, RCR training is preventative of unintentional research misconduct. On most campuses, it appears that RIOs take the lead or contribute to other RCR efforts on campuses to promote research integrity.

In most instances, RIOs do not give any data management training. Two RIOs did say yes, but it was “out of 11 or 12 sessions one covers data management” (P12). Similar to other data storage and costs, RIOs are aware of research data management offered across their institutions usually at the academic library or other IT units. Research Data Management is more central to many data-intensive sciences now, so perhaps greater experience with these areas could lead to more focus on RCR training in these areas.

It might be problematic that most RIOs had only received informal Research Data Management training, from their own research careers or at conferences, given that methods and data change over time. As one participant expressed concern over incidental misconduct in this way “things have changed immensely, and I would say, I mean I think in the research integrity, or misconduct world, there is kind of the need of the PI who entered the field ten years ago, say, before the big data explosion, and it is now running a lab, full-borne in the big data explosion, without a solid statistical training, without solid scripting ... That’s a good way to get in trouble” (P10). A lack of familiarity with this new paradigm might also present challenges for investigations into allegations of research misconduct. As the data lifecycle relates to some aspects of potential fabrication and falsification, RIOs should have additional training on these aspects of the research enterprise if not to train others at least for their own responsiveness to new research practices.

RIO Backgrounds

RIOs have various backgrounds that reflect some pipelines into these administrative roles. Research administrators seemingly collect job titles (i.e., wear many hats) and the role of the RIO is often one of multiple jobs for most of these individuals. In this study, nine participants mentioned faculty appointments whether as professors in departments or that they retained faculty status in their administrative roles. This matches a prior survey that found 42% of 56 RIOs were tenured faculty (Wright & Schneider, 2010). Clearly, some institutions value the faculty status of a RIO and

others do not, but there are pros and cons to either model. A pro for faculty status may be peer respect throughout the research misconduct procedures. A con for faculty status may be duration of proceedings due to faculties' limited availability. A dedicated staff person handling operations is a model for many to facilitate a more streamlined process.

These participants averaged six years, but seven participants had served five or fewer years. These results match closely with a prior survey of 56 RIOs that found an average length of service of five years (Wright & Schneider, 2010). RIO Boot Camps serve as continuing education for these newer RIOs as the institutional knowledge and experience gained from this type of work only can be acquired through personal practice or learned from senior mentors. Turnover in these positions underscores the importance of data curation standardization in the profession.

Half of the participants had a PhD and many were from the life sciences. This also matches a prior interview study of 79 RIOs that found 60% of RIOs self-identified as researchers with over half possessing a PhD (Bonito et al., 2012). Although this was a small qualitative study, these consistencies with prior research may indicate the sample reflects RIOs more widely. Prior work did not gather discipline-specific information, but future studies should. With many regulations related to the life and health sciences a great portion of all RIOs likely match these results and future hires would benefit from these educational backgrounds.

Again, eleven RIOs mentioned the ORI-sponsored training RIO Boot Camps as critical to their success. The Boot Camps allowed for a best practice exchange and as participant 8 put it, "fellow colleagues at other institutions are very, very valuable". Many former and current RIOs likely agree with participant 4's thought that "I'm not really sure there's training for this job". Despite educational efforts, RIOs are not uniformly trained for their positions, but what training does exist would benefit from more Research Data Management scenarios and at the very least data curation terminology and concepts.

Conclusion

The study provided some baseline results on RIOs' overall responsibilities and perspectives on DMPs. RIOs included staff and senior faculty from a variety of backgrounds, but consistencies emerged from their lack of RDM training and understanding of data management across their institutions. As DMPs become more routine following funding agency requirements, RIOs will encounter more research misconduct that relates to data and DMPs. Although not a representative sample,

these participants were all from highly ranked universities. Most RIOs participating in this study were either research office staff or very senior faculty, so DMPs and more broadly the concepts of Research Data Management would be unknown as most of them received training prior to the big data-paradigm in sciences and related requirements.

In this study, no one had used a DMP in any research misconduct activity. The DMP as a static document may not assist with some assessments, inquiries, and investigations, but knowing how data are created, stored, and made available during and beyond the life of a project certainly could be useful. The DCP questionnaire itself is a tool from Information Sciences to gather a data story and in the event that a DMP does not exist or is outdated, a DCP might be an additional useful instrument for a RIO. At each step in the data lifecycle, different processes and people create, interact, transform, and use data; a DCP highlights these steps and that alone could be relevant to a RIO's work. The misuse potential in data reuse presents other probable considerations for RCR trainings. Perhaps, a RIO's awareness of these potential tools and reuses of data are low due to a lack of experience. More broadly, if not a RIO, some research administration entity should conduct DMP oversight as proper data curation practices prevent misuse, including fabrication and falsification. With advancements in artificial intelligence and machine-learning, research misconduct propagation may occur, but these new tools (e.g., iThenticate) may also become invaluable tools to assist RIOs. Plagiarism software needs an equivalent for data.

Recruiting participants from other locations may lead to other findings, but qualitative research is a good first step to explore understudied areas. The interview responses could inform future survey work to produce more generalizable findings. Still, there was some saturation in responses from the participants and clear themes emerged about RIO backgrounds, training, and perspectives on DMPs. Prior to the needed creation of RDM training at future RIO Boot Camps, academic data librarians may serve as a resource to help all the "faculty out there who really could use some help setting up data management plans for their research" (P6) as well as the RIOs who may need to speak with them.

Authors' Note

Material in this paper is the result of data collection done for the Spring 2020 Faculty Development Leave of the first author. The first author served as one of two deputy RIOs at the University of Tennessee under the second author who was the primary RIO and Interim Vice Chancellor for Research during that time. Bishop's primary research interests are Research Data Management and Data Discovery behaviours

of scientists. Nobles' prior work focused on adolescent health, but now he serves as a national leader in RCR and a catalyst to enhancing research culture globally. We greatly appreciate the participants and upon publication will deposit the anonymized and deidentified transcripts in the Tennessee Research and Creative Exchange (TRACE), which serves as the University of Tennessee's institutional repository.

Wade Bishop, PhD

Associate Professor
School of Information Sciences
University of Tennessee
1345 Circle Park Dr. Room 454
Communications Bldg.
Knoxville, TN 37996
Tel: (865) 974-2775
Fax: (865) 974-7878
Email: wade.bishop@utk.edu

Robert Nobles, DrPH, MPH, CIP

Vice President for Research Administration
Emory University
1599 Clifton Road NE
Atlanta, GA 30322
Tel: (404) 727-3889
Email: robert.e.nobles@emory.edu

Hannah Collier

Graduate Research Assistant
School of Information Sciences
University of Tennessee
1345 Circle Park Dr. Suite 451
Communications Bldg.
Knoxville, TN 37996
Tel: (865) 974-2148
Fax: (865) 974-7878
Email: harmenda@vols.utk.edu

Correspondence concerning this article should be addressed to Wade Bishop, PhD, Associate Professor, School of Information Sciences, University of Tennessee, 1345 Circle Park Dr. Room 454, Communications Bldg., Knoxville, TN 37996, wade.bishop@utk.edu.

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Research Managers and Administrators in Conflicting Organizational Cultures: How Does Their Human Capital Help Professional Survival in Knowledge-Intensive Organizations?

Junko Shimazoe, Ph.D.

IDE-JETRO

Abstract

Research Managers and Administrators (RMAs) face various challenges caused by conflicting and contradictory organizational subcultures in knowledge-intensive organizations (KIOs), but their human capital, such as skills and personality traits, helps RMAs to maintain job and organizational engagement and professional growth. Focusing on self-leadership of RMAs, the effects of the RMAs' human capital on their performance and job satisfaction are statistically tested with the Research Administration as a Profession (RAAAP) wave-1 dataset that captures the current states of RMA around the world. RMAs more willing to mobilize their self-leadership are more successful in terms of their career development and are happier with the job, and thus, they are surviving even in conflicting and contradictory subcultures. Implications are also provided about human capital and agency of RMAs as well as human resources practices of KIOs.

Keywords:

Research Manager and Administrator (RMA), knowledge-intensive organization (KIO), organizational culture, human capital, self-leadership, RAAAP

Introduction

This paper is intended to explain professional development and survival of Research Managers and Administrators (RMAs) in knowledge-intensive organizations (KIOs), focusing on organizational culture and human capital management. RMAs are

professional workers in KIOs, e.g., universities, research institutes, and other organizations for which knowledge is critical for survival, and they tend to face conflicting and even contradictory subcultures in the KIOs. On the one hand, there is a culture of innovation and research that values challenges and free thinking, and on the other, there is a culture of bureaucracy that values control. The latter exists to a certain degree even in KIOs because bureaucracy is (a) necessary (evil) where people have to collaborate for common goals, including research projects (e.g., Bourgeault et al., 2011; Greenwood, 2009; Grey, 2012; Kaplan, 1959; Kleinman & Vallas, 2001; Leitner & O'Donnell, 2007; Scott et al., 2000). In addition, increasing reliance on public research grants more often demands that KIOs comply with standardized accounting and reporting on the granters' term, which results in some degrees of bureaucratic control in recipient KIOs (e.g., Greenwood, 2009; Grey, 2012; Kaplan, 1959; Leitner & O'Donnell, 2007). The subcultures also exist along occupational lines, such as researchers and administrators. RMAs are exposed to sometimes contradicting expectations from researchers, who value the innovative, free-thinking subculture, and non-research administrative workers, who value the subculture of bureaucratic control.

In this paper, how RMAs use their human capital to survive in the two organizational subcultures and grow as professional workers is discussed. Human capital is a concept that describes the intangible assets that employees can contribute at the workplace (e.g., Caddy, 2000; Lenihan et al., 2019; Petty & Guthrie, 2000). It originally emphasized skills, training, and expertise of workers, but today it encompasses different job-related attributes of an employee, such as personality traits, attitudes, values, beliefs, and other characteristics, including willingness to assist colleagues and contribute to an organization, resilience, creativity, self-efficacy as well as cognitive ability. This paper particularly focuses on an attribute called self-leadership of RMAs. Self-leadership is an employee's own initiative to commit to an assigned job and improve their performance by relying on internal, in addition to external¹, standards about what should be done and why it should be done for the assignment (Carmeli et al., 2006; Pearce & Manz, 2005; Stewart et al., 2011). Employees may exert self-leadership whether or not an assignment is intrinsically rewarding, i.e., challenging, meaningful, and motivating, but the exertion is especially important when an assignment is not. In such a case, employees with self-leadership are believed to try to reduce the discrepancies between their internal standards of an intrinsically rewarding job and the external requirements by embedding naturally rewarding elements into the assignment.

For example, an RMA can set self-goals that contribute to the job AND are motivating to oneself and can imagine the intrinsic and extrinsic rewards that one can enjoy when

the goals are attained. In this regard, self-leadership includes the process of influencing one's own cognition, emotions, and thought patterns so that a job is psychologically and materialistically satisfactory but without changing the external goal of the job itself. Then, while working, the RMA self-monitors and uses the advancement of the job and others' reactions as feedback. Thus, it is also a learning process initiated by the RMAs themselves. In other words, when RMAs are more resourceful in terms of their human capital, they are more likely to use self-leadership.

When self-leadership works well, it increases job satisfaction, performance, engagement, and organizational citizenship behavior, which is a voluntary behavior to help others at the workplace beyond prescribed responsibilities (Sun et al., 2007). At the same time, other psychological benefits are attained, including self-control, confidence, and self-efficacy, and thus, the possibility of stress and anxiety are decreased, whereas the possibility of career success is increased. It is also said that workers with certain personality traits, especially conscientiousness of the BIG 5 personality traits (openness, conscientiousness, extraversion, agreeableness, and neuroticism), are more likely to exert self-leadership (Stewart, Carson, & Cardy, 1996 in Stewart et al., 2011), and as a result, to become high performers through their own initiative. The benefits of the RMAs' initiative, such as self-leadership, may not be limited to those just mentioned. For example, to survive the conflicting and contradictory work demands in a free-thinking knowledge-creating culture and control-oriented bureaucratic culture, it is necessary to be adaptable and resilient when facing the frictions and tensions due to the subcultures. While handling the stressful situations and finding solutions (or points of compromise) at work, RMAs have to be tough enough to undertake the challenges of strategizing for their own professional development as well as proving their talents at the same time. The initiative may help them to establish their foothold in a KIO and to advance their individual growth.

The concept of human capital above is more than what theories of motivation, such as Theory Y that emphasizes managerial control while focusing on intrinsic aspects of employee motivation, describe and what the classic definition of human capital such as the "willingness to work" (e.g., Petty & Guthrie, 2000) covers. However, it is actually the talents normatively expected of RMAs, including the capability of and a positive attitude toward lifelong self-learning (Landen & McCallister, 2006). In this regard, the inclination to engage in self-leadership is an essential attribute of RMAs. Thus, in this paper, it is assumed that self-leadership by RMAs helps them to survive difficult work environments in KIOs. In other words, RMAs with self-leadership are more likely to survive and be successful, making them more valuable assets in KIOs than those without self-leadership.

Research Questions and Method

By explaining the relationship between self-leadership of RMAs and their survival and development in KIOs, this paper is intended to specifically answer the following questions. First, what attributes and behavior patterns are helpful for RMAs to overcome the difficulties of the conflicting and contradictory subcultures in KIOs? Second, what implications do the attributes and behavior patterns have to human resources management practices in KIOs? The first question is especially important because the difficulties that RMAs encounter in the conflicting and contradictory organizational subcultures do not automatically indicate that, for example, they will psychologically break down, burn out, or quit². Those difficulties may lead to job-related stresses that result in negative workplace behavior and turnover, but not everyone follows that path. Thus, the real question involves determining what makes a difference between the “exit, voice, and loyalty” (Withey & Cooper, 1989) on the side of RMAs. Withey and Cooper (1989), citing Hirschman (1970), argued that an organization will receive three possible responses when someone is dissatisfied with the current situation, which are: simply leaving and never returning (exit), taking action to amend problems (voice), and remaining silent but making the best efforts to improve the situation (loyalty). In other words, what causes RMAs to take the path of voice or loyalty and what attributes and behavior patterns help them to take the initiative to maintain or even improve their job commitment and engagement? In this regard, loyalty does not necessarily mean committing to an organization for the organization’s benefit but remaining at the organization and crafting jobs to increase one’s own satisfaction.

In addition to recruiting, hiring, career development, and talent management of RMAs in general, the second question is important in terms of the professional development of RMAs, especially for junior ones, from within themselves. The existing studies about RMAs mainly aim to help the managerial leadership in KIOs (e.g., Kerridge & Scott, 2018; Landen & McCallister, 2006), and this approach is important because the understanding and willingness of the management team is always critical for RMAs to grow as individuals and as a profession. However, there are at least two caveats in the approach. First, unfortunately, the support from the management cannot always be taken for granted. It is not because managers are exploitative of talents or budget constraints from time to time may prevent them from utilizing RMAs, but because their span of control and overall job responsibilities do not allow them to focus on developing RMAs. In addition, some of them may be uninterested in RMAs because the position is new to their KIOs and they are uncertain of how to use RMAs. In these situations, junior RMAs must take the initiative to develop their own career as many other professionals do. Second and related to the first point, RMAs as knowledge

workers, including even junior RMAs, have to be ready to take the responsibility for their professional development without being directed from the leadership. This type of initiative from the side of junior RMAs may also be helpful to the leadership of KIOs because it will increase effectiveness and efficiency of their organizations without direction and control from above. In this regard, it is important not only for junior RMAs but also for senior ones and the managerial leadership of KIOs to understand what attributes are helpful for the professional development of RMAs.

To answer the above questions, the rank-ordered and categorical data obtained in wave 1 of the Research Administration as a Profession (RAAAP) survey are analyzed with ordered logistic regression. The survey, conducted in 2016, aimed to help the leadership of KIOs to obtain prospects for the professional development of junior RMAs by capturing the state of the RMAs' soft skills worldwide (Kerridge & Scott, 2017, 2018). It was funded by the US National Council of University Research Administrators (NCURA) Research Program, and eleven global and local professional associations distributed its questionnaire to their members. As a result, 2,691 RMAs and others responded from the US, UK, Canada, Europe, Oceania, and other regions. The details of the data and survey are explained in the Research Method section.

Expected Contributions of This Paper

Then, why is it important to study RMAs from the perspective of human capital and organizational culture? The first clear reason is that the jobs of RMAs have become more complicated than before as the KIOs and funding sources for research diversify around the world. The RAAAP survey (Kerridge & Scott, 2018) indicates that the roles of and expectations for RMAs have grown as the profession spreads from the US, UK, and Europe to the rest of the world. In addition, the KIOs themselves are becoming more diversified as emerging economies build up their capability for policy research. For example, think tanks traditionally meant nonprofit, independent organizations that made public-policy proposals to the government, but today, there are many different forms of think tanks, such as research institutes inside universities, for-profit research institutes, nonprofit organizations, non-governmental organizations, and research institutes affiliated with the government (McGann, 2020). As the organizational forms of KIOs diversify, more research funding is provided from the public sector, including the government. This tendency has been clear in Anglo-American and other developed countries for more than several decades since government agencies started providing research funding to non-governmental institutions for R&D projects (e.g., B. L. R. Smith, 1990; Sapolsky, 1990; M. R. Smith, 1985), whereas in emerging economies, it seems to be a comparatively recent phenomena, as their

governments have started establishing research institutes of their own. Injection of public fund into KIOs has already increased the pressures for accountability not only at the individual level of each researcher but also at the organizational level (Chaminade & Catusus, 2007; Kleinman & Vallas, 2001; Silva, 2018; B. L. R. Smith, 1990; M. R. Smith, 1985), which encourages the centralized control of research projects in the form of rules and paperwork. In other words, the RMAs in more KIOs are likely to feel the job-related tensions caused by the different expectations stemming from the organizational subcultures of bureaucratic control and free-thinking knowledge creation that are common today. It is worthwhile to understand how RMAs handle these complicated situations.

Second, developing a work environment in which RMAs can perform to their fullest potential is important from a larger context, which includes the ever-changing relationship between KIOs and the public, the pressure for KIOs to stay lean, and the emergence of the digital economy. The changes in the relationship between KIOs and the public started in the 1960s when public voices about the social impact of scientific research, especially research financed by public funds, began to be heard (Chaminade & Catusus, 2007; Kleinman & Vallas, 2001; Silva, 2018; B. L. R. Smith, 1990; M. R. Smith, 1985). Since then, the public has demanded accountability from KIOs for the impact of research, and their voices are ever growing globally. In this environment, how effectively RMAs can perform their jobs, which means, what the work environment allows them to do, may influence the effectiveness not only of individual research projects but also an entire KIO³. This need for an appropriate work environment has also grown because of the trends towards lean organizations and the digital economy. Being effective and efficient as an organization, i.e., staying competitive, organizations today tend to keep as little slack as possible, including personnel, inventory, and facilities. Digital economy adds uncertainties to the trend. Even before the global crises by COVID-19 advanced digitization of work, knowledge work to be replaced by artificial intelligence was a hot issue and global network of organizations was expected to change how knowledge was created and innovation occurred. It is still unclear how KIOs survive in this drastically changing environment. Under these conditions, workers have to be “high performers” equipped with multiple skills and a willingness to learn throughout their careers, regardless of their job categories.

The studies on high-performance work systems (HPWSs) suggest that high performers tend to emerge at workplaces where job satisfaction and trust in management are common because of meaningful and challenging jobs, opportunities to participate in substantive decision-making at the team levels, and support for training (Appelbaum, 2002; Belanger, Giles, & Murray, 2002; Giles, Murray, & Belanger, 2002; Lenihan et al., 2019; McGuirk et al., 2015; Petty & Guthrie, 2000)⁴. Here, again, the type of

work environment in which RMAs are working is a problem that warrants attention. Although the existing studies of HPWSs concern how the management contributes to creating high performing workers by designing appropriate work environments, this paper is concerned about how RMAs take the initiatives themselves to make their job interesting, challenging, meaningful, and satisfying from the bottom. This is why the concept of self-leadership will be helpful to understand how they professionally survive and grow in the conflicting and contradictory subcultures of KIOs. Instead of the management, the actors with agency in this research are the RMAs themselves who take the initiative toward job crafting so that the job is intrinsically rewarding and satisfactory. In this regard, this paper is a response to the call by Huang and Hung (2018) and Kaplan (1959) to study the perspective of social activities and human agency in research management.

In short, RMAs today face increasing challenges, such as complexity and uncertainty, in their work, work environment, and the digital economy, in addition to the already shifting relationship between academia and the public. Advancing the knowledge of how RMAs work under these conditions and what attributes are necessary for the job will be helpful not only for RMAs but also for the KIOs that need their human capital.

Structure of This Paper

Following the Introduction, RMAs are defined drawing on the existing research in the first section. There, a definition for this paper is provided, as well as that of non-research administrative workers in KIOs. In the second section, KIOs are defined and how the bureaucratic subculture may affect organizational behavior of KIOs is discussed. In the third section, the problems that individual RMAs may encounter in conflicting and contradictory subcultures of KIOs are described, which is based on this author's experience in a research institute in the public sector of Japan in addition to the existing literature of organizational sociology and behavior. Then, in the fourth and fifth sections, the hypotheses regarding the use of the RMAs' human capital to overcome the problems of the subcultures are introduced, and the research method is explained. In the next two sections, the results of the statistical hypotheses testing are explained, and the findings and their implications are discussed. Finally, in the concluding section, the research in this paper is summarized and its limitations and the further research needed are discussed.

Who are RMAs: Definition

The existing studies suggest that there are two main approaches to defining RMAs, although the two are not mutually exclusive. The first approach uses the functional roles expected for RMAs to define the profession (e.g., Chronister & Killoren, 2006; Kerridge & Scott, 2018). It goes through the research life cycle, starting with fundraising (which is called research development in many cases), followed by the pre-award and then the post-award responsibilities, including accountability for spending and the application of knowledge to produce tangible assets outside academia. This process also requires the RMAs to perform such roles as international coordination and contracting, compliance with the legal requirements of accounting and export control, intellectual property protection, and research ethics. In this approach, RMAs are professional workers who provide necessary services to researchers, the administration, and research funders throughout the phases of the research. This approach is also interested in the high-echelon positions that RMAs occupy in KIOs, such as chief research officer, associate vice president, director of sponsored programs, and so on (Chronister & Killoren, 2006). The ranks and positions describe another aspect of the functional roles that RMAs may take as their careers advance in KIOs. In general, in this approach, RMAs are defined as supporters, managers, and leaders to advance core competencies of KIOs.

The second approach follows the functional definition of RMAs and enriches it by reflecting on the philosophical values of the profession and on the necessary skills and attributes of individual RMAs to realize those values (Kaplan, 1959; Kerridge & Scott, 2018; Landen & McCallister, 2006; Lehman, 2017; Shambrook & Roberts, 2001). In this view, RMAs are considered to not simply move the research forward but to add their own value to the outputs of the research at the organizational and interorganizational levels by reconciling the interests of the researchers with those of the organization or vice versa. Their responsibilities include, for example, proactively connecting the existing and potential stakeholders and controlling the institutional resources allocated to the research project to appropriate degrees. To maximize the total value of the research for the KIOs and the outside stakeholders, RMAs have to play diverse roles ranging from data translators, communicators, problem solvers, holders of expert knowledge about one's own KIO to "brokers, translators, intermediaries, and helpers who value the long-term process", "compliance officers, cheerleaders, consoler, advocate, and ... crisis counselors" (Landen & McCallister, 2006, p. 75, 77).

These are both functional descriptions of RMAs, but the second approach is more interested in their human capital to perform their responsibilities, such as knowledge

and skills. For example, Lehman (2017) discusses that the various types of knowledge necessary for the responsibilities requires RMAs to accumulate and share knowledge (i.e., knowledge management), and for that purpose, an organizational culture that supports knowledge management and the community of practice of RMAs is crucial. Concerning the need for broad knowledge, Landen and McCallister (2006) also argue that learning-by-doing is still an essential part of the profession due to the lack of formal education and training for RMAs and thus their traits, especially a propensity for initiative and lifelong learning, matter in addition to support from supervisors. In a similar vein, Kerridge & Scott (2018) are interested in the soft skills necessary to perform the RMAs' jobs and for their career development.

The above two approaches successfully capture aspects of RMAs, and drawing on these studies, this paper is intended to understand RMAs from the organizational sociology and behavior points of view. RMAs in this paper are defined as professionals working for the good of research who commit to establishing their foothold at the workplace, developing an occupational identity, and evolving professionally in two contradictory subcultures of free-thinking knowledge workers (to which they belong) and of bureaucracy-oriented non-research administrative workers in KIOs. In the process, they have to contend for appreciation and recognition from both types of workers, which adds complications to their efforts. Based on this definition, the interest of this paper is to explain how RMAs use their human capital while facing the challenges caused by the subcultures and trying to meet the various demands in the institutional contexts specific to each of their KIOs. Thus, as described in the Introduction, this paper is interested in the human agency of RMAs, as Huang and Hung (2018) and Kaplan (1959) were. It can also be said that the definition of RMAs in this paper is less normative but more descriptive than the above two approaches.

Since this paper concerns a bureaucratic subculture that may exist along occupational divisions in KIOs, it is also necessary to define non-research administrative workers. In this paper, they are defined as generalist workers without research background and experience who use their knowledge of governmental and organizational budget, legal affairs, auditing, accounting, personnel policy, contact with the government, public affairs, and so on mainly in the central offices of KIOs for the entire organization. Although some of their functions overlap with those of RMAs, the priority in their job is to maintain the operational continuity of the entire organization, for which routines and bureaucratic control are more useful than in the job of RMAs whose priority is advancing research. In other words, even though RMAs share the concerns of non-research administrative workers, the priority of their profession is not always the same as that beheld by non-research administrative workers.

Bureaucratic Culture in KIOs

Then, how exactly do the conflicting and contradictory subcultures of KIOs intervene when RMAs perform their responsibilities and try to grow as professionals individually and occupationally? Although RMAs may accept the job-related stress created by working with researchers in a free-thinking, knowledge-creation culture as an occupational hazard and handle it accordingly, the duality in the organizational culture clearly adds difficulties to their job. In this section, the influence of the bureaucratic subculture of KIOs is discussed.

KIOs are organizations whose inputs and outputs heavily rely on the knowledge of their employees, and the inputs and outputs are not only for producing goods and services but also for innovating the organization itself to adapt to the environment (Alvesson, 1993, 2000; Benjamins et al., 2002; Chaminade & Catusus, 2007; Greenwood, 2009; Lyon, 2005; Makani & Marche, 2010; Sheehan & Stabell, 2007). There is no simple agreement about the definition and examples of KIOs, but the bottom line is that not only does a KIO need the expert knowledge of employees for its growth and survival but expert knowledge is also the cornerstone of the organization. Thus, not all KIOs are the workplaces of RMAs, but RMAs, who are professionals working for the good of research, clearly work in KIOs regardless of the sector or institution. Then, how is it possible for KIOs to have the bureaucratic subculture? In the Introduction, this author mentioned two possibilities. First, bureaucracy is (a) necessary (evil) in an organization where people have to collaborate for common goals. Elements of bureaucracy, such as standardization, compliance with predefined procedures, documentation, and meritocracy, are inventions of modern organizations in which being goal-oriented is the mantra (March & Simon, 1958; Perrow, 1986; Selznick, 1947; Weber, 1978), and thus, any organization, including KIOs, naturally has a bureaucratic orientation to some extent (e.g., Alvesson, 2000; Bourgeault et al., 2011; Greenwood, 2009; Grey, 2012; Kaplan, 1959; Kleinman & Vallas, 2001; Leitner & O'Donnell, 2007; Scott et al., 2000). Second, the accountability for using public research grants necessitates a certain amount of bureaucracy because researchers, RMAs, and non-research administrative workers have to follow the directives, rules, due dates, etc. set by the granters. On these points, the existing literature on research management and administration also mentions that the organizational structure of universities and research institutes has been centralized for oversight, i.e., bureaucratic control, of pre- and post-award activities (Chronister & Killoren, 2006; Kaplan, 1959).

In other words, it is not automatically assumed that any KIO is free from bureaucracy in itself. At the same time, because the organization is a KIO wherein knowledge workers provide resources crucial for its survival, it is highly probable that the KIO

has two contradictory and conflicting subcultures of bureaucratic control and free-thinking knowledge creation. The contradiction and conflicts are a reality in the work environment for RMAs. Then, how do the KIOs with the bureaucratic subculture behave towards RMAs?

To begin with, bureaucratic organizations tend to avoid developing clear job descriptions for individual employees. This is because bureaucracy, in principle, assumes that the power to make a decision resides with the office instead of a specific individual and anyone is replaceable in terms of taking on a responsibility (Weber, 1978). As a result, job rotation becomes common as a means to train employees, generalists are considered more useful at the organizational level, and thus, the need for job descriptions for specific employees disappears. Under this condition, even if a KIO hires advanced degree holders for specific functions, such as RMAs, the organization applies the bureaucratic control methods originally developed for generalist administrative staff sometimes mass-recruited without considering the purpose of hiring RMAs. At the same time, even without clearly defined job descriptions, expectations in nonverbal form may exist, and this results in the dilemma that RMAs face because anyone can expect anything from them when their job is not clearly defined. In some cases, the above problem occurs because a KIO lacks experience in hiring and using RMAs. However, there is also a more fundamental issue at the KIOs with stronger bureaucratic subcultures behind the problem, which is, the power of non-research administrative workers.

In KIOs with bureaucratic subcultures, many employees are non-research administrative workers, and in some cases, they have an even larger influence than do researchers because the former controls various organizational functions at the entire organizational level. Although researchers generally enjoy higher status in KIOs, in regard to the functions under the control of non-research administrative workers, their “nay” stops the paper processing and halts the progress of the project. This is their power due to the bureaucratic control in KIOs. Since RMAs frequently work with both researchers and non-research administrative workers, the influence of the latter, which may be implicit and invisible to researchers, makes the jobs of RMAs complicated. Researchers may not understand why their desires are not fulfilled when working with the RMAs, RMAs have to follow the researchers’ demands AND comply with bureaucratic requirements, and non-research administrative workers do not tend to understand that the bureaucratic mode of operation is not as natural to researchers and RMAs as it is to themselves.

The bureaucratic subculture also leads to knowledge management problems in KIOs. Organizations develop their own knowledge management cultures that define

what knowledge is valuable for organizational survival (Benjamins et al., 2002; Kimble et al., 2016; Lehman, 2017; Lyon, 2005). Thus, the important knowledge to be distributed, shared, and retained under the bureaucratic culture is different from that in an innovative, free-thinking culture. For the former, the knowledge directly serving the implementation of organizational policy is valued, whereas for the latter, it is mainly abstract ideas that are appreciated in the academic community or findings for application that may change the world. This difference in what is valued clearly appears in, for example, the key performance indicators for each of the activities. The conflict in the knowledge management culture adds complexity not only to the day-to-day jobs of RMAs but also to the career development of individual RMAs because the organizational values may affect how their KIOs want to train and utilize them.

On this point, the studies on HPWSs and human resources management argue that an intrinsic reward, such as meaningful and challenging work, increases the job satisfaction of employees (Appelbaum, 2002; Appelbaum et al., 2000; Belanger et al., 2002; Giles et al., 2002). However, the above understanding of a knowledge management culture implies that what is meaningful depends on the organizational values, i.e., the definitions are different for the bureaucratic and knowledge-creating cultures. Then, what if the management of the KIO that believes in bureaucratic control tries to provide intrinsically rewarding jobs to RMAs from their perspective when RMAs expect to promote a culture of innovation and knowledge creation? In addition, it is necessary in HPWSs to encourage employee participation in substantive decision-making in an autonomous team as a source of motivation, but what types of decision-making opportunities are more important for RMAs, i.e., the opportunities for bureaucratic processes or the benefit of research? RMAs internalize these conflicts caused by the cultural schism while they are working with researchers and non-research administrative workers.

Another problem originating from the bureaucratic subculture in KIOs is that bureaucracy tends to resist learning and change, and thus, a KIO with the subculture is less likely to adopt a work environment in which RMAs can be fully utilized. Bureaucracy is notorious in terms of having strong inertia and being immune to change (Perrow, 1986; Scott, 2001; Scott et al., 2000), although change is said to be the only constant today. On the other hand, practices that encourage high performers are something "to be learned" by organizations (Appelbaum et al., 2000). The combination of these findings results in a grim picture. Even if KIOs hire RMAs and try to utilize their talents, those with the strong bureaucratic subculture cannot provide appropriate opportunities for the professionals to contribute because those organizations are not accustomed to learning from the new employees and changing themselves.

Problems that Individual RMAs Encounter in KIOs

In the previous section, it has been argued that the bureaucratic subculture of KIOs results in a conflict-ridden work environment for RMAs, which includes ambiguous and diversified expectations from researchers and non-research administrative workers, conflicting values about knowledge management, and resistance to organizational learning and change. In this section, the problems of the duality in the organizational culture will be elaborated at the level of individual RMAs.

The studies on organizational behavior and human resources management suggest that “reality shock” from discrepancies between expectations and reality of a job may lead to person-organization misfit⁵ and increase the risk of many problems, such as demotivation, disengagement, job-related stress, decreased job satisfaction, loss of trust, absenteeism, and eventually turnover (e.g., Arigbe, 2018; Follmer et al., 2018; Louis, 1980). RMAs may experience this “reality shock” when they encounter the contradictory and conflicting values and expectations due to the subcultures of bureaucratic control and free-thinking knowledge creation. For example, it could happen that newly hired RMAs are assigned to administrative positions or to positions where much effort is expended on administrative paperwork in KIOs. As a result, most of their work hours tend to be used for administrative tasks, meetings with non-research administrative workers, and for other bureaucratic procedures rather than helping researchers, in contrast to the job description and expectation common to the profession. This assignment is beneficial as a type of on-the-job training and job enrichment. However, for RMAs who are hired to work for research and researchers, it could be a breach of the psychological contract and an implication that bureaucratic formalism is more valued in their KIOs. In terms of the HPWS, challenges and meaningfulness are not felt from the assigned tasks, which decreases the intrinsic reward and, thus, job satisfaction. In addition, the role ambiguity and conflict due to the contradictory and conflicting job demands may lead to a conflicting role identity, which increases the job-related stress.

The dissociation between the normative expectations of the RMA profession and the reality of their work also puts RMAs in a quandary about how to handle the demands and requests from researchers. Researchers tend to have their own expectations of RMAs regardless of the jobs assigned to the RMAs and try to appropriate the talents and efforts of RMAs for their own benefit. Some of them simply consider RMAs as another job category to perform administrative work for their KIO. On the other end of the spectrum, however, there are researchers who demand RMAs to fulfill their requests even when the RMA's work hours are already occupied with formal assignments or the requests appear irrelevant to or low in priority in terms of the

assignments. In between the two, there are researchers who try to use RMAs to save their own efforts and budget, for example, using RMAs as surrogates to supervise research assistants, to do paperwork for their research projects, such as writing draft proposals, and to organize events in and out of their KIO by relying on the financial and human resources that the RMA's division has.

These researchers naturally tend to prioritize their research needs over the hierarchy and formalized procedures, whereas non-research administrative workers who have learned the bureaucratic subculture throughout their career tend to demand that RMAs learn and share those values. To the eyes of the former, RMAs may be human resources provided to them by their KIO to help the researchers whenever they need aid. On the other hand, to the latter, nothing may be wrong with assigning RMAs to administrative positions for bureaucratic routines because those are THE work to them. RMAs themselves are stuck in the middle of the two occupational and cultural camps and are forced to make a choice to satisfy the demands from both camps at once, i.e., by not choosing either and working harder than formally required, or by making either demand a priority tacitly and performing a balancing act. This type of predicament at the workplace is unhealthy, but there are more problems in it. First, the pressure to make the choice is implicit because neither the researcher nor the non-research administrative worker tends to believe that anything is wrong with their own behavior. As a result, it is likely that the RMAs' overwork and/or commitment is misunderstood by others in the KIO as simply a voluntary choice, not the result of situational forces. Second, in the case that RMAs are supposed to be tenured after a few years of more than satisfactory performance, it is naturally assumed that the nontenured ones are more likely to be risk-averse and bend to the pressure without raising their voices. The silence, however, is no guarantee that they are happy with the job.

The paradox is that even with the above problems that RMAs encounter at the organizational and individual levels, including job-related stress due to role ambiguity, identity conflict, and contradictory expectations as part of the job routine, not every RMA leaves their KIO or disengages from the job. Since conflicting and contradictory subcultures are common in KIOs to larger or smaller degrees, it is worthwhile to ask what makes the difference in the responses of the RMAs to the problems. Thus, two questions are asked in this paper. First, what attributes and behavior patterns are helpful for RMAs to overcome difficulties of the conflicting and contradictory subcultures in KIOs? Second, what implications do the attributes and behavior patterns have to the human resources management practices in KIOs? In the next section, two hypotheses that focus on an attribute of RMAs, self-leadership, are explained. As described in the Introduction, self-leadership is the initiative of

the RMAs themselves toward job crafting so that the job is intrinsically rewarding and meaningful, which results in increased job satisfaction and performance. This attribute constitutes part of the human capital of RMAs with which they tend to be high performers and contribute to the missions of their KIOs.

Hypotheses about the Human Capital of RMAs

According to the existing literature on organizations, human resources management, and research management and administration, human capital of RMAs, such as self-leadership, is helpful for them to survive when facing the tensions caused by the conflicting and contradictory subcultures in KIOs. RMAs with self-leadership are supposed to mobilize their knowledge, skills, and psychological and cognitive abilities for job crafting, which results in various positive outcomes, including longer tenure, career success, rational decision-making, better performance, learning, and voluntary helping behavior extended to colleagues (Carmeli et al., 2006; Pearce & Manz, 2005; Prussia et al., 1998; Stewart et al., 2011; Sun et al., 2007). In short, they show better person-organization and person-job fit.

Thus, the following hypothesis is proposed:

H1: RMAs who mobilize self-leadership are more likely to show higher degrees of fit to their organization and job than RMAs who do not mobilize self-leadership.

The existing literature also emphasizes that self-leadership leads to psychological benefits in, for example, job satisfaction and engagement, higher motivation, self-efficacy, emotional control, and better mental states (Carmeli et al., 2006; Pearce & Manz, 2005; Prussia et al., 1998; Stewart et al., 2011). It deserves attention that these effects are obtained through the intrinsic motivation of RMAs to make their jobs challenging and meaningful to them. RMAs proactively redesign their assignments to make the tasks intrinsically rewarding, although the redesigning does not harm their KIOs by changing the objectives of the assignments. This type of proactiveness and balancing on the side of the employees due to self-leadership contrasts with classic arguments about human capital and high-performance workers that focus on how to encourage employees to be proactive and challenging through an extrinsic reward and motivating system designed by the employer (e.g., Appelbaum, 2002; McGuirk et al., 2015; Pyoria, 2007; Sun et al., 2007). With self-leadership, RMAs intrinsically make their job challenging and meaningful, which increases their happiness with working as RMAs.

Therefore, the following hypothesis is proposed:

H2: RMAs who mobilize self-leadership are more likely to show higher degrees of satisfaction with their job and the accompanying challenges than RMAs who do not mobilize self-leadership.

As mentioned in the Introduction, the above hypotheses are statistically tested using the results of the Research Administration as a Profession (RAAAP) survey (Kerridge & Scott, 2017, 2018; RAAAP, 2016). The next section provides descriptions of the survey and dataset developed from its results.

Research Method

The dataset for this paper was taken from wave 1 of the RAAAP survey. The survey was aimed at grasping the current state of RMAs all over the world and at helping the leadership of KIOs to support junior RMAs, who will be the leaders of the next generation, to develop the necessary skills. The questionnaire had 83 optional, multiple-choice questions in total and several descriptive questions and consisted of three parts about the experience of working as an RMA, the skills in the current RMA role, and the background, including the educational level, training and certificates, and affiliations with professional associations. To reach RMAs worldwide, the survey was distributed online through 11 global and regional RMA associations, and 2,691 responses were collected from the US (36.9%), the UK (17.8%), Continental Europe (15.3%), Oceania, i.e., Australia and New Zealand (13.3%), Canada (9.5%), and rest of the world (7.2%)⁶. As a result, a dataset with over 200 variables was developed, the majority of which were rank-ordered variables.

Selected Variables for This Paper

Whereas the RAAAP survey was concerned with the relevant skillsets of RMAs, this paper is intended to explain how their human capital, such as self-leadership, contributes to surviving in the conflicting and contradictory subcultures in KIOs. The different purpose demands the development of a dataset specifically for this paper from the one obtained from the survey, which means a set of appropriate variables to operationalize the RMAs' human capital and measure its usefulness for occupational survival. Winnowing down the RAAAP dataset is also necessary because over 200 variables are too many for a statistical model. Thus, this author went through the questions in the RAAAP questionnaire and selected the four dependent and four independent variables listed in Table 1. In the process, the answers in strings such as

Table 1
List of Variables

Variables	Values	Interpretation	Questions in RAAAP-1 Survey	Choices in RAAAP-1 Survey
Dependent				
Tenure	1	Less than 10 Years	Approximately how many years in total have you been employed in the field of Research Administration? [Does not have to be consecutive years and can be full or part time]	< 5
	2	10 to 19 Years		5-9
	3	20 to 29 Years		10-14
	4	30 Years or More		15-19
	(Deleted)	(Deleted)		20-24
Position	4	Leader	How would you define your current role?	25-29
	3	Manager		30-34
	2	Operational		35-39
	1	None of These		>= 40
Challenging	1	Not Very Relevant	Why have you stayed in research administration? I like the challenging work.	Never
	2	Relevant		Leader - head of office, or responsible for leading strategic function(s)
	3	Really/Highly Relevant		Manager - subordinate to a leader but responsible for a team or functional area
Inability to Move	1	Not Very Relevant	Why have you stayed in research administration? Unsuccessful in trying to move into another field.	Operational - responsible for undertaking specific duties, with no line management
	2	Relevant		Not Sure - None of these options seem to fit my role
	3	Really/Highly Relevant		1 (Not important/relevant)
Independent	1	Not Very Important	Adaptability/Change Management - includes identifying external changes early on, and developing strategies for managing change How important is Adaptability to the performance of your current job?	2
	2	Important		3
	3	Very Important		4
	missing	missing		5 (Really important/relevant)
	missing	missing		1 (Not important/relevant)
Problem Solving	1	Not Very Important	Problem Solving - ability to identify problems and recommend solutions How important are Problem-solving skills to the performance of your current job?	2
	2	Important		3
	3	Very Important		4
	missing	missing		5 (Really important/relevant)
	missing	missing		1 (Not important/relevant)
Initiative	1	Not Very Important	Initiative Taking - being a "self-starter", proactive rather than reactive, persistent in overcoming difficulties that arise in pursuit of a goal How important is Initiative Taking to the performance of your current job?	2
	2	Important		3
	3	Very Important		4
	missing	missing		5 (Really important/relevant)
	missing	missing		1 (Not important/relevant)
Decision Making	1	Not Very Important	Decision Making - the ability to make good decisions with missing or incomplete information How important is Decision Making to the performance of your current job?	2
	2	Important		3
	3	Very Important		4
	missing	missing		5 (Really important/relevant)
	missing	missing		1 (Not important/relevant)

"no response" were converted into missing values, whereas "Leader" and "Manager" were converted into a Likert scale. In addition, some samples were deleted when their answers seemed to be unreliable, such as they were "Never" working as an RMA, they were "Not Sure" in what sector or types of institutes they were working, and although their institution was "Other Government Department", its sector was "Private non-profit" (a respondent chose one of these answers). Other rank-ordered variables were also rescaled because their distributions were skewed, and as a result, an assumption about the statistical models for ordinal variables could be violated, which is, no cell should have less than five or zero observations in the ordered logistic regression and tabulation.

Dependent Variables

Among the variables in Table 1, the four are chosen as dependent variables because the existing research suggests that the length of cumulative years working as an RMA (Tenure) and the current role (Position) are positively related to self-leadership (Carmeli et al., 2006; Pearce & Manz, 2005; Prussia et al., 1998; Stewart et al., 2011; Sun et al., 2007), the latter of which is an operationalization of career success. The other two variables, i.e., Challenging and Inability to Move, are taken from ten questions in the RAAAP survey about reasons to continue working as an RMA because it is assumed that self-leadership may result in positive reasons to do so. For this paper, the questions are categorized into three groups as in Table 2, i.e., continue working for excitement, lack of mobility, and other reasons. Then, to strip down those variables as much as possible, the Cronbach's Alpha and intervariable covariance for each group are checked. Those statistics suggest that the variables in the first group, i.e., RMAs for excitement, are correlated and are likely to measure the same effect about RMAs around the world ($\alpha = 0.81$), and thus, it is sufficient to include one of them in the statistical model. The variable "Challenging" is selected because a form of self-leadership is redefining one's work to be motivating by oneself when the work is not

Table 2

Correlation between Alternative Dependent Variables

	Obs.*	Average Intervariable Covariance	Cronbach's Alpha
Tenure			
Position			
Test Scale		0.40	0.42
RMA's for Excitement			
Fun	2,592	0.66	0.73
Challenging	2,595	0.73	0.74
Not Boring	2,586	0.66	0.77
Test Scale		0.68	0.81
RMA's for Lack of Mobility			
No Want to Move for Now	2,524	0.53	0.63
No Opportunity to Move	2,488	0.06	0.08
Inability to Move	2,495	-0.04	.
Test Scale		0.19	0.29
RMA's for Other Reason			
Pay	2,521	0.27	0.42
Possible Advancement	2,553	0.32	0.46
Job Security	2,530	0.31	0.45
Love of Working with Faculty	2,579	0.47	0.55
Test Scale		0.35	0.56

* Observations prior to the dataset cleanup

and the challenging work may be a result of their initiative over a long period of time.

Indeed, the wording in the RAAAP survey is "I like challenging work" (Table 1), whereas for the other two variables, it is "The work is never boring or monotonous" and "I enjoy the profession, it's fun". Since the variables measure the same effect, the latter two can also be appropriate for use as dependent variables for this paper. However, the first one is still better because it is less clear whether the other two suggest that RMAs use their self-leadership, or they simply feel their work is exciting. The phrase "The work is never boring or monotonous" even contradicts the assumptions about

self-leadership because a worker mobilizes the psychological asset when the work is boring or monotonous.

For the groups that continue working as RMAs due to lack of mobility and other reasons, the statistics in Table 2 suggest that the variables of each group have little correlations, and thus, they measure different effects about the population of RMAs ($\alpha = 0.29$ and 0.56). Among these, the variable “Inability to Move” is selected because its wording is “Unsuccessful in trying to move into another field”, and it is clearly opposite to job satisfaction resulting from self-leadership. The other two are “I don’t want to change fields at this time” and “No opportunity to change”. The former may be because of any reason, such as family, and thus, it is less valid to examine effects of self-leadership than the “Inability to Move”. The latter may come from dissatisfaction with the job, but “Unsuccessful in trying to move into another field” indicates more negative sentiments about the jobs of RMAs. Therefore, “Inability to Move” is again more appropriate. No variables are selected from the “RMAs for Other Reason”

Table 3
Correlation between Selected Dependent Variables

	Obs.	Average Intervariable Covariance	Cronbach's Alpha
Tenure	2,454	0.06	0.33
Position	2,552	0.05	0.28
Challenging	2,484	0.08	0.37
Inability to Move	2,389	0.11	0.44

group in Table 2 because reasons such as good pay, opportunity for promotion, job security, and love of working with colleagues may make workers stay regardless of self-leadership.

Through the above process, the four dependent variables of “Tenure”, “Position”, “Challenging”, and “Inability to Move” are selected. Finally, the intervariable covariance and Cronbach’s Alpha are taken again to examine whether the four dependent variables measure different effects. As Table 3 shows, the low correlations among them ($\alpha = 0.28$ to 0.44) suggest that it is worthwhile to include those variables in a statistical model to explain the different outcomes of self-leadership. In this paper, the relationships between one of these variables and each of the independent variables below are studied pairwise.

Independent Variables

Next, the explanatory variables are selected from the dataset of the RAAAP survey, particularly from the questions in the “Generic Skills” section. In this section, the RMAs are asked about their soft skills, such as verbal and written communication skill, collaboration, and conflict resolution. While selecting the variables, this author focuses not on the labels but on the descriptions of the skills in the survey. For example, one of the skills is named “Critical Observation” in the survey. Critical observation is a necessary skill for self-leadership because a worker has to monitor others’ reactions to his/her customizing of the assigned tasks and use the reactions as a feedback to one’s own way of using self-leadership (Carmeli et al., 2006; Pearce & Manz, 2005; Prussia et al., 1998; Stewart et al., 2011). However, the description of “Critical Observation” in the survey says that it is an “ability to analyze and summarize aggregated data to various audiences”, and thus, the skill is different from the one discussed in the research about self-leadership. In addition, self-leadership concerns the internal drive of individual workers, such as self-discipline, self-monitoring, self-efficacy, constructive thinking, emotional control, and self-standards about assigned tasks. Thus, skills that concern other workers are less appropriate as independent variables for this paper.

For example, “Taking Responsibility” is described as “Accepting and demonstrating personal responsibility for compliance areas, and for your staff”. Similarly, “Project Management” is described as “assigning tasks and managing deadlines for an overall project goal (e.g.[.] implementation of a new system, policy or procedure)”. Both are less appropriate than “Adaptability”, which means “including identifying external changes early on, and developing strategies for managing change” or “Initiative Taking”, which means “being a ‘self-starter’, proactive rather than reactive, persistent in overcoming difficulties that arise in pursuit of a goal”. In this way, the four independent variables in Table 1 are selected, which are “Adaptability”, “Problem Solving”, “Initiative”, and “Decision Making”.

In the RAAAP survey, there are two types of questions for each soft skill. One is about its importance to perform the current job, and the other is about the level of the skill. In this paper, responses on the importance of the four skills are used because the same scale from “Not important” to “Extremely important” is used for all variables. On the other hand, the scale of the skill level, although it ranges from “Very low” to “Very high”, has different definitions about tasks for RMAs depending on the skill, and thus, it is difficult to simply compare what each choice means across the variables. For example, a higher level of “Adaptability” means that RMAs change their approaches at departmental or organizational levels to respond to

changes “outside of the organization” or “in the wider environment”, in other words, the skill level is associated with the span of influence of individual RMAs across organizational boundaries. In contrast, as the skill level of “Problem Solving” becomes higher, the definition in the survey says what RMAs do is refined from just handling “inconsistencies”, “e.g.[,] identifying and addressing issues”, to “e.g.[,] developing new processes/approaches to maximize effectiveness”. The difference may or may not be individual or organizational.

Table 4
Distribution of the Ordinal Variables

Statistics	Obs.	Min.	Max.	Percentile				
				25%	50%	75%	90%	95%
Dependent Variables								
Tenure	2,454	1	4	1	1	2	3	3
Position	2,552	1	4	2	3	3	4	4
Challenging Job	2,484	1	3	3	3	3	3	3
Inability to Move	2,389	1	3	1	1	1	2	3
Independent Variables								
Adaptability	2,530	1	3	2	3	3	3	3
Problem Solving	2,532	1	3	3	3	3	3	3
Initiative	2,519	1	3	3	3	3	3	3
Decision Making	2,524	1	3	2	3	3	3	3

Table 4 summarizes the descriptive statistics of the dependent and independent variables. Through the variable selection, 2,691 observations in the RAAAP dataset are reduced to approximately 2,500. The Likert scales for the variables range from 1 to 4 for Tenure and Position, whereas for the other variables, the scales range from 1 to 3. Table 1 shows what each value of the Likert scale means, and the percentile distribution of each variable in Table 4 suggests that it is greatly skewed. First, a majority of the respondents seem to work for less than 10 years as RMAs in total (1 = Less than 10 Years) and then come those who work for 10 to 19 years (2 = 10 to 19 Years), whereas only approximately 10% seems to work for 20 years or longer (3 = 20 to 29 Years, 4 = 30 Years or More). The skewness may occur because research management and administration is a comparatively new profession outside the US and is still evolving, as Kerridge and Scott (2017, 2018) discussed. On the other hand, a majority of the respondents seem to occupy the positions of manager or higher (3 = Manager, 4 = Leader), and again, approximately 10% of them seem to work as heads of the office responsible for strategic functions. Second, almost all of the respondents seem to continue working as RMAs because they love a challenging job (3 = Really/ Highly Relevant). Kerridge and Scott (2017, 2018) also pointed to this characteristic of

the respondents of the RAAAP survey. When this author examined its distribution in detail, only approximately 6.7% of the respondents answered that the challenge is not very relevant as the reason and approximately 14% answered that it is relevant. Third, only approximately 10% of the respondents seem to keep working as RMAs because they have been unsuccessful in changing their occupation (2 = Relevant, 3 = Really/Highly Relevant), whereas for approximately 90% of them, the reason is irrelevant (1 = Not Very Relevant).

Fourth, all of the independent variables also have skewed distributions. Almost all of the respondents answered that those skills were important or very important in performing their current jobs (1 = Not Very Important, 2 = Important, 3 = Very Important). In detail, approximately 12% of the respondents answered that adaptability is not very important, approximately 22% answered that the skill is important, and approximately 66% answered that it is very important. For problem solving, the distribution is approximately 3%, 13%, and 84% respectively. For initiative, it is approximately 6%, 17.8%, and 76.2%. Finally, for decision making, it is approximately 10%, 22.8%, and 67.2%. The skewed distributions of the variables even after rescaling may cause a concern in analyzing the relationship between ordinal and categorical variables because in the tabulation, there may be cells with less than five observations. This issue is elaborated in the next part about the statistical model.

Statistical Model

To study the relationship between ordinal and categorical variables pairwise, ordered logistic regression and simple tabulation are the most common models, and if the independent variables are highly correlated, the multicollinearity demands tabulating each pair of dependent and independent variables instead of using ordered logistic regression. Table 5 shows the values of the Kendall's tau-b correlation coefficients of the independent variables, which range from 0.39 to 0.48. These values mean that they have weak to moderate correlations with statistical significance at the level of $\alpha = 0.95$ ($p = 0.05$), and thus, it is possible to use ordered logistic regression. However, the skewness in the variable distributions leads to the concern about cells with small observations mentioned before. Considering these possibilities, this author checked the ratio of such cells in each pair of variables and confirmed the statistical significance of the pairs with small-sample cells using Fisher's exact test. Table 6 shows the results of the test. Based on the statistical conventions about when a chi-square test should be abandoned and switched to the exact test, the test is performed for pairs that have more than 20% of cells with observations of less than five or at least one cell with no observation.

Table 5
Correlation between the Independent Variables

	Adaptability	Problem Solving	Initiative	Decision Making
<u>Adaptability</u>				
Kendall's Tau-b	1.00			
Levels of Significance				
<u>Problem Solving</u>				
Kendall's Tau-b	0.48	1.00		
Levels of Significance	0.00 **			
<u>Initiative</u>				
Kendall's Tau-b	0.39	0.44	1.00	
Levels of Significance	0.00 **	0.00 **		
<u>Decision Making</u>				
Kendall's Tau-b	0.43	0.46	0.44	1.00
Levels of Significance	0.00 **	0.00 **	0.00 **	

** p = 0.05 level

Table 6
Cells with < 5 Observations and Results of Fisher's Exact Test

	Adaptability	Problem Solving	Initiative	Decision Making
<u>Dependent Variables</u>				
Tenure	1/12	0.00 **	0.00 **	1/12
Position	0/12	2/12	2/12	0/12
Challenging Job	0/9	0/9	0/9	0/9
Inability to Move	0/9	0/9	0/9	0/9

m/n = cell counts with < 5 Obs. ** p = 0.05 level

Tests are performed when more than 20% of cells have < 5 Obs. or at least 1 cell has no observation.

In the table, the underlined cells indicate the pairs of variables for which Fisher's exact test is performed. Among them, the pairs with two stars suggest that the results of the statistical tests about the relationship between those variables are significant. Thus, it is worthwhile to use ordered logistic regression for them to study the effects of self-leadership over the dependent variables. Many of the cells in Table 6 are filled with fractions that are not underlined. These pairs have less than 20% of small-frequency cells when they are tabulated, and thus, ordered logistic regression is also used for them.

Finally, for the hypotheses about self-leadership and the survival and evolution of

RMAs to be supported, the odds ratios for positive outcomes, such as longer tenure, higher positions, and satisfaction with challenging job, have to become larger as the unit of independent variables increases. At the same time, the odds ratio for the negative outcome, i.e., continue working as an RMA because they fail in changing the job category, has to decrease as the unit increases.

Results of the Test

Table 7 shows the results of ordered logistic regression about the four dependent and independent variables. The chi-square test suggests that the dependent variables have effects on the independent variables in the statistical model at the level of $\alpha = 0.90$ and 0.95 ($p = 0.10$ and 0.05). In the next column, the values of pseudo R^2 are very low. Although a pseudo R^2 does not have much meaning to compare across different pairs of a dependent variable and independent variables, those low values raise a concern about the explanatory power of the independent variables regarding the variability of the dependent variable. However, the independent variables are selected from the survey results of the RAAAP based on theories of self-leadership, and the multicollinearity between the independent variables is checked (Table 5). Thus, the low pseudo- R^2 values may come from the highly skewed distributions of the variables (Table 4), which may occur with rank-ordered and categorical variables⁷. In addition, due to the large observations in the dataset, even the small variability may make a difference in the actual population. With these possibilities in mind, the results of the regression analysis are explained in this section.

Table 7
Results of the Ordered Logistic Regression

	Odds Ratio	Std. Err.	P > z	CI (95%)		P > Chi ²	Pseudo R ²
Tenure (2,377 Obs.)						0.00	0.02
Adaptability	1.19	0.09	0.02 **	1.03	1.37		
Problem Solving	1.05	0.13	0.71	0.83	1.32		
Initiative	1.38	0.12	0.00 **	1.12	1.60		
Decision Making	1.39	0.11	0.00 **	1.19	1.63		
Position (2,470 Obs.)						0.00	0.07
Adaptability	1.69	0.12	0.00 **	1.48	1.93		
Problem Solving	1.06	0.11	0.60	0.86	1.31		
Initiative	1.26	0.10	0.01 **	1.07	1.48		
Decision Making	1.99	0.15	0.00 **	1.72	2.30		
Challenging Job (2,409 Obs.)						0.00	0.05
Adaptability	1.31	0.11	0.00 **	1.11	1.55		
Problem Solving	1.52	0.18	0.00 **	1.20	1.92		
Initiative	1.52	0.15	0.00 **	1.26	1.84		
Decision Making	1.19	0.11	0.05 **	1.00	1.43		
Inability to Move (2,316 Obs.)						0.04	0.00
Adaptability	1.02	0.11	0.84	0.83	1.27		
Problem Solving	0.91	0.15	0.57	0.67	1.25		
Initiative	0.79	0.10	0.06 *	0.62	1.01		
Decision Making	0.93	0.11	0.54	0.75	1.17		

** p = 0.05 level * p = 0.1 level

At the beginning, the adaptability, initiative, and decision making each make statistically significant differences in tenure, i.e., cumulative years of working as an RMA. As the years become longer by ten years, the ratio of RMAs who feel that adaptability is more important for performing their job to those who do not feel so increases 19% with all other factors held constant. Similarly, the ratio of RMAs who feel that initiative is more important for their job to those who do not feel so increases 38%, and that of RMAs who feel that decision making is more important for their job to those who do not feel so increases 39%. These results suggest that positive associations exist between how long the RMAs are working and their self-leadership, and the association is stronger with decision making, i.e., being able to make a good decision even from incomplete information, and then initiative, i.e., being a self-starter. Regarding the positions that RMAs hold in their KIOs, adaptability, initiative, and decision making are each also statistically significant, but the strength of associations are different from those for tenure. The stronger association exists with decision making, in which the ratio of RMAs who feel that the ability is more important to their job to those who do not increases almost twice (99%) as their positions increase from no specific position, operational ones, managers, to leadership. Next comes adaptability, with the odds ratio of 1.69, which is also very high. Then, initiative has the ratio of 1.26 but the lowest positive association. The results suggest that there are positive associations between the career success of an RMA and their self-leadership.

Two points are interesting about the results. First, a good decision-making ability is clearly important for a longer tenure and higher echelons, but as RMAs go up their career ladder in KIOs, the ability of being a self-starter seems to lose its gravity to that of being adaptable. This result is opposite in the case of tenure, for which initiative makes a larger difference as RMAs continue working for more years. Second, problem solving, which is an ability to identify problems and recommend solutions, is not statistically significant for tenure and positions. It is possible that problem solving is not important for self-leadership of RMAs, but in Table 7, the ability is still significant for challenging jobs. What these outcomes may imply will be discussed later.

The first hypothesis about the human capital of RMAs (H1) is that RMAs who mobilize self-leadership are more likely to show higher degrees of fit to their organization and job than RMAs who do not mobilize self-leadership. The above results about tenure and positions partly support this hypothesis because self-leadership has larger chances to occur among RMAs who are working for longer years and occupy higher positions. However, among the four independent variables, the problem-solving ability is not significant and the importance levels of the remaining three variables are different regarding tenure or positions.

The second hypothesis (H2) is that RMAs who mobilize self-leadership are more likely to show higher degrees of satisfaction with their job and the accompanying challenges than RMAs who do not mobilize self-leadership. This hypothesis is based on the theory that self-leadership leads to psychological benefits, such as job satisfaction, through intrinsic rewards coming from a challenging job, for example. The satisfaction and intrinsic rewards are measured by the two dependent variables of tenure and challenging job in this paper. The positive effects of decision-making, initiative, and adaptability on tenure have already been discussed above. For challenging job, adaptability, problem solving, initiative, and decision-making are all statistically significant in Table 7, which means that these attributes contribute to making the challenging job a reason why RMAs continue working. The results of the ordered logistic regression show that as the challenging work aspect becomes more relevant for RMAs as the reason to continue working, the ratio of RMAs who feel that adaptability is more important for performing their job to those who do not feel so increases 31% with all other factors held constant. The ratio becomes 52% regarding problem solving and initiative but decreases to 19% for decision-making. These positive associations between self-leadership and its theoretical outcomes, i.e., longer tenure and challenging job, suggest that as RMAs use their self-leadership more, they tend to have greater job satisfaction and a sense of intrinsic rewards, and thus, H2 is supported.

At the end of the Research Method section, this author predicted that the hypotheses are supported if the odds ratio becomes lower for the negative effect, i.e., inability to move. The results in Table 7 show that only one independent variable, i.e., initiative, is statistically significant at the $p = 0.10$ level. Its odds ratio is 0.79, which means, as failure in changing the job category becomes more relevant for RMAs as the reason to continue working, the ratio of RMAs who feel that an ability to take initiative is more important for performing their job to those who do not feel so decreases approximately 20% with all other factors held constant. This result conforms with the prediction, and the lower threshold of the p-value and statistical insignificance of the other independent variables may suggest that there is a weak or almost no association between being an RMA because of being unsuccessful in moving on and mobilizing self-leadership. However, further studies will be necessary with more appropriate dependent variables to evaluate negative associations.

These results suggest that the self-leadership of RMAs has positive effects on their performance and psychological state, such as job satisfaction through intrinsic rewards. RMAs with the attribute tend to show better fit to their jobs and organizations that results in longer tenure and higher positions. The attribute also helps RMAs to increase their job satisfaction and sense of intrinsic rewards, which takes the forms

of longer tenure and inclination to challenging, meaningful, and motivating jobs. Consequently, they are likely to successfully handle the complexities caused by the conflicting and contradictory subcultures of KIOs, establish footholds in the KIOs, and keep growing as professionals and individuals by their own initiative.

Discussion

This paper is intended to explain the work environment of RMAs in KIOs and the relationship between their human capital and professional survival and development in the environment. It particularly focuses on how self-leadership contributes to RMAs' willingness to continue committing to the job despite the problems caused by the organizational subcultures of free-thinking knowledge creation and control-oriented bureaucracy in KIOs. For the purpose, two hypotheses have been developed concerning how self-leadership affects the occupational and organizational fit of RMAs and their job satisfaction, both of which have been statistically tested with a dataset developed from the results of the RAAAP survey. The positive results of the hypothesis test provide answers to the two questions of this paper. First, what attributes and behavior patterns are helpful for RMAs to overcome the difficulties of the conflicting and contradictory subcultures in KIOs? Second, what implications do the attributes and behavior patterns have to human resources management practices in KIOs?

Regarding the first question, the results show that RMAs with the attribute of self-leadership more successfully overcome the difficulties, and in this paper, the attribute specifically consists of an ability to "identify external changes early on, and developing strategies for managing change" (adaptability), to "identify problems and recommend solutions" (problem solving), to be "a 'self-starter', proactive rather than reactive, persistent in overcoming difficulties that arise in pursuit of a goal" (initiative), and finally, "to make good decisions with missing or incomplete information" (decision making) (RAAAP, 2016). Although each ability contributes to how long RMAs are working and what positions they occupy in KIOs to different degrees, those who are more willing to use these abilities tend to commit to their job more than their counterparts and with the loyalty, they overcome the difficulties caused by the cultural and occupational schisms in KIOs while taking on the challenges at work with positive attitudes. It can also be said that RMAs who are willing to mobilize their self-leadership are more resourceful as human capital to KIOs because they take the initiative to make the job intrinsically rewarding even when it is actually not.

Among the four abilities, initiative and problem solving deserve more attention. In

the test results, it seems that initiative is less important for RMAs in higher positions than adaptability, whereas the ability is more important than adaptability when they are working for more years. In regard to problem solving, the ability is significant only for the RMAs' tendency to favor challenging jobs but not for their tenure and positions. These differences are interesting because the majority of the respondents in the RAAAP survey answered that they thought those abilities were very important. A possibility is that there has been a status issue that prevents RMAs from fully using their initiative and problem-solving abilities to move up the career ladders in KIOs because research management and administration is a comparatively new profession (Kerridge & Scott, 2017, 2018), and the same situation makes adaptability more useful for them to occupy higher positions. On the other hand, to keep working for more years while committing to the challenging job, RMAs may need initiative and problem solving, as well as adaptability and decision-making abilities. If this inference is correct, it further supports the argument of this paper about the predicaments that RMAs face at the workplace and the need for self-leadership for their survival and development. However, further research will be necessary to prove it.

The second question of this paper concerns the implications of the above findings to human resources management (HRM) practices in KIOs, which will be important for RMAs and KIOs in a larger context. RMAs and KIOs are in increasingly complex environments with diversification of the profession and organizational forms as well as shifting relations with the public and funding agencies. Thus, it has become more important for KIOs to fully utilize the talents of RMAs, but conflicting and contradictory organizational subcultures make KIOs fail in doing so. As a result, RMAs are stuck in the middle of inconsistent expectations from researchers and non-research administrative workers, which hampers their contributions to the fullest degree. Under this condition, hiring RMAs with self-leadership is important for both RMAs and KIOs, because for the former, the attribute helps to overcome the difficulties in the work environment, including job-related stress and dissatisfaction with the job, and for the latter, it is helpful for employee and talent retention. In addition, self-leadership is essential not only for RMAs but also for professional and knowledge workers in general because the attribute seems to be part of a larger class of human capital that includes lifelong learning and self-development processes by the employees themselves and without being directed from above. In the diversified and complex environment surrounding research enterprises and KIOs, the resilience and initiative of RMAs are assets both for themselves and KIOs. How to select applicants with self-leadership is another question, but there are several known methods to assess the adaptability, problem-solving ability, initiative, and decision-making ability of applicants from psychometric exams to work-sample tests, although those are not necessarily fine-tuned for self-leadership.

Another implication to HRM practices concerns organizational support for the training and personal growth of RMAs, which is especially relevant to junior RMAs. The existing studies on HPWSs, human capital, and research administration emphasizes the importance of the organizational support of training not only for skills enhancement but also for trust relations with employees (e.g., Appelbaum, 2002; Appelbaum et al., 2000; Landen & McCallister, 2006; Lenihan et al., 2019). Considering that formal education and training for RMAs are uncommon because it is a new profession, Landen and McCallister (2006) and Lehman (2017) discuss that experiential learning and knowledge sharing and accumulation are helpful, such as mentoring, guidance from supervisors, on-the-job training, and participation in any community of practice of RMAs.

It is common sense today that support for training is critical to retain high-performance employees, but further implications can be added. First, self-leadership of RMAs may lead to training opportunities proposed and even designed by RMAs themselves instead of those set by mentors and supervisors. As repeatedly explained in this paper, not only positive but also proactive attitudes toward continuous, lifelong learning is a sign of willingness to change and grow, which is particular to workers with high-quality human capital (e.g., Lenihan et al., 2019). RMAs, as professional and knowledge worker with such human capital, are highly likely to identify what they need and want to invest their time (and cost, if possible) in professional and personal growth by themselves. In addition, the ever expanding job descriptions of RMAs may necessitate a “more global mode of problem solving” (Landen & McCallister, 2006, p. 76) than what mentors and supervisors have already assumed from their experience or the current states of their KIOs. In the changing environment, it is possible that well-informed RMAs, or even newer ones, know better about what is necessary for their own training. When RMAs make proposals for their training in such a situation, the initiative has to be appreciated.

Second, however, the bureaucratic subculture of KIOs may interfere with the proposals and initiative because “goals” are often narrowly defined in bureaucracy. Bureaucracy is an instrument for the rational pursuit of organizational goals, which allows little slack in terms of being goal-oriented at the individual and organizational levels. As a result, when the training proposed by RMAs is new to the formally prepared one, it is more likely turned down as being disoriented. This is paradoxical because self-leadership is supposed to help RMAs in conflicting and contradictory organizational subcultures. Here, the managers and leadership should acknowledge the opinions of the professional, knowledge workers about their self-development because the acknowledgement is fundamental to trust relations with employees and to their organizational commitment and retainment as follows.

The test results in this paper suggest that self-leadership contributes to longer tenure as far as RMAs are concerned, although the research on self-leadership is yet to examine its effect on organizational commitment and turnover (Stewart et al., 2011). In this regard, professional, high-performance workers commit to not only their jobs but also organizations when their voices are heard and they can trust the management, and their commitment is increased as they are loyal to and inclined to stay in their organizations (Alvesson, 2000; Appelbaum et al., 2000). In other words, a positive feedback loop exists between trust, tenure, and organizational commitment. For RMAs in the conflicting and contradictory subcultures of KIOs, to what extent they are allowed to use self-leadership is the touchstone for trust, which increases their organizational commitment, makes them continue working there, and again, it increases the commitment to their KIOs. Therefore, the managerial leadership of KIOs must at least allow RMAs discretion to rely on self-leadership as a means to overcome the difficulties caused by the organizational subcultures. On this point, it is unnecessary to fear the initiative on the side of employees because self-leadership is not threatening to organizational purposes. It is rather a proactive behavior to make an assigned task intrinsically rewarding so that its purpose can be attained as demanded even if the task is not very attractive to the RMAs themselves at first. The agency of RMAs should rather be appreciated than feared for KIOs to prevail in the increasingly complicated environments surrounding research enterprises.

Conclusion

In this paper, this author examined how the human capital of RMAs contributes to their professional survival and development in KIOs with contradictory and conflicting subcultures of free-thinking knowledge creation and control-oriented bureaucracy. KIOs, whose membership consists of different occupational categories from researchers, non-research administrative workers to RMAs, inherently have bureaucracy to some extent, and the duality in the organizational culture makes it difficult for RMAs to reach their fullest potential. Under this condition, RMAs are assumed to use their human capital, which is exerted in the form of self-leadership, to handle the difficulties and continue committing to their job. To verify the assumption, two hypotheses about the effects of self-leadership on performance and job satisfaction are developed and then tested with data taken from wave 1 of the RAAAP survey. From the results of the test, it is confirmed that RMAs with self-leadership tend to work for more years as RMAs, occupy higher positions in KIOs, and favor challenging jobs more than otherwise, and thus, they show higher fit and engagement to their jobs and organizations, although they encounter inconsistent

expectations by the cultural schism at the workplace as much as their counterparts do.

The findings have a few implications to the HRM practices in KIOs. First, it is important that KIOs hire RMAs with self-leadership who are adaptable, self-starters, problem solvers, and good decision makers because the attribute and behavior patterns are helpful for RMAs to professionally survive and grow in KIOs and for KIOs to retain and use the talents fully and long term. Both will contribute to the survival of KIOs in the ever-complicated environments surrounding research enterprises. Second, the self-leadership of RMAs may necessitate training opportunities proposed by themselves and beyond those prepared by KIOs. When the RMA's initiative is about to be hampered because of the bureaucratic subculture, the organizational leadership is expected to take necessary actions to develop shared understanding about organizational support of self-leadership and enhance trust between the professional workers and KIOs. Finally, it is found that the self-leadership of RMAs leads to their commitment and inclination to continue to work in KIOs in addition to maintaining job engagement, and the positive association starts with trust in the management. Since KIOs need talents and the commitment of RMAs for the organizations' own success in the complicated environment, it is crucial for KIOs to allow RMAs to use their self-leadership and build trust relations with KIOs.

With the findings and implications, this paper also contributes to the existing research on research management and administration. First, by drawing on the existing research in organizational sociology and behavior, this paper describes RMAs as professional, knowledge workers with human agency who can be job crafters and take the initiative for professional and personal growth from within themselves. This approach provides a different view regarding RMAs from the many existing studies that focus on the functional roles, skills, and necessary trainings of the job. Second, in doing so, RMAs are put in the real-life conditions of working in KIOs, and their struggles and capabilities for survival as an individual and a profession are understood in the context of the work environment and organization. Finally, this paper clarifies how RMAs can use their agency and human capital for survival and how this initiative of RMAs contributes to the survival of KIOs in the complicated environment today.

However, there are limitations in this study and further research needs. First, the concept of self-leadership also covers individual cognitive processes, such as self-discipline, self-monitoring, self-efficacy, constructive thinking, and even self-talk (e.g., Prussia et al., 1998). This paper could not delve into such mechanisms that are deep within the minds of RMAs. Second, this paper could not fully grasp the issues of status of RMAs as a comparatively new profession in KIOs, although one of the

findings of this paper suggested that lack of the status might affect how RMAs use their initiative, problem-solving abilities, and adaptability. Third, self-leadership was treated as a form of human capital of RMAs in this paper, but human capital is a class of properties larger than an attribute, and thus, other attributes, abilities, and behaviors may help RMAs to survive and develop professionally. Further research is necessary to overcome these limitations while focusing on the human agency and human capital of RMAs.

Author's Note

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Junko SHIMAZOE

Ph.D., Senior Research Fellow

Institute of Developing Economies, Japan External Trade Organization (IDE-JETRO)
3-2-2 Wakaba, Mihama-ku, Chiba-shi, Chiba 261-8545, Japan

Telephone: +81(43)299-9500 Fax: +81(43)299-9724

E-mail: shimazoe@alum.mit.edu

Correspondence concerning this paper should be addressed to Junko Shimazoe, Ph.D., Senior Research Fellow, IDE-JETRO, 3-2-2 Wakaba, Mihama-ku, Chiba-shi, Chiba 261-8545, Japan, shimazoe@alum.mit.edu.

Endnotes

1. The existing research deemphasizes the importance of external standards for self-leadership compared to internal ones, but at the same time, the research seems to assume that workers with self-leadership satisfy externally-set requirements and do not use their human capital to exploit their organization (e.g., Carmeli, Meitar, & Weisberg, 2006; Pearce & Manz, 2005; Stewart, Courtright, & Manz, 2011).
2. Quitting is not always a direct outcome of job dissatisfaction because other variables may also work for the decision, such as job engagement due to self-leadership, as well as the conditions of the external labor market. The interest of

this paper is the conditions of the former.

3. On the other hand, measuring the performance of knowledge workers such as researchers and RMAs or calculating the value of intellectual capital is never an easy task, and there is no universally accepted method to satisfy the need (Chaminade & Catusus, 2007; Davenport, Thomas, & Cantrell, 2002; Drucker, 1999; Lewis, 2004; Pyoria, 2007; Ramirez & Nembhard, 2004). It has long been a concern in the management studies how to solve the gap between the market value and book value of a company by determining the value of intellectual capital and how to manage knowledge to turn intangible assets into tangible ones (e.g., Chaminade & Catusus, 2007; Drucker, 1999; Pyoria, 2007; Sanger, 2012).
4. Appelbaum (2002), Appelbaum et al. (2000), Belanger et al. (2002), and Giles et al. (2002) studied manufacturing workers to find out why some companies in the sector were successful while others were failing. However, their case studies also included KIOs, such as a medical device developer (Appelbaum et al., 2000), and the characteristics of HPWSs in the literature are the same as those discussed as positive human resource management practices common across industrial sectors today (e.g., Appelbaum et al., 2000; Makani & Marche, 2010; Prussia, Anderson, & Manz, 1998; Society for Human Resource Management).
5. Person-organization misfit is different from the person-job misfit that is caused by insufficient skills, knowledge, and abilities on the side of the employees.
6. The method of distribution, number of respondents, and their geographical ratio are according to Kerridge and Scott (2017, 2018).
7. Although it is theoretically meaningless, a pseudo R² was checked with Tenure and all independent variables of the importance of soft skills in the RAAAP survey results. Even with all the explanatory variables, the pseudo R² was 0.03, which suggests that the low value in Table 7 is likely because of discrete variables and their skewed distributions.

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