¶2520.31 Evaluating the Impact of Internal Submission Deadline Policy on Grant Proposal Success

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Background

Grant proposals contribute to advancing research at higher education institutions. Pre-Award research administration serves a critical function in the development of proposal submissions through services provided and the application of internal and external policies. Internal submission deadline policies enable research administration personnel to effectively ensure that proposals meet institutional standards and comply with funding agency requirements. However, the impact of internal deadlines on proposal success needs to be better understood.

A data-driven analysis is applied to proposals submitted by a public R1 institution [1] between 2017 and 2022. The analysis focuses on first understanding the effect of an internal submission deadline policy on proposal submission trends, success rates, and funding amounts. In addition, it explores the association between compliance with the internal deadline policy and factors such as proposal success, funder category, deadline month, Principal Investigator (PI) previous funding, PI previous proposal submission, award tier, and institutional divisions. Statistical tests, including paired t-tests and Chi-Squared tests, are used to assess the impact of the policy by comparing years prior to its implementation in an electronic Research Administration (eRA) system with years following its implementation and, additionally, to understand the association between the internal submission deadline policy compliance and other factors during years the policy was active.

The findings of the first part of the analysis suggest that although implementing the internal submission deadline policy did not significantly affect the institution's overall success rate, a notable increase in submissions was observed, indicating that the policy did not hinder the submission rate. In addition, the analysis reveals a strong association between compliance with the internal submission deadline policy and factors such as funder category, deadline month, division, year, and award tier. Yet, we find no significant association between internal policy compliance and PI previous submission or PI previous funding. A post hoc test was carried out to understand where the differences came from, and the results revealed patterns across the institution's proposals submissions related to divisions, funder types, months, and award tiers. While the results indicate that 32% of all funded proposals at the institution were late to the internal submission deadline policy, the success rate of non-compliant proposals submitted to the different funder types was on average 5% less than the success rate of proposals submitted with compliance to the internal submission deadline policy, in addition to finding a stronger correlation between non-compliant proposals that are declined over those that are funded. The results obtained were used at our institution to evaluate and revise the current policy, and the analysis provides a data-driven evaluation methodology that can be applied at other institutions.

1. Introduction

Successful proposals are important to secure funding for institutions. While funding secured through proposals can impact the faculty's experience and opportunity to expand on their research and the overall knowledge in their fields, funding also provides tremendous opportunities for students to continue their education. Moreover, funding contributes to improving the research infrastructure and attracting talent to the institution. Highly funded institutions receive nationwide recognition, which can support a reinforcement cycle that increases competitiveness for future funding. Therefore, understanding how institutions can increase proposal success is highly relevant. Proposal success is an outcome that depends on many interconnected factors [2], and the following list and its representation in Figure 1. provides a starting point to discussing policy and available data:

Figure 1. Factors that Affect Proposal Success
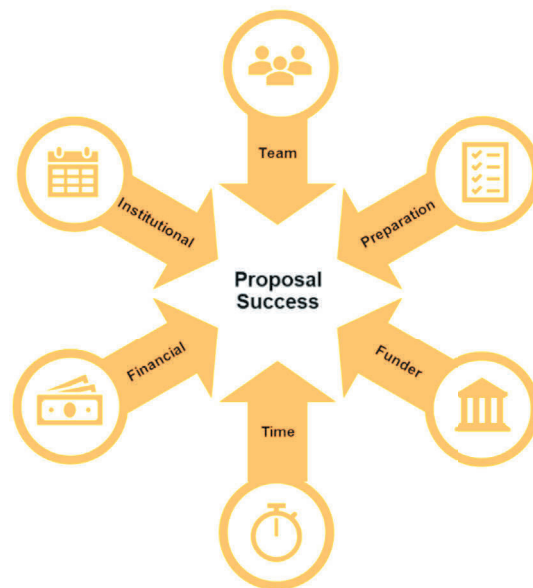
◆ **Team** (makeup, topic expertise, disciplines, previous experience, cultures, teaching load)

◆ **Preparation** (ideation, development, document collection, revisions, timeliness)

◆ **Funder** (type, priorities/topics, success rate, required forms/systems, review panel makeup)

◆ **Financial** (allocated funding, funding limits, budget, cost share)

◆ **Time** (holidays, trends through year, patterns in funder deadlines, reviews, finalization)

◆ **Institutional** (investment, infrastructure, policies, procedures, internal timing)

There is growing awareness of the importance of data-driven decision-making, and leveraging data to evaluate teams, divisions, or individual-level performance or characteristics. Data is used to inform faculty hiring and aid in strategic planning at various levels. In recent years, many higher education institutions are leveraging

data-driven decisions for go-no-go proposals submissions in addition to analysis on the funding landscape and sponsor-level analysis [3, 4]. One of its many valuable applications is for research administrators to utilize data in determining staffing needs as well as shaping, evaluating, and revising internal policy. Additionally, with regard to internal policy, the use of internal deadlines is recommended by some funding agencies as a way to help reduce potential mistakes that can occur when working right up to a submission deadline [5]. Such examples motivated our interest in assessing if the internal deadline policy is affecting the institution's performance and whether it has positively or negatively impacted proposal success.

The data analysis reflects a case study for one institution, but the methodology can be adapted in other institutional contexts. While policies, procedures, and support are among the institutional factors that research administrators can highly contribute to, we present this methodology to evaluate the impact of internal submission policies on proposal success. We selected several factors from Figure 1 for this study.

2. Internal Submission Deadline Policy

Our institution's internal submission deadline policy states that faculty must submit their proposal package five days prior to the submission deadline. The process and timeline are included in Figure 2.

Figure 2. Internal Submission Deadline Policy
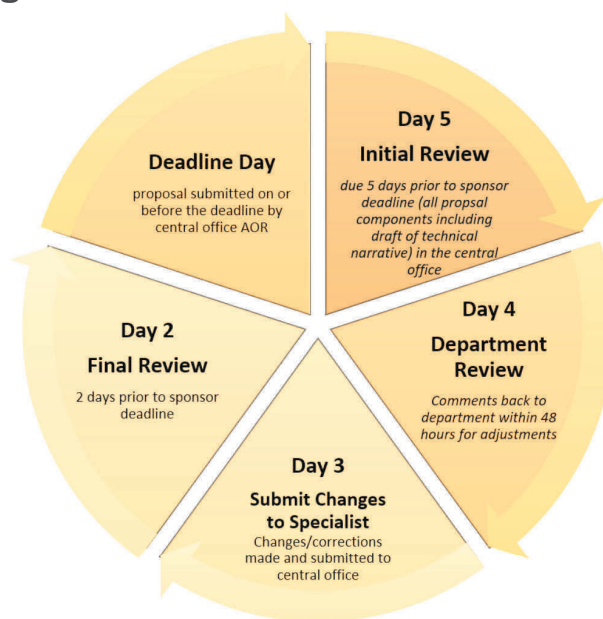
While the policy was first introduced at our institution in Fiscal Year 2016, the electronic Research Administration (eRA) system did not track adherence to the policy prior to Fiscal Year 2020. In 2020, the aforementioned internal submission deadline policy was fully implemented in the eRA system at our institution. This change was intended to realign our functions to provide better research administration services to the university community and ensure that our institution operates more

effectively in marching towards achieving a collective impact on our strategic goals. Among the many benefits this policy has brought to our institutional community is creating a less reactive work environment by reducing the burden submissions have on research administrators. In addition, the policy helps develop shared responsibility by making a clear structure for all entities responsible for successful proposal submissions. While those benefits are well valued at the administration level, in contrast, there was some pushback by faculty, who would like the maximum opportunity to continue working on their proposals until very close to the submission deadline. While our institution provides a waiver process for those who tend to be late to the internal deadline, faculty feedback suggests that it is a stringent policy and a one-size-fits-all, which should only apply to specific funders.

To evaluate the success and impact of this internal submission policy on our submission, success, or funding rates, we start our analysis by assessing the difference between the years before and after the policy was implemented in the eRA system. Next, we investigate the correlation between complying with the policy and factors such as funder category, deadline month, proposal success, fiscal year, award tier, institutional divisions, PI previous funding, and PI previous proposal submission.

3. Data and Methodology

Data availability with the implemented internal submission deadline policy is from Fiscal Year 2020 to Fiscal Year 2023. However, given that at the time of this analysis, approximately 50% of submissions made during Fiscal Year 2023 are pending (final award determination yet to be known), we only include data up to Fiscal Year 2022. With three years' worth of data with the policy being active, data from an equal number of years before the policy implementation were included to conduct an equally weighted comparison. As can be seen in Figure 3, there were initially 10407 proposal submissions included. While 1053 records from the Fiscal Year 2022 were tagged in the system as pending, we applied a strategy to label those with a submission deadline over 18 months prior as declined, resulting in only 323 records remaining tagged as pending. Withdrawn proposals and award continuations were excluded from our data as they either did not receive an award/decline determination or did not require compliance with the internal submission deadline policy. Pending awards were only included in comparing submission rates; they were excluded when assessing success rates.

To compare different years to each other, the methodology in this analysis uses a combination of statistical tests listed below [6]:

◆ Paired T-Test to compare two samples' mean and see whether the averages of two groups are significantly different.

◆ Chi-Squared Test of independence to investigate if there is an association between categorical variables and whether two categorical variables are correlated.

◆ Post-hoc test to understand where the associations observed in the Chi-Squared Test come from.

Figure 3. Data Overview
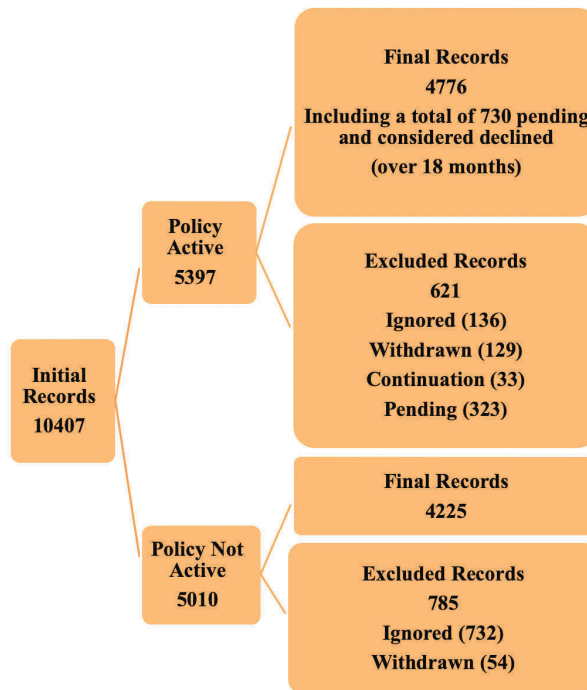
Leveraging Data - Survey

During the 2023 National Council of University Research Administrators (NCURA) Pre-Award Research Administration (PRA) Conference in Las Vegas, we presented a session on this topic. There was a total of thirty-five participants from different institutions in attendance. The attendees were surveyed on whether they use data in shaping, evaluating, or revising policy at their institutions. A total of 32% responded that they do either frequently or very frequently, 37% responded they do occasionally, 20% responded they do either rarely or very rarely, and 9% responded they never do.
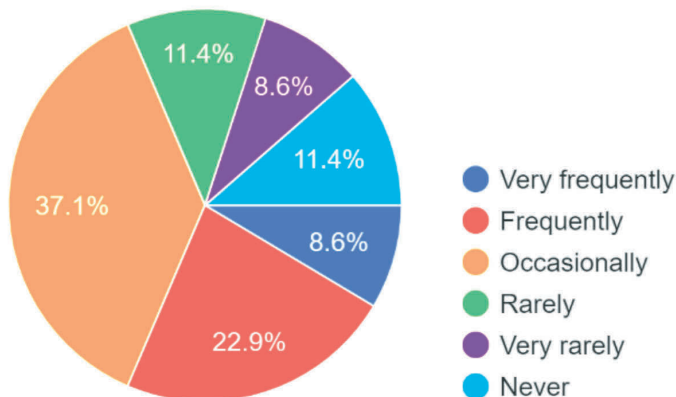
The attendees were also surveyed about use of data, and responses differed between institutions. Data use related to team metrics scored the highest, followed by university-level assessment, college / department funding, and expertise-related data analysis practices.

Lastly, the survey inquired whether their institutions had an internal submission deadline policy. It was found that 71% of participants currently have such a policy, but only 50% perceive it as successful.

4. Before versus After Policy Implementation in eRA System

When assessing the difference in success rates, number of submissions, number of funded proposals, and number of declined proposals between the Fiscal Years with the policy implemented in the eRA system (2020-2022) and the Fiscal Years prior to its implementation (2017-2019), we find a 20% increase in the number of submissions in the later years, yet we find no significant difference in the average number of submissions, number of funded proposals, and success rates.

When assessing the difference in success rates, number of submissions, number of funded proposals, number of declined proposals, and the amount awarded between the divisions for the Fiscal Years the policy was implemented in the eRA system (2020-2022) to the Fiscal Years prior to its implementation (2017-2019), we find that only the average number of submissions by the different divisions was statistically significant between the years before and after the policy, with an average increase of 30% over all the divisions. Given that the number of proposal submissions is significantly higher for Fiscal Years 2020-2022 compared to Fiscal Years 2017-2019, we have a slight increase in funded proposals versus a high increase in declined proposals. Therefore, our divisions' average success rate is lower for the years the policy was active, yet the difference is not statistically significant.

Overall, we find a correlation between the increase in the number of submissions with the decrease in success rate. From the analysis, we highlight three performance categories for each of the divisions as presented in Figure 4:

1. Divisions with an increase in submissions, a drop in success rates, and a drop in dollar amounts awarded that we refer to as low performers, e.g., Division numbers 2, 6, 11.

2. Divisions with an increase in submissions and a drop in success rates, but with an increase in the dollar amounts awarded, that we refer to as good performers, e.g., Division numbers 3, 4, 7, 10, 12, 13.

3. Divisions with an increase in submissions, success rates, and the dollar amounts awarded that we refer to as high performers, e.g., Division number 9.

In addition, we highlight outlier divisions with an increase in submissions, disproportional to the decline in success rate compared to other divisions. This highlights a need to investigate and evaluate additional internal submission deadline policies related to quality assurance checks at the division level.

This analysis, among many, provides a metric for evaluating divisions' performance. While the variations observed could be due to other reasons, such as the differences in funding landscapes for the different divisions, hired talent, and many more, it sheds light on the importance of extending the analysis further to understand the reasons behind the variation and differences between the individual divisions.

Figure 4. Percentage of Change by Division
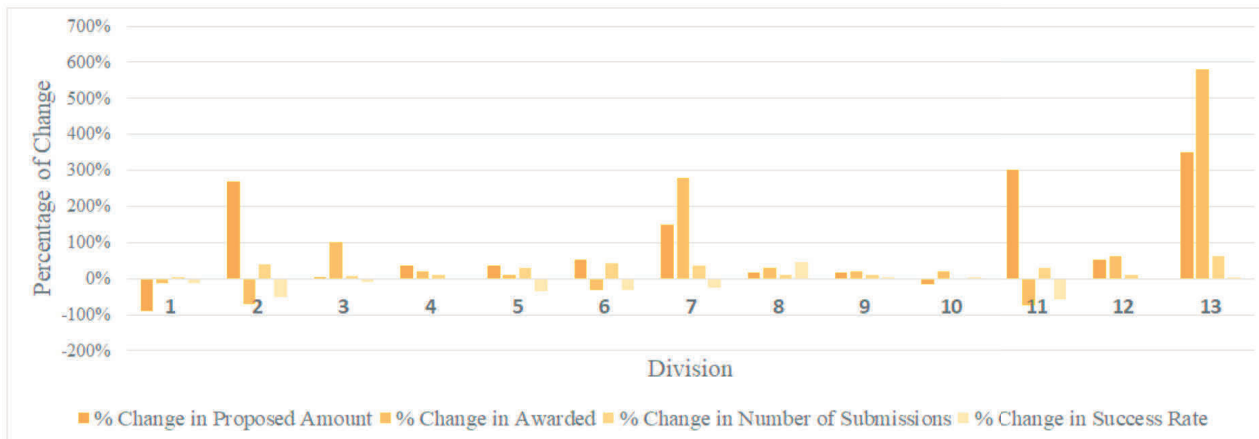
To investigate the policy's effect on the award amount proposed and funded, we categorize our proposal's proposed amount into five tiers (A <100K), (100k>= B <=500K), (500k>= C < 1 million), (1 million >= D < 5 million), and (E >= 5 million). As shown in Figure 5. we find that our institution has increased the number of large proposals submitted (larger than 1 million dollars) by half, in the years following the policy implementation versus the years prior to its implementation, which we find proportional to the number of proposals funded in that award tier. In addition to an increase in the funded amounts related to that award tier by one and a half. While our overall success rate pre-and post-implementation of the internal submission deadline policy is not statistically different, it did increase from 21% to 25%. With the policy implemented, we find overall more submissions, higher proposed amounts, and higher awarded amounts.

Figure 5. Percentage Change by Award Tier
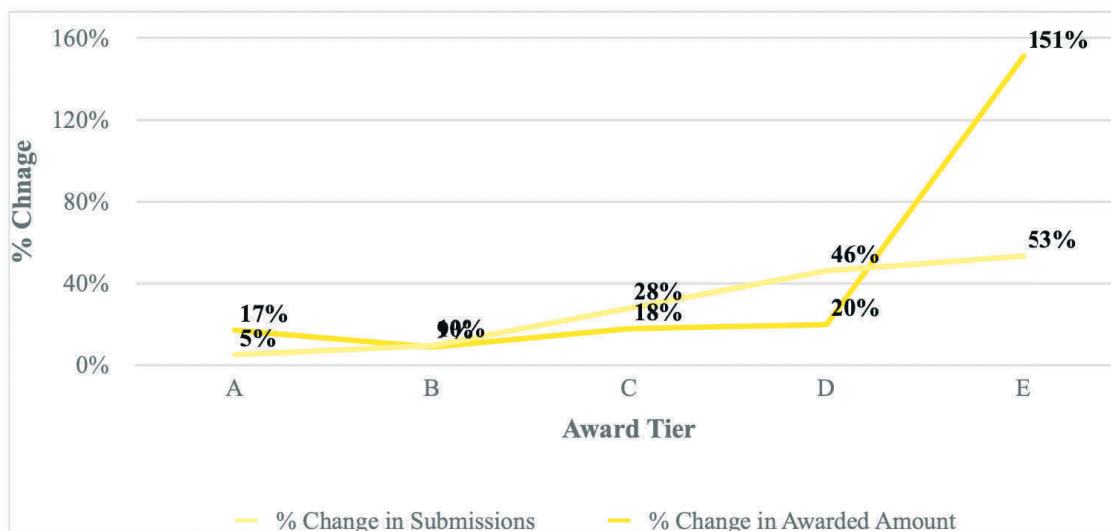
5. Compliance with the Internal Submission Deadline Policy and Associated Factors

To find submission patterns related to compliance with the internal submission deadline policy, we use submission data from 2020-2022 when the policy was

implemented in the eRA system. A Chi-Squared Test of independence is applied to the data to find the association between compliance with the internal submission deadline policy and a few selected variables extracted from Table 1, listed below:

◆ Proposal Outcome: Funded/Declined

◆ Funder Category: Federal (1), Educational Institution (2), Industry (3), Foreign (4), Foundation-Private (5), State (6)

◆ Deadline month: Jan, Feb, Mar, Apr, May, Jun, Jul, Aug, Sep, Oct, Nov, Dec

◆ Fiscal Year: 2020, 2021, 2022

◆ Federal: Yes, No

◆ PI Previous Proposal Submission: Yes, No

◆ PI Previous Funding: Yes, No

◆ Division: Thirteen unique divisions representing academic colleges and non-academic units

The results of the Chi-Squared Test are shown in Table 1 below.

Table 1. Association between policy compliance and the listed factors

Variable	Chi-Squared	P-value	Degree of Freedom	Significance P=0.05	Test of Independence
Funded	16.174	0.000	1	Reject H0	**They are associated**
Deadline Month	109.984	0.000	11	Reject H0	**They are associated**
Fiscal Year	10.565	0.005	2	Reject H0	**They are associated**
Funder Category	135.605	0.000	5	Reject H0	**They are associated**
Federal	101.161	0.000	1	Reject H0	**They are associated**
PI Previous Proposal	0.312	0.576	1	Accept H0	No association
PI Previous Funding	2.138	0.144	1	Accept H0	No association
Division	90.251	0.000	12	Reject H0	**They are associated**

We find a strong association between the internal submission deadline policy compliance and all the listed factors. Yet we find no significant association between PI Previous Proposal and PI Previous Funding.

To understand where the association between those factors and the compliance with the internal submission deadline policy is coming from and understand the difference between the different groups, we follow the Chi-Squared Test with a post-hoc test for each of those factors and the compliance with the internal submission policy.

6. Funder Category

Figure 6 shows post hoc test results when assessing the difference between the funder categories based on compliance with the internal submission deadline policy. The shades of each square reflect the degree of significance between the variables on each end of the colored square. The darker the shade, the higher the difference between the two groups. It can be observed that the highest significant difference in the number of submissions that are late to the internal submission deadline policy is found when the proposal is submitted to a federal sponsor in comparison to all the
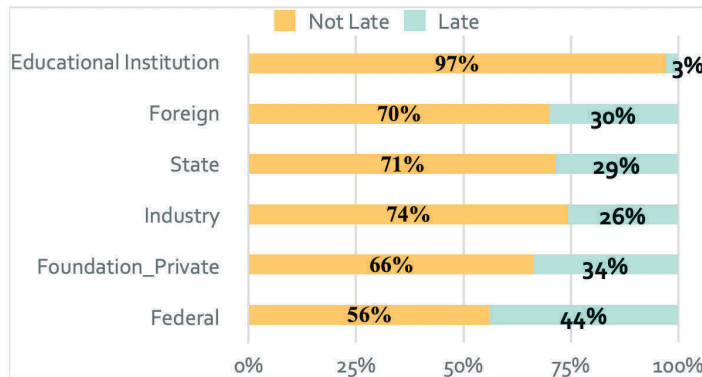
other funder categories, followed by a significant difference when the funder is an educational institution. To further investigate those differences, we quantify the percentages of late submissions to internal submission deadline policy versus on time ones by each of the funder categories, as shown in Figure 7. It can be observed that proposals submitted to federal funders contribute the most to our late submissions and that submissions made to Educational Institutions contribute the least. That explains the high significance found between those two categories and the rest of the categories. This analysis can assess the association between compliance with the policy and funder categories. We find that late submissions make up 35% of all submissions between Fiscal Year 2020 and Fiscal Year 2022, with the highest proportion being submissions made to federal sponsors. Late proposals to internal submission deadline policy account for almost half of all submissions made to federal funders, highlighting the need to extend the analysis further to understand the reasons behind the low compliance with the policy when the funder is federal and to find the correlation between policy compliance and the type of federal funders the proposals are submitted to. This analysis can inform decision-making and help guide institutional policy to propose interventions needed at the institutional level.

Figure 6. Post Hoc for Funder Category vs. Compliance
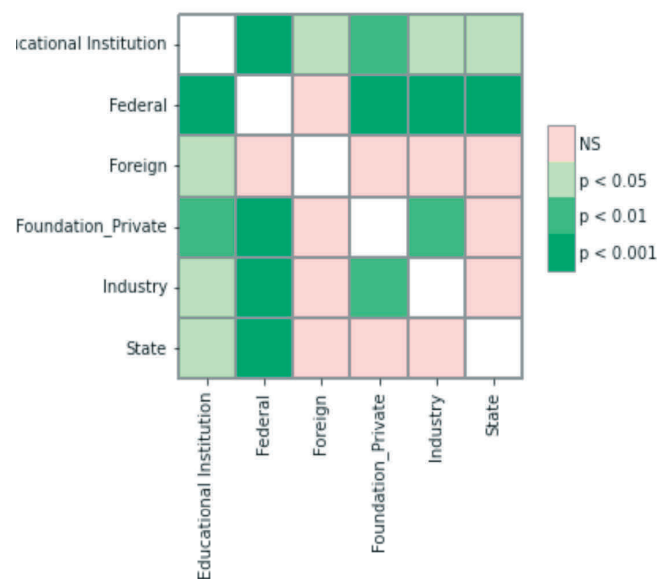
When assessing the impact of late submissions to the internal submission deadline policy on success, we find that the success rate of those submitted without compliance with the policy was less by an average of 5% across all funder categories compared to proposals submitted in compliance with the policy. While the difference is statistically insignificant, proposals compliant with the policy account for a significantly higher proportion of successful proposals than non-compliant ones. And while late submissions still contribute to funded proposals at our institution, it stands for only one-third of funded proposals. In conclusion, proposals that comply with the policy contribute more to our success rate.

Figure 7. Policy Compliance versus Funder Category

7. Deadline month

Figure 8 shows post hoc test results when assessing the differences between the proposal's deadline months based on compliance with the internal submission deadline policy. The shades of each square reflect the degree of significance between the variables on each end of the colored square. The darker the shade, the higher the difference between the two groups. The highest significant difference in late submissions is found between proposals submitted in the summer and Fall months. To further investigate those differences, we quantify the percentages of late submissions for each month.

Figure 8. Post Hoc test for Deadline month verses Policy Compliance
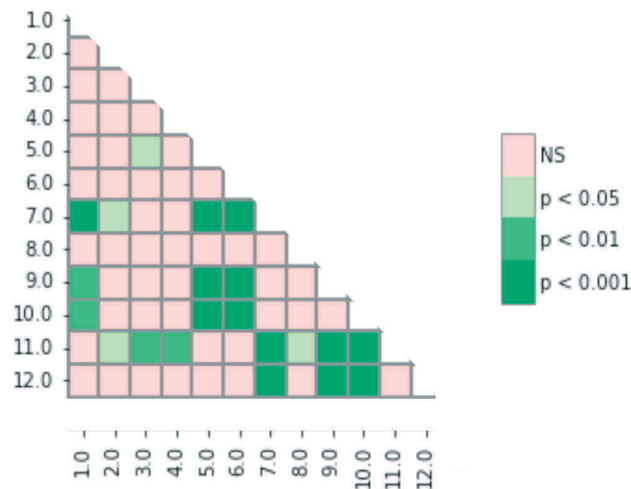

Figure 9 shows the percentages of late submissions to the internal submission deadline by month. May, June, and November have the highest value, and the proportion of submissions to the internal submission deadline is significantly different from the months of July, September, and October, which have the lowest number and proportion of late submissions to the internal submission deadline. We also find in our internal data that June and October are the months with the lowest success rate, which could be due to the high number of late submissions, we find that May has a high success rate and that the high number of late submissions does not seem

to affect it. Could some months have higher success rates? It could be something that needs further investigation. This can benefit planning and managing staffing allocation over the months based on the patterns observed in the data.

Figure 9. Percentage of late submissions by Deadline Month
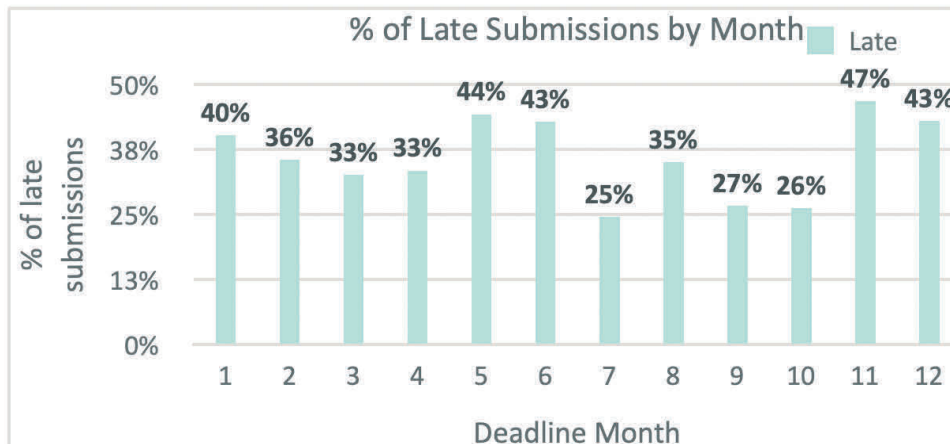
When assessing the correlation between late submissions and success, as shown in Figure 10, we find that proposals submitted in compliance with the policy were not correlated with proposal success. Yet, we find a strong correlation between proposals submitted late and not being funded. In addition, we find that the correlation between late proposals is higher with declined than with funded; late proposals to internal submission deadlines are more likely declined than funded.

Figure 10. Internal Submission Deadline Policy Compliance with Success
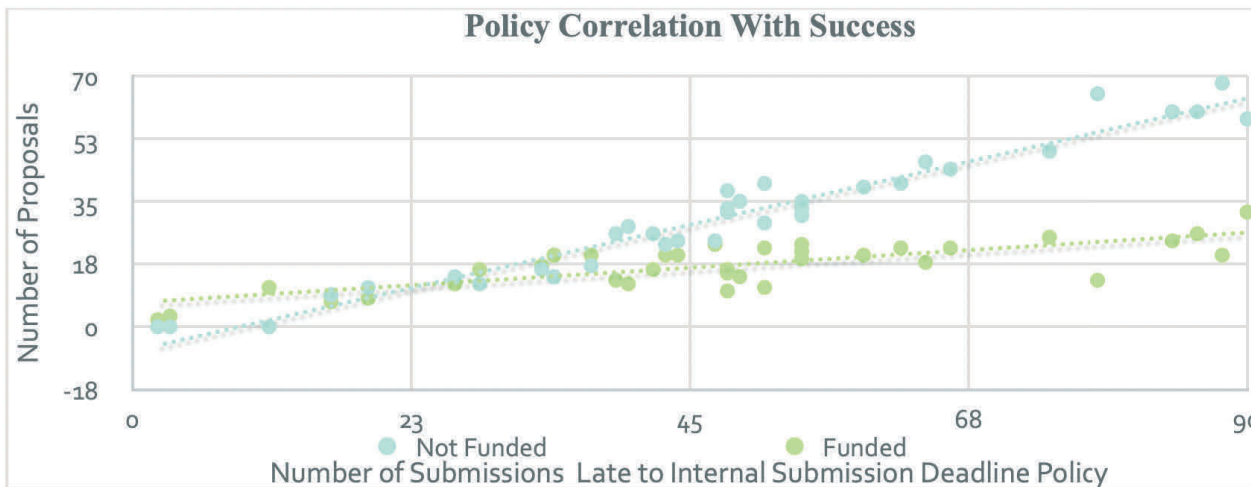
8. Years

When comparing the years shown in Figure 11, we find the most significant difference in late submissions is between Fiscal Year 2021 and Fiscal Year 2022, with 2022 having fewer late submissions. This shows the growing culture of compliance with internal submission deadlines across the institution. In addition, it shows how the proportion of successful proposals has increased in Fiscal Year 2022.

Figure 11. Yearly differences in compliance and success
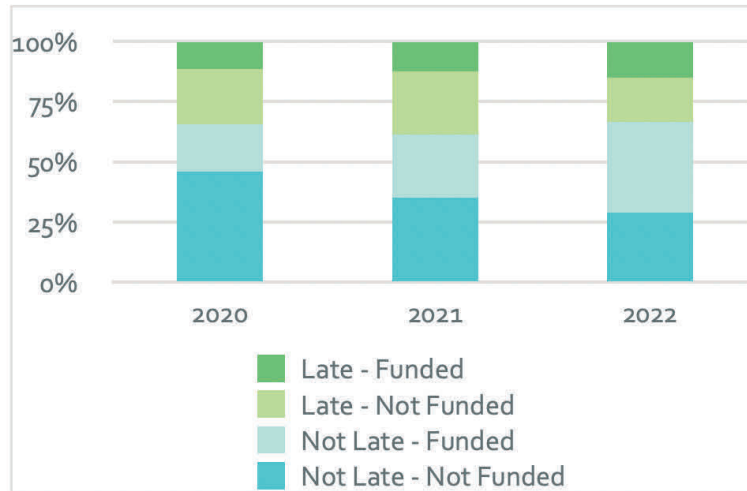

9. Award Amount

To investigate compliance with the policy based on the award amount proposed, we use the five tiers introduced in section 4.

(A < 100K), (100k >= B <= 500K), (500k >= C < 1 million), (1 million >= D < 5 million), and (E >= 5 million).

Figure 12 shows the percentage of late submissions to the internal submission policy by the award tier. It can be noted that the highest proportion of late submissions to internal deadlines are submissions with proposed amounts in award tier E. We find that proposals that have higher proposed award amounts are more likely to be late to the internal submission deadline than proposals with smaller proposed award amounts. This highlights the need to provide more administrative support and staffing to proposals that fall under the large award tiers, which has also been recognized as a priority area in the fields of Research Development and Research Administration [7, 8].

Figure 12. Policy compliance, by Award Tier
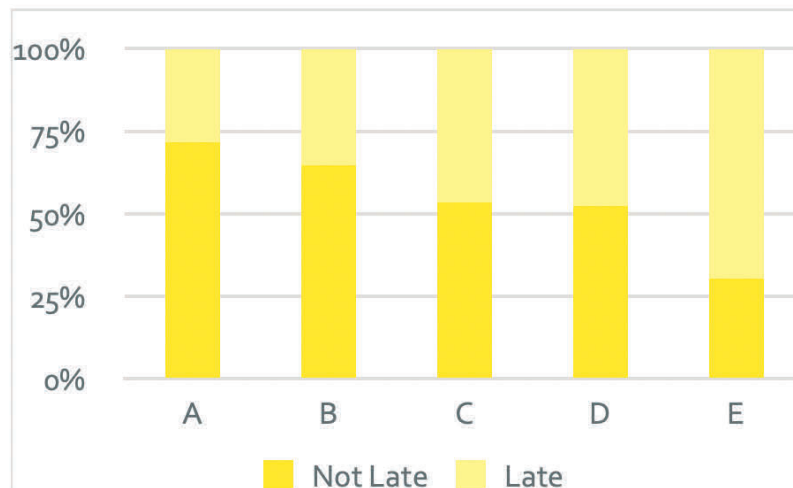
10. Divisions

To investigate the difference between the institution divisions in terms of compliance with the internal submission deadline policy, we conducted the post-hoc test. The results show which divisions had significant differences in terms of late submissions. When combining this information with insights gained on the effect of the policy on submission rates and success rates, we can assess how different divisions comply with internal policy and highlight which divisions are the most impacted and how that correlates with its success.

11. Submissions to Federal Sponsors

To further investigate compliance with the internal submission deadline policy when the sponsor is federal, we analyze the association between compliance with the policy and the type of federal funder the proposal is submitted to. The total number of records included was 2199 from Fiscal Year 2020 to Fiscal Year 2022. In this part of the analysis, we can highlight which federal agencies we submit the most to and in what proportion the submissions comply with the internal submission deadline policy. We found the lowest compliance whenever the submission was to the National Science Foundation (NSF), National Aeronautics and Space Administration (NASA), or Department of Health and Human Service (DHHS), respectively. In addition, when comparing the success rates between submissions compliant with the policy to those that were not, we found an average drop of 13% in the success rate for federal agency submissions. In addition, we found a strong association between non-compliance to the internal submission policy when the submissions are to a federal sponsor and PI previous proposal submissions. We find that PIs submitting for the first time to a federal sponsor are less likely late than when having previously submitted a proposal to a federal sponsor. This highlights the important role an internal submission deadline has on allowing sufficient time to submit and correct any errors that may arise during validation in the federal sponsor portal.

12. Insights and Recommendations

This article investigates the effect of implementing an internal submission deadline policy within a public R1 institution, in addition to investigating the effect of compliance with the policy and success rates among other factors we have investigated. While we find no significant effect of the policy on our institutions' overall submission rate or success rate, the implementation of the policy has brought numerous benefits to our research administration community institution-wide.

In addition, we find that in the years with the policy implemented in the eRA system, non-compliant proposals were more likely declined than funded. When assessing the association that compliance with the policy has on the factors we have investigated, we are able to highlight the individual divisions' performance, which contributes to effective policy interventions and lesson reports that address the differences found between divisions. Moreover, the association between the type of funding agency and compliance to the internal submission deadline policy was highlighted, particularly the strong correlation found between late submissions to the internal submission deadline policy and proposals submitted to federal funders. In addition,

we find monthly patterns of late submissions to internal submission deadline policy that is strongly correlated with federal funding agencies' deadlines. We also highlight award size characteristics that are strongly correlated with proposals late to internal submission deadlines. Finally, this analysis contributes to identifying gaps in data collection methodologies and provides recommendations for responsible divisions to provide better data refinement, indexing, and data collection policies.

The results of this analysis unveil the association between compliance with the internal submission deadlines and other factors, in addition to the association between compliance with the internal submission deadline and proposal success. Policy compliance behavior patterns are extracted across the institutions' divisions by leveraging data analysis and internal submission data. This highlights the complementing role that leveraging data analysis has in extracting institutional characteristics and patterns related to institutional policy compliance.

The analysis revealed the relevance of using available data to analyze behaviors and impacts, and it has set a basis to have productive discussions on what data is available, how it is managed, and how it can be utilized. With more information and transparency provided through data collection, analysis, and sharing, meaningful steps can be taken that are in the best interest of the staff and faculty members, and that help support proposal success at the individual and institutional level.

Based on aspects from this analysis, steps have begun to revise the internal submission deadline policy. Using our results, a sub-committee was initiated to address business practices for late submissions to internal submission deadlines, including stakeholders, unit staff, and the central office. This ensures that the data infrastructure and submission behavior inform the institutional policy. In addition, it helps in adopting a long-term view of iterative improvements of inputs and programs. Understanding all the above, we can evaluate current policy and its effectiveness and provide recommendations for influencing institutional internal submission policies and increasing success. In addition, to create a submission-aware culture that influences the advancement of science through a more cohesive and collaborative research process. While this analysis is applied to one institution, it presents a policy and an evaluation methodology that other institutions can use.

13. Future Direction

Future potential for this work includes extending the analysis with more years of data and more facets for evaluation as well as building a model to predict the likelihood of proposal success. As we've prepared this work, a preliminary model for predicting proposal success was developed. To do so, we first investigated what factors from our list of internally reported metrics can be associated with the success of proposals. We found that factors like deadline month, Fiscal Year, division, award tier, sponsor internal success rate, PI previous funding, and whether the research team was collaborative (consisting of more than one researcher) were all associated with proposal success. To understand their effect, we build a preliminary logistic regression model, where the predicted variable is either success or failure.

While research conducted in this area has shown factors like PI publication

history and its alignment with the proposal and the proposal quality as factors that increase the proposal's likelihood of success [2, 9], to our knowledge, this approach will be the first to address factors related to internal institution metrics in predicting proposals success. Despite that, our model is still in its preliminary stages; we hope to extend it further and improve the factors we have included to obtain higher accuracy and better prediction of proposals success. We anticipate that predicting proposal success can help strategically improve institutions' success in securing research funding.

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