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From Text to Impact

NLP Analysis of the University of the Philippines' Public Policy Research Contribution

Ronald A. Pernia, PhD

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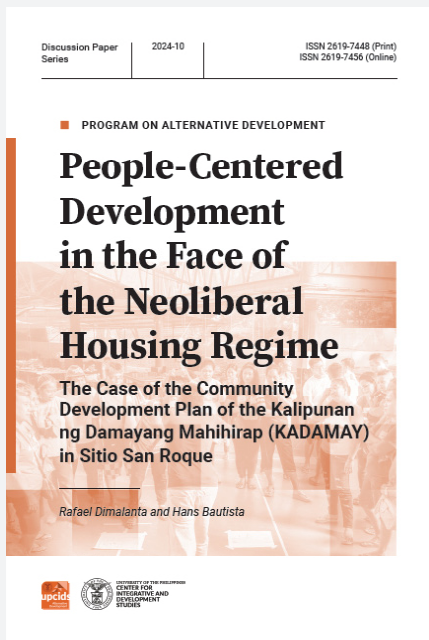
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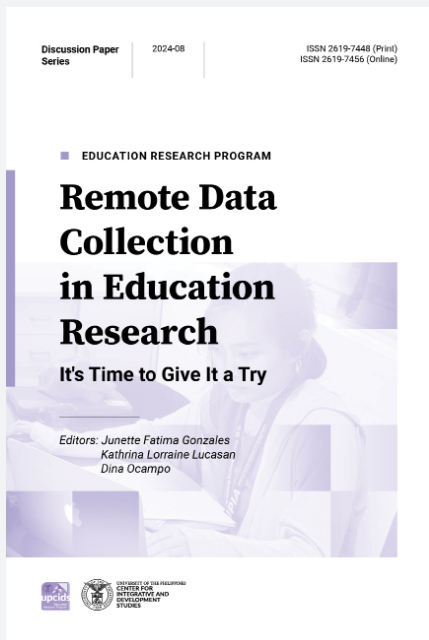
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HIGHLIGHTS

➡ Focus

The study investigates the University of the Philippines' (UP) contributions to public policy research between 1961 and 2024. By employing advanced Natural Language Processing (NLP) techniques—such as frequency analysis, topic modeling, and sentiment analysis—it evaluates the themes, sentiment, and impact of UP's scholarly outputs on governance, sustainability, and social justice. The research positions UP as a critical player in shaping public policy both locally and internationally.

➡ Key Findings

☐ **Dominant Themes**: UP's research predominantly addresses governance, environmental sustainability, indigenous rights, urban development, and gender equity.

☐ **Topic Diversity**: Using Latent Dirichlet Allocation (LDA) modeling, the study identifies ten (10) recurring topics, including disaster management, public transportation, local governance, and social equity, emphasizing UP's interdisciplinary approach.

☐ **Balanced Sentiment**: Sentiment analysis reveals a constructive discourse, where critiques of governance challenges are accompanied by solution-oriented recommendations, reflecting a *balanced* and *progressive* stance.

➡ Methodological Strengths

The study utilizes a curated dataset of 720 Scopus-indexed publications and applies robust NLP methods to uncover nuanced insights. Term Frequency-Inverse Document Frequency (TF-IDF) highlights UP's emphasis on specialized topics like disaster resilience and water

governance. Sentiment and topic modeling illustrate how academic outputs align with the Philippines' evolving policy needs.

▶ Contributions to Public Policy

The findings underscore UP's leadership in addressing national and regional policy challenges, particularly in the Global South. Its research aligns with pressing societal priorities, including sustainable development, community empowerment, and gender justice, positioning the university as both a critical observer and an agent of change in policy discourse.

▶ Implications for Academia and Policymaking

The study demonstrates how universities can leverage NLP techniques to amplify their research's impact on governance and policy. By highlighting UP's strengths in interdisciplinary collaboration and evidence-based recommendations, the research sets a precedent for integrating computational methods in social science research.

▶ Recommendations for Future Research

- Broaden the scope by including non-English publications to capture a more comprehensive representation of UP's contributions;
- Expand the dataset to incorporate outputs from other databases like Web of Science and Google Scholar; and
- Employ longitudinal and inferential analyses to explore causal relationships between UP's research and tangible policy outcomes.

In summary, the study underscores UP's pivotal role in fostering societal change through its policy-oriented research. By combining data-driven methods with thematic and sentiment analyses, it provides a model for assessing the impact of academic institutions on public policy globally.

INTRODUCTION

Universities, especially state institutions, are pivotal in shaping public policy through their research, teaching, and outreach activities. They act as bridges between knowledge creation and societal change, influencing governance, policy reform, and public discourse. In the Philippines, the University of the Philippines (UP) stands at the forefront of this responsibility, renowned not only for its academic excellence but also for its historical role in activism, public engagement, and nation-building. UP's research output, particularly in the realm of public policy, serves as a critical resource for understanding the intersection of academic knowledge, governance, and policy development. Its contributions extend beyond theoretical insights, shaping the contours of national and regional debates on governance, sustainable development, and social equity.

Given UP's long-standing reputation as the leading state university in the Philippines, the institution's public policy research is uniquely positioned to influence both local and international discourse. Its history of producing scholarship that critically engages with political, social, and economic challenges reflects the broader role that universities can play in addressing national issues. This discussion paper explores UP's public policy research output through a data-driven analysis of themes, sentiment, and topics, offering an assessment of its broader impact and reception within the academic and policy-making community.

The study is guided by several key research questions:

1. What are the key *themes* and *topics* in UP's public policy research?
2. How does the *sentiment* surrounding this research reflect the state of governance in the Philippines?
3. How do UP's contributions *compare* to those of other academic institutions, both domestically and internationally, in terms of themes and sentiment?

In addressing these questions, the study contributes to the growing body of literature exploring the relationship between universities and public policy. It offers insights into how UP's research not only informs academic discourse but

also influences policy-making processes and governance in the Philippines. Moreover, it highlights the importance of academic collaborations, both local and international, in amplifying the reach and impact of public policy research. By mapping the themes, topics, and sentiment patterns of UP's scholarship, this paper sheds light on the dynamic role that universities, particularly in the Global South, play in shaping national and global policy agendas.

This discussion paper is structured to offer a comprehensive exploration of the role of universities in shaping public policy, with a particular focus on academic impact and the Philippine context. First, the study provides a thorough review of existing scholarship on the role universities play in public policy formulation and the determinants of academic impact. This section establishes the theoretical foundation by examining how universities contribute to public discourse and governance through research and knowledge dissemination. It will also discuss the usefulness of Natural Language Processing (NLP) techniques in the broader social sciences discipline.

The second section outlines the study's research methodology, emphasizing the application of NLP. This section details how text mining and text analysis were applied to a curated corpus of journal articles indexed in Scopus that focus on public policy research in the Philippines. The text corpus, representing cutting-edge public policy scholarship, forms the foundation of a data-driven analysis. Key NLP techniques such as frequency analysis, sentiment analysis, and topic modeling using Latent Dirichlet Allocation (LDA) are employed to extract dominant themes and trends. By leveraging these methodologies, the paper provides a nuanced, quantitative perspective on the nature and scope of public policy discourse in the Philippines.

The third section presents the empirical findings, with a particular focus on the contributions of UP scholars compared to those of other domestic and international universities. This section is divided into three key subsections, each reflecting a different aspect of the NLP analysis: frequency analysis identifies the most frequently discussed themes in UP's public policy research; sentiment analysis reveals the tone of the discourse, distinguishing between critical evaluations of governance and solution-oriented approaches; and

topic modeling using LDA uncovers the major research themes, linking them to broader academic and policy concerns.

The final section draws conclusions from the study, summarizing key insights and their implications for academic institutions and policymakers. It highlights UP's critical role in addressing pressing societal challenges through interdisciplinary research on governance, sustainability, and social justice. The conclusion also outlines avenues for future research that emphasize the need for empirical testing. This includes strengthening international collaborations, enhancing global visibility, and aligning research with emerging trends in governance and policy. By focusing on empirical validation, future studies can quantify the effects of UP's research on public policy outcomes, providing a more robust framework for understanding the university's influence. This approach will not only enrich academic discourse but also serve as a valuable resource for policymakers who seek evidence-based guidance in fostering transformative change within their societies.

REVIEW OF RELATED LITERATURE

A. The Role of Universities in Public Policy

The relationship between universities and public policy is well-documented in scholarly literature, underscoring the critical role that higher education institutions play in shaping governance. Universities are not merely producers of knowledge; they actively engage with policymakers to influence governance structures and public decisions. Burstein (1998) emphasizes that both public opinion and academic research are fundamental in shaping public policy, though their interaction remains largely underexplored. He argues that while public opinion significantly influences policymaking, academic research provides the empirical foundation necessary to guide those decisions.

Kochenkova, Grimaldi, and Munari (2016) delve into the intersection of academia and industry, highlighting the importance of public policy in facilitating knowledge transfer. Their research underscores the need for systematic assessment of how academic research impacts policy outcomes, particularly concerning technology transfer and innovation. This relationship illustrates the role of universities in bridging the gap between theoretical knowledge and practical application in society.

Universities also play a vital role in regional development. Trippl, Sinozic, and Smith (2015) and Capello, Gorzelak, and Olechnicka (2012) provide a comprehensive analysis of universities' contributions to regional development, proposing a framework for understanding how regions can leverage various university activities. They review several conceptual models, including the entrepreneurial university model and the regional innovation system (RIS) model, each emphasizing different activities and outputs. Their findings indicate that public policy institutions are crucial in promoting these activities, with varying approaches evident in different national contexts, such as the UK, Austria, and Sweden. Furthermore, Harrison and Turok (2017) emphasize the importance of placing universities at the center of regional analysis, reflecting on the challenges faced by universities in knowledge production and regional development. They urge regional researchers to apply critical scrutiny to universities, paralleling their analyses of other economic and societal sectors.

However, Uyarra (2010) critiques the roles universities play in regional economic wellbeing and innovative potential, identifying five (5) models that reflect different interactions and mechanisms for university engagement. This critique highlights the complexities and potential contradictions in national and regional innovation policies, emphasizing the need for coherent strategies that align with the multifaceted roles universities can assume.

In addition to the increased engagement of universities in Western contexts particularly in Europe, Saad and Zawdie (2011) examine the university-industry relationship in developing countries. They highlight the operationalization of the triple helix system and its implications for national and regional innovation systems. Their findings stress the importance of policy initiatives to foster collaboration between industry, universities, and government agencies.

The role of globalization cannot be understated. Scholars have noted the increasing influence of market and "market-like" policy instruments in higher education reforms worldwide, exploring how these mechanisms aim to enhance economic efficiency and equity in access to higher education (Dill 1997; 2014; Dill and Soo 2005). Market and "market-like" policy instruments are assuming increasing importance. Long perceived as a unique characteristic of the US system of higher education, experiments with market competition in academic labor markets, institutional finance, student support, and the allocation of research funds are now evident in the higher education policy

of many different nations. Ironically, the overt rationale for these reforms is not only the traditional argument of economic efficiency—with its supposed corollary benefits of institutional adaptation and innovation—but increasingly a resort to market competition as a means of achieving equity in the form of mass higher education. The paper explores the nature of markets in higher education, the policy mechanisms related to their implementation, and some emerging questions regarding their impact.

In summary, it is evident that universities serve as pivotal players in the public policy arena. Their contributions extend beyond mere knowledge production, encompassing active participation in governance and policy formulation, thereby shaping the social and economic landscape. Daun-Barnett and John (2018) articulate that higher education institutions have historically been at the forefront of public policy reform. Their influence extends beyond the educational sector, affecting economic development, social equity, and governance structures. In this context, universities, such as the University of the Philippines (UP), contribute not only to the formulation of educational policy but also to broader governance issues, thereby shaping public discourse and influencing policy decisions at various levels.

B. The Use and Application of Natural Language Processing in the Social Sciences

Natural Language Processing (NLP) has revolutionized the analysis of textual data across various domains, providing innovative tools for extracting insights from large datasets (Chowdhary 2020; Jones 1994; Nadkarni, Ohno-Machado, and Chapman 2011). This section highlights key studies that demonstrate the effectiveness of NLP techniques in human rights monitoring, government accountability, and other fields, illustrating the method's versatility and impact (Németh 2023; Feder et al. 2022; Crowston, Allen, and Heckman 2012; Zhou et al. 2022).

Recent research has showcased the power of NLP in addressing human rights issues. Bagozzi and Berliner (2018) employed structural topic models (STMs) to analyze 6,298 US State Department Country Reports on Human Rights Practices from 1977 to 2012. Their findings revealed significant variations in topics such as killings, disappearances, and labor rights over time and across regions. Notably, the study challenged previous assumptions about bias

toward US allies, demonstrating that these reports often scrutinized violations of physical integrity rights committed by military partners more rigorously. This highlights the potential of NLP to uncover complex narratives within large bodies of text that may inform policy and advocacy.

In a similar vein, Park, Greene, and Colaresi (2020) reconceptualized human rights as nested taxonomies within textual reports, using "supervised learning algorithms" to "extract implicit rights taxonomies" from documents produced by organizations like Amnesty International and Human Rights Watch. Their work illustrated how technological advancements shape the documentation and prioritization of human rights. This approach underscores the dynamic nature of human rights discourse and the importance of NLP in adapting to changing societal values and norms.

In the realm of government accountability, Berliner, Bagozzi, and Palmer-Rubin (2018) analyzed over one million information requests submitted to Mexican federal government agencies from 2003 to 2015. Utilizing unsupervised topic modeling, they categorized these requests into various topics, revealing a strong demand for information related to public accountability. Their findings affirmed that citizens are inclined to seek information on issues such as environmental impacts and government procurement when provided with effective information-request systems. This demonstrates the capacity of NLP to facilitate greater transparency and responsiveness in governance.

Beyond human rights and accountability, the applications of NLP extend to various other fields. For instance, Shin et al. (2023) conducted a content analysis of technology use in teaching mathematics to students with disabilities. By applying word networks and structural topic modeling to 488 studies published between 1980 and 2021, their research identified trends in instructional practices and the evolution of technology use. This illustrates the utility of NLP methods in educational research, offering insights that can enchance teaching strategies and improve learning outcomes.

In addition, Chen et al. (2020) employed STM with bibliometric analysis to explore AI-assisted human brain research. Their analysis revealed developmental trends, correlations, and topical distributions, providing insights into the interdisciplinary nature of this rapidly evolving field. This example further emphasizes the versatility of NLP in analyzing complex

data across various disciplines. Similarly, STM has been used in analyzing the knowledge structures in other areas such as international management research (Mostafa 2023).

In conclusion, advancements in NLP techniques have significantly enhanced the analysis of textual data across various domains, particularly in human rights monitoring and government accountability. By employing innovative methods like structural topic modeling and keyword-assisted topic modeling, researchers can extract meaningful insights from large datasets, informing policies and practices in critical areas. As NLP continues to evolve, its applications in understanding complex social issues will likely expand, offering deeper insights into the dynamics of human rights, government accountability, and beyond.

In this context, I will examine how the University of the Philippines performs in relation to these factors while applying NLP to analyze a public policy corpus in the Philippines, further contributing to the understanding of academic performance and its implications for governance.

METHODOLOGY

This study employs Natural Language Processing (NLP) techniques to analyze research outputs related to public policy from the Scopus database, which is a widely recognized repository for scholarly publications. This approach provides a systematic framework to understand UP's research contributions to public policy and governance. The methodology centers on using advanced text-mining techniques, which include Term Frequency-Inverse Document Frequency (TF-IDF), Latent Dirichlet Allocation (LDA) for topic modeling, and sentiment analysis to explore key themes, dominant topics, and the overall tone of policy-related academic outputs. These methods allow a comprehensive examination of UP's policy-oriented scholarship and its alignment with national and regional priorities.

DATA COLLECTION AND PREPROCESSING

The data for this study consists of research articles extracted from Scopus. The search criteria included keywords such as "Philippine*" AND "public policy" OR "governance" OR "public administration."[1] The asterisk symbol (*) was employed as a wildcard character to broaden the search scope, capturing various forms of words that share the same root. For instance, "Philippine*" retrieves "Philippine," "Philippines," and any other derivative forms. This technique ensures that the dataset encompasses a broad array of research that pertains to governance, policy, and public administration in the Philippine context.

To maintain a focused analysis, only journal articles were included, excluding book chapters, conference papers, and reviews. This criterion builds on prior work that highlights journal articles as the most direct form of scholarly contributions to policy discourse (Pernia 2024). Ultimately, 720 research articles were identified, each dealing with themes directly relevant to public policy. These articles cover diverse topics, ranging from urban development and environmental governance to social justice and indigenous rights. Before analysis, the dataset was cleaned and preprocessed to remove common issues such as stop words, punctuation, and any extraneous metadata, thus optimizing the texts for NLP processing.

NATURAL LANGUAGE PROCESSING TECHNIQUES

NLP techniques have become crucial for analyzing large-scale textual data, particularly in domains like public policy, where thematic patterns and sentiment can reveal policy alignment and societal impact (Grimmer, Roberts, and Stewart 2022). Techniques such as topic modeling and sentiment analysis allow for an efficient examination of underlying structures within vast text corpora, uncovering key themes, discourses, and policy implications in academic publications. By leveraging these techniques, the study provides

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[1]   As of September 10, 2024, additional related articles may have been published since that time.

insights into UP's research priorities, examining how the University's research aligns with and contributes to governance and public policy.

This analysis is conducted using the R statistical programming language, a powerful tool for text mining, visualization, and data analysis. R packages such as tm (Feinerer 2013; Feinerer, Hornik, and Feinerer 2015), quanteda (Benoit et al. 2018), and topicmodels (Grün and Hornik 2011) provide essential functionalities for processing large datasets and performing NLP analyses. R's extensive libraries and visualization tools facilitate the efficient handling of large datasets, ensuring that the analysis captures both the breadth and depth of the research outputs (Welbers, Van Atteveldt, and Benoit 2017).

Each technique used in this study contributes a different perspective on UP's policy-related research.

A. Term Frequency-Inverse Document Frequency (TF-IDF) Analysis

The first analytical method employed is TF-IDF, which is used to assess the prominence of keywords across the dataset. TF-IDF is a metric that reflects the importance of a word within an individual document relative to its frequency across the entire corpus. In the context of this study, TF-IDF identifies terms that are frequently used in specific articles but are relatively uncommon across the entire dataset, highlighting distinctive language and terminology relevant to specific policy domains.

This approach enables the identification of key concepts that are particularly significant in the context of UP's research output. For instance, terms related to governance, sustainability, and reform may be disproportionately frequent in articles from UP and affiliated institutions. The TF-IDF method thus provides a lens through which one may understand the dominant themes in UP's policy research, offering insights into areas where the institution's academic outputs stand out within the broader landscape of Philippine public policy scholarship (Manning, Raghavan, and Schütze 2008). By examining these keywords, the study also maps out the research landscape of other leading institutions like Ateneo de Manila University (ADMU) and De La Salle University (DLSU), thereby contextualizing UP's contributions within the academic field.

B. Latent Dirichlet Allocation (LDA) Topic Modeling

To delve deeper into the thematic structure of the dataset, this study employs Latent Dirichlet Allocation (LDA) topic modeling. LDA is an unsupervised machine learning method that uncovers latent thematic clusters within textual data, making it a powerful tool for identifying recurring themes in large datasets. Topic modeling is particularly valuable in public policy research, where the thematic diversity can be wide-ranging, covering topics from healthcare and education to environmental policy and political reforms.

In this study, LDA identifies clusters of topics that recur throughout UP's policy research publications. Major themes that emerge from the topic modeling analysis include governance, disaster management, sustainable development, indigenous rights, and policy reform. Each topic is represented as a set of words with probabilistic weights, which reflect their importance to the given theme. By examining these clusters, the study highlights the core thematic areas UP focuses on, which are closely aligned with the sociopolitical priorities of the Philippines. This topic modeling approach follows the framework established by Roberts et al. (2013), and Grimmer and Stewart (2013), which emphasizes LDA as an effective means of discovering both explicit and implicit themes within policy-related texts.

The LDA model's ability to reveal UP's research priorities provides insights into the University's commitment to governance and public policy, positioning it as a key contributor to academic and policy discourse. For example, the identification of topics related to disaster management and sustainable development suggests UP's responsiveness to pressing national challenges. Such thematic patterns highlight the institution's role in contributing to policy areas that have significant public impact, reinforcing UP's alignment with the needs and aspirations of the broader Philippine society.

C. Sentiment Analysis

In addition to thematic analysis, sentiment analysis is employed to examine the tone of the articles in the dataset. This method evaluates the orientation of text (positive, neutral, or negative) by scoring individual words according to established sentiment lexicons. Positive sentiment scores may be associated

with terms like "development," "reform," and "sustainable," while negative sentiment scores could relate to words such as "poverty," "disaster," and "conflict."

Sentiment analysis is particularly valuable for understanding the tone of UP's contributions to policy discourse. For instance, a predominantly positive sentiment within an article may indicate an alignment with policy recommendations and constructive engagement, while negative sentiment may signal a focus on governance challenges and areas needing improvement. By analyzing the overall tone of the dataset, this study gauges how UP's research reflects societal concerns and governmental priorities.

Sentiment analysis provides an additional layer of understanding by highlighting how UP's research not only identifies policy issues but also approaches them constructively. Articles with balanced sentiment, for example, might critique policy gaps while simultaneously proposing solutions, demonstrating UP's role as both a critical observer and a proactive participant in the national policy dialogue. This analysis offers a nuanced view of UP's engagement with governance issues, revealing the institution's approach to policy analysis as both critical and solution-oriented.

RESULTS

This section presents the findings of the study. The first part provides a descriptive statistical analysis and offers a general overview of the dataset. The second part presents the results from various NLP methods, including frequency analysis, TF-IDF, sentiment analysis, and Latent Dirichlet Allocation (LDA) modeling.

To provide clarity and context, we begin by visualizing the dataset and presenting key descriptive insights. These visualizations and factual details will help set the foundation for a deeper understanding of the subsequent statistical and NLP analyses.

A. Documents by Year

Figure 1 provides a detailed overview of the temporal trends in document production within the field, revealing a striking upward trajectory that began in the mid-2000s. Between 1961 and the early 2000s, scholarly output remained relatively modest, with fewer than 10 documents published annually. This stability can be attributed to the limited accessibility of publication platforms and the slower pace of academic dissemination during that period (Odlyzko 2002; Solomon, Laakso, and Björk 2013). However, starting around 2010, there was a marked increase in document production, with the number of annual publications rapidly peaking at around 60 documents per year by the late 2010s and early 2020s (Odlyzko 2002; Solomon, Laakso, and Björk 2013). This dramatic surge reflects a broader, global trend of accelerating academic productivity, driven in part by advancements in digital research tools, the rise of open-access publishing, and improved global connectivity in the academic community (Ding et al. 2010; Lee and Bozeman 2005).

The significant increase in scholarly output could also be linked to a number of factors, including the expansion of higher education, increased funding for research, and the growing importance of interdisciplinary studies, which have opened new avenues for publication. However, the slight decline observed in recent years, as depicted in Figure 1, may suggest the influence of temporary external factors such as global economic slowdowns, shifting research priorities, or even the disruptive impact of the COVID-19 pandemic, which led to the reallocation of research efforts (Krukowski, Jagsi, and Cardel 2021; Staniscuaski et al. 2021; Arora et al. 2021; Ellinas et al. 2022). Despite these short-term dips, the overall trend still reflects an era of expanding academic scholarship that shows no signs of long-term decline.
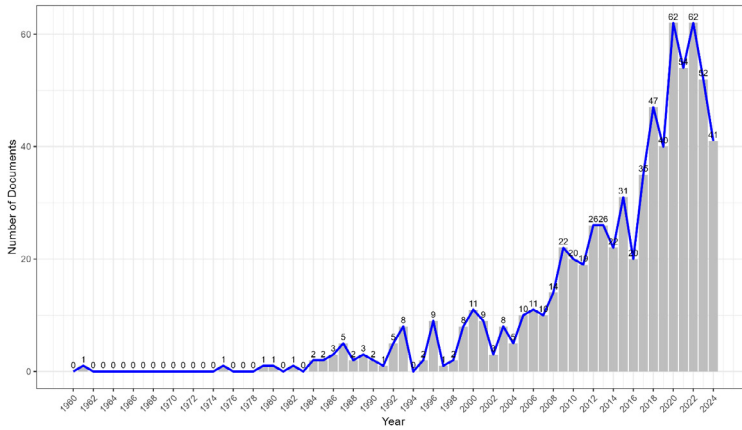
B. Documents by University Affiliation

In **Figure 2**, we see a representation of document production by affiliation, specifically highlighting contributions from different institutions engaged in public policy research. The University of the Philippines (UP) emerges as the leading contributor, producing the largest number of documents and reinforcing its prominent role as a key player in shaping public policy discourse. For consistency in this paper, all constituent universities of the University of the Philippines are grouped together to represent the *UP System*, allowing for a more comprehensive analysis of its collective impact on public policy research. UP's dominance in scholarly output is particularly notable, reflecting its long-standing commitment to research and policy development within the Philippines. Following UP, other top Philippine institutions, including Ateneo de Manila University and De La Salle University, demonstrate significant contributions to public policy research, albeit with a lower document count. These institutions, while important contributors, underscore a national hierarchy in terms of research output within the Philippines' public policy landscape.

Moreover, the presence of international universities, such as the National University of Singapore, the University of Melbourne, and the Australian National University in the top affiliations, speaks to the strong international collaborations and the broader influence of global academic networks in shaping public policy scholarship in the Philippines. This international dimension highlights the Philippines' role as a key player in Southeast Asian public policy research, and points to the increasing interconnectedness of academic institutions globally. Such collaborations may also enrich local public policy discourses by incorporating diverse perspectives and global best practices.
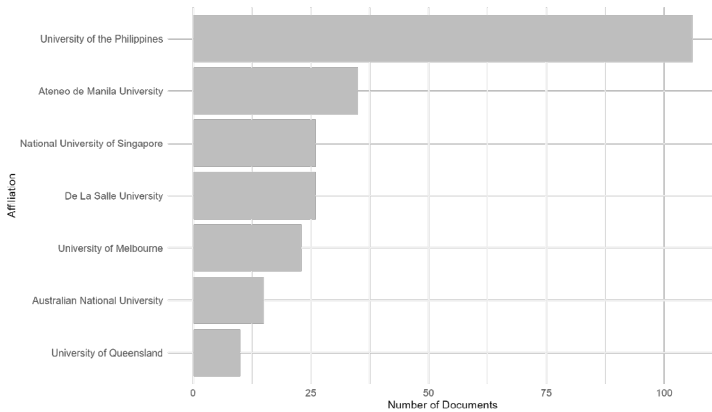
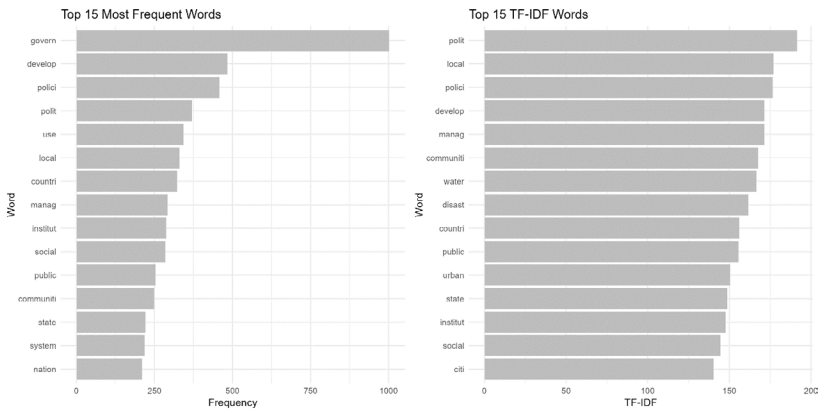■ **Figure 2**. Number of Documents by Affiliation of the Public Policy Corpus in the Philippines.
Source: Scopus Database. Note: The figures were generated using R programming language, leveraging advanced text analysis techniques.

These insights offer a broader understanding of the factors driving both local and international research outputs, emphasizing the importance of collaboration and the evolving role of digital tools in shaping modern academic scholarship.

The next section presents general statistical insights drawn from the Scopus database using Natural Language Processing (NLP) approaches, building on this preliminary overview.

C. High-Frequency Words and TF-IDF Terms

Figure 3 presents an analysis of the most frequent words and TF-IDF terms from the public policy text corpus. The frequent word chart reveals that terms such as "govern," "develop," "policy," "polit," and "use" dominate the discussions, reflecting a strong focus on governance, development, and policy-related themes. The prominence of words like "local" and "community" further indicates a significant interest in decentralized governance and the management of community-level issues, consistent with literature highlighting the importance of local governance in policy effectiveness (Wright et al. 2016; Cheema and Rondinelli 2007; Bardach and Patashnik 2023). These high-frequency terms suggest that the corpus is heavily concentrated on addressing governance challenges and policy formulation on both local and national levels (Newig and Koontz 2014; Krahmann 2003; Thompson 2008; Bauer, Feichtinger, and Steurer 2012; Gupta 2007).

■ **Figure 3**. High-Frequency Words and TF-IDF Terms in the Public Policy Corpus in the Philippines.
Source: Scopus Database. Note: The figures were generated using R programming language, leveraging advanced text analysis techniques.

In addition, words like "manage" and "institution" highlight the importance of institutional capacity and social system management in the analyzed texts, echoing findings from authors such as North (1990) and DiMaggio and Powell (1983), who discuss the critical role of institutions in governance and policy implementation.

The TF-IDF analysis, on the other hand, reveals slightly different insights. While words like "policy," "develop," and "local" still rank high, terms such as "disaster" and "water" emerge. This indicates that certain documents emphasize specific topics like disaster management and water resource governance. Such results align with recent studies that underscore the need for tailored policies in disaster risk reduction and water resource management (Knutsson and Ostwald 2023; Whelchel et al. 2018; Ishiwatari 2022). These terms, although not as frequent across the entire dataset, are pivotal in particular contexts, emphasizing the need for more focused policies in areas such as environmental resilience and crisis management.

This distinction between frequent and TF-IDF terms highlights the value of TF-IDF in uncovering specialized themes within the corpus that are not necessarily frequent but are highly relevant in particular discussions (Silge 2017). The combined analysis of these two metrics suggests a corpus that is broadly concerned with governance and development while addressing specialized topics such as disaster management and environmental policy in certain contexts.
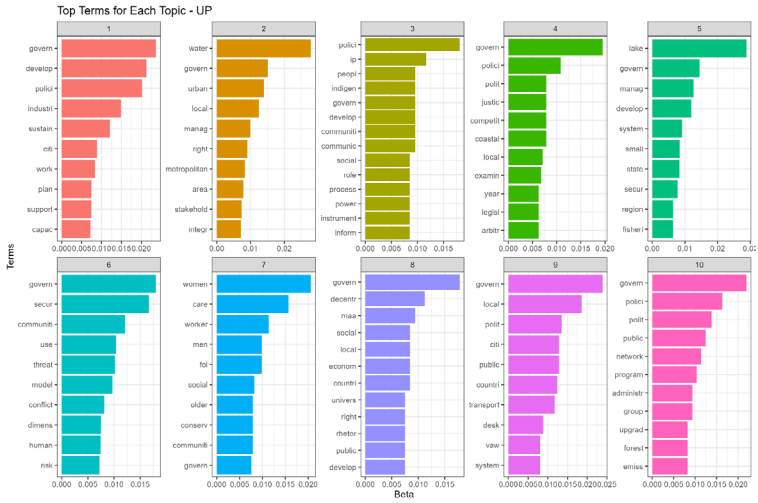
D. Topic Modeling

After extracting the TF-IDF, we delve deeper into topic modeling using Latent Dirichlet Allocation (LDA), visualizing the top terms across ten (10) topics as shown in **Figure 4**, focusing only on the works of UP System scholars. The topic modeling analysis of the University of the Philippines (UP) reveals a broad range of key themes that reflect the institution's diverse academic and research focus areas. Topic 1 emphasizes governance and development, particularly in relation to policies on industrial progress and sustainability, highlighting UP's focus on shaping national policy directions. Topic 2 centers on urban water governance and local management, underscoring the university's engagement with environmental and resource management issues, particularly in urban settings. Topic 3 delves into indigenous peoples' policies, exploring governance structures that support indigenous communities—a reflection of UP's commitment to social inclusion and indigenous rights. Similarly, Topic 4 focuses on justice, coastal competition, and local legislation, addressing issues of fairness and resource allocation, particularly in coastal areas.

Topic 5 touches on environmental management, focusing on lake systems, fisheries, and regional security, which highlights UP's attention to the intersection of environmental sustainability and national security. Topic 6 is concerned with community governance and security, likely related to local conflicts and threats. This further emphasizes the University's focus on peace and community wellbeing.

Topic 7 addresses gender issues, particularly those related to women, care work, and social equity, showcasing UP's engagement with social justice and gender equality. Topic 8 covers decentralization, economic governance, and community development, reflecting the institution's effort on empowering local governance structures and fostering economic growth on the grassroots level.

Topic 9 explores public transportation systems, political structures, and violence against women (VAW), stressing UP's critical engagement with both infrastructure development and social protection measures. Finally, Topic 10 deals with governance in forest management, public programs, and emissions regulation, which reveals the University's involvement in environmental governance and sustainable development.

The diversity of these topics illustrates UP's interdisciplinary approach in addressing a wide array of national and local challenges. Governance, sustainability, and social justice emerge as recurring themes, with scholars focusing on issues ranging from indigenous rights and urban development to environmental conservation and gender equity. This broad engagement stresses UP's central role in contributing to policy discussions and fostering societal change across multiple sectors.

Figure 4. Top Terms from LDA Topic Modeling from the Public Policy
Corpus for University of the Philippines.
*Source: Scopus Database. Note: The figures were generated using R
programming language, leveraging advanced text analysis techniques.*

E. Sentiment Analysis

In this section, we aim to analyze the tone of the published articles in the public
policy corpus by applying sentiment analysis. To assess how the University
of the Philippines compares to other universities, we conducted separate
sentiment analyses for each institutional affiliation. There is a key caveat to
note before presenting the results: we aggregated all universities, except for
the top three in the Philippines, into a single category for comparison. In this
paper, we acknowledge that there is a so-called "Big Four" traditionally refers
to the University of the Philippines System (UP), Ateneo de Manila University
(Ateneo), De La Salle University (DLSU), and the University of Santo Tomas
(UST) (Baclig 2021; Presillas 2024). However, for the purpose of illustration, we
have opted to use three categories in our analysis.

Figure 5 highlights the most frequent positive and negative words associated
with discussions on public policy or governance, allowing us to see how
different institutions approach these topics. Focusing on UP, we observe a
balanced sentiment in its discourse. Positive words such as "sustainable,"

"support," "well," and "good" are prominent, suggesting that UP's discussions on public policy emphasize sustainability, support for reforms, and optimism regarding effective governance. The repeated appearance of terms like "sustainable" and "support" indicates that UP is perceived as an institution actively promoting long-term development goals and pushing for reforms that benefit society. On the negative side, words like "disaster," "risk," "issues," and "crisis" appear, although less frequently. These terms reflect critical evaluations of public policy challenges, acknowledging that UP-affiliated discussions engage with both the successes and shortcomings of governance. Overall, UP's sentiment is slightly more positive, emphasizing the institution's balanced but progressive stance on public policy.

In comparison, Ateneo presents a discourse with a mix of both positive and negative sentiments. Terms like "well," "sustainable," and "effective" dominate the positive side, showing that Ateneo focuses on effective governance and sustainability. However, negative terms such as "problematic," "poor," and "failure" suggest that Ateneo's discussions also critique policy inefficiencies and failures. This balance between criticism and support reflects Ateneo's nuanced approach to public policy analysis.

De La Salle's discourse, on the other hand, leans more critically; negative terms such as "corruption," "poor," and "limited" stand out. This suggests that De La Salle's discussions tend to focus heavily on governance failures, particularly issues like corruption and ineffective policies. While positive words like "support" and "effective" appear, they are less frequent, indicating that De La Salle's discourse is more critical compared to other universities.

The institutions categorized under "Other" display a more negative sentiment, with "disaster," "risk," and "poor" being the most frequent terms. This suggests that these universities focus significantly on risks, policy failures, and governance issues. However, positive terms such as "sustainable" and "well" indicate that the institutions also contribute to discussions on public policy improvement, albeit from a more critical standpoint.

The sentiment analysis provides key insights into how different universities approach public policy discussions. UP stands out for its balanced engagement, focusing both on policy reforms and sustainability while critically addressing policy challenges. This may suggest that UP plays a

leading role in public policy discourse, emphasizing long-term solutions and reforms while remaining attentive to governance risks. Ateneo offers a balanced discourse but with a slight emphasis on policy effectiveness, while De La Salle's discussions are heavily critical, with a focus on governance issues like corruption. Institutions in the "Other" category present a predominantly negative sentiment, emphasizing policy risks and failures.
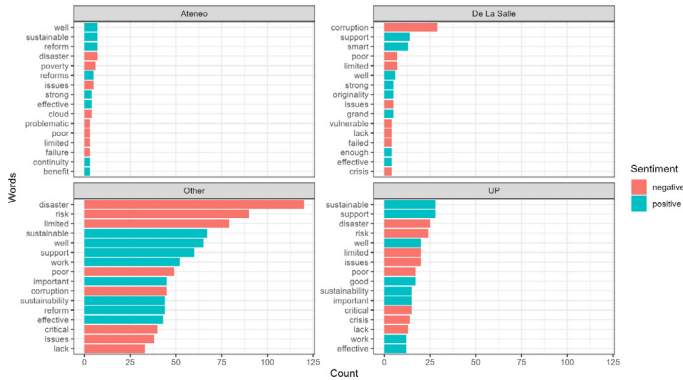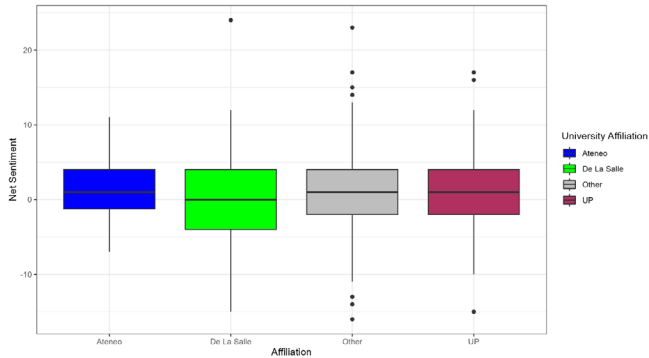

■ **Figure 5**. Comparative Sentiment Analysis of Top Universities in Public Policy Discourse in the Philippines.
Source: Scopus Database. Note: The figures were generated using R programming language, leveraging advanced text analysis techniques.

Interestingly, when comparing net sentiment scores—calculated by subtracting negative scores from positive ones—across different affiliations as shown in **Figure 6**, the results reveal minimal variation in median sentiment scores. DLSU and the "Other" category show slightly higher median net sentiments compared to Ateneo and UP. However, what stands out is the wider distribution of scores in the "Other" category, reflected by its larger interquartile range and the presence of notable outliers. This broader distribution likely stems from the heterogeneous nature of affiliations within this group, encompassing a wide array of disciplines and global issues.

The inclusion of institutions with diverse research agendas, ranging from technical fields like engineering to more humanistic areas such as social sciences, introduces greater variation in sentiment patterns. Research outputs from disciplines with practical or urgent policy implications, such as public health or environmental studies, may evoke stronger positive or negative

reactions based on the issues addressed. This variability not only reflects the multidisciplinary nature of the "Other" category but also suggests that research from different fields has the potential to trigger distinct emotional responses, influencing the overall sentiment landscape.

■ **Figure 6**. Comparative Net Sentiment of the Public Policy Discourse in the Philippines by Affiliation.
Source: Scopus Database. Note: The figures were generated using R programming language, leveraging advanced text analysis techniques.

The insights from sentiment analysis, both individual and net scores, highlight the critical role universities play in shaping public discourse, driving policy innovation, and addressing the complex challenges faced by contemporary society. The variation in sentiment patterns—or lack thereof when considering the net scores—suggests that universities adopt diverse approaches, with a focus on governance, social equity, and environmental sustainability. This underscores the need for a multifaceted strategy to drive meaningful progress in the country.

CONCLUDING REMARKS

This paper highlights the influential role of the University of the Philippines (UP) in shaping public policy through its extensive and impactful research contributions. By leveraging advanced Natural Language Processing (NLP) techniques to analyze a substantial collection of public policy-oriented publications, this study uncovers UP's primary thematic focus on governance,

sustainability, and social justice—areas that closely reflect and respond to the sociopolitical priorities and evolving challenges in the Philippines.

The broad diversity of these themes speaks to UP's commitment to an interdisciplinary approach, addressing a wide spectrum of national and local issues, including indigenous rights, urban planning, environmental conservation, and gender equity. Such range demonstrates UP's responsiveness to both enduring and emerging societal concerns. The balanced discourse identified through sentiment analysis further reveals UP's nuanced engagement with these issues: while the University's research critiques governance inadequacies, it simultaneously proposes constructive pathways for reform. This dual role not only strengthens UP's reputation as an academic institution but also positions it as a catalyst for positive change within the national policy landscape.

By applying NLP methods, this study illustrates the power of data-driven analysis in capturing the University's influence in public policy. This analytical approach offers a more profound understanding of how UP's contributions resonate within the broader social sciences and enhance its academic visibility and societal relevance.

The findings underscore the remarkable research efforts spearheaded by the University of the Philippines Center for Integrative and Development Studies (UP CIDS), the policy research arm of the UP System. UP CIDS' work, as highlighted by recent studies (Tadem 2023), plays an indispensable role in advocating for and addressing the urgent concerns of marginalized and vulnerable sectors of Philippine society.

Future research should aim to deepen this analysis by integrating inferential statistical methods to explore and establish relationships among critical variables. Such an approach would allow for the measurement of the tangible impact of UP's academic work on specific public policy outcomes, enabling a transition from descriptive insights to causal interpretations. Incorporating inferential statistics could quantify the contributions of UP's research to governance improvements and policy reforms, establishing a clearer empirical link between academic outputs and real-world impact. This enriched framework would not only advance academic discussions but also offer actionable insights for policymakers. Ultimately, establishing these

empirical connections will strengthen both scholarship and public policy, which may enhance the societal contributions of academic research in addressing pressing issues within the Philippines and beyond.

SCOPE AND LIMITATIONS

This study focuses on analyzing the University of the Philippines' (UP) contributions to public policy through an examination of its published research outputs using Natural Language Processing (NLP) techniques. By applying tools such as topic modeling and sentiment analysis to a corpus of policy-related publications, the study seeks to identify core themes, sentiments, and UP's overall discourse on critical sociopolitical issues. The scope of this research is confined to publications generated within the UP System, specifically those with a public policy orientation, as this focus allows for a targeted examination of the university's role in addressing national issues such as governance, social justice, and sustainability.

However, there are limitations inherent to this study. First, the analysis is sensitive to the keywords used in generating the corpus. This means that some policy-focused studies may not have been captured if they lacked the specific keywords that guided our search algorithm. Consequently, while we aimed for comprehensive coverage, we acknowledge the possibility of omissions due to the limitations of keyword-based retrieval. This dependence on keywords highlights an area for further refinement in future research, to ensure a more exhaustive collection of policy-oriented publications.

Moreover, this study focused only on English-language publications, which might not fully capture UP's research impact. There are non-English publications within UP that were not included in this analysis, and their inclusion could provide additional insights and possibly nuance the findings further, particularly in the context of local or regional policy issues.

The data sources also present a limitation, as the study primarily relied on specific databases. Expanding the scope to include additional databases like Web of Science or Google Scholar could enhance the representativeness of the dataset and improve the generalizability of the findings. Such expansion would allow for a more comprehensive capture of UP's policy research and

provide a richer basis for understanding its influence on governance and societal reform.

In addition, while NLP techniques such as sentiment analysis provide insights into the tone and framing of UP's discourse, they may lack the nuanced interpretation that human analysis can offer, especially on complex sociopolitical texts where context can heavily influence meaning.

Finally, this study's descriptive approach, while valuable for identifying themes and patterns, does not establish causal relationships between UP's research output and specific policy outcomes. Future studies are encouraged to incorporate inferential methods to examine the extent to which UP's research directly impacts public policy changes and governance improvements. Expanding the dataset and employing inferential statistical approaches could provide a more comprehensive understanding of UP's tangible impact on public policy and societal reforms.

Overall, while this study provides valuable insights into the thematic focus and tone of UP's contributions to public policy, its findings must be viewed with an understanding of the study's limitations. Future research can enhance this understanding by refining keyword selection, including non-English publications, expanding the range of databases, and employing inferential methods. These steps would enable a more comprehensive and nuanced assessment of UP's influence in the public policy domain.

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