Tribal Knowledge Cocreation in Generative Artificial Intelligence Systems

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ABSTRACT

Generative Artificial Intelligence (AI) systems bring innovative ways of information provision and knowledge delivery. In the public sector, generative AI has the potential to decrease bureaucratic discretion in the decision-making process. Increasing reliance on this technology brings challenges of unfair treatment, colonized responses from the system, and data governance. Because of historical interaction, tribal communities are the most underrepresented in policy planning and implementation. Indigenous communities suffer from the neglect of tribal sovereignty by the U.S. federal government and limited accessibility and literacy in the digital world. Generative AI systems exacerbate these challenges with insufficient tribal input. However, the negative impact can be alleviated with digital equity and knowledge cocreation. Digital equity emphasizes the importance of tribal knowledge representation, and knowledge cocreation focuses on the collaboration between Indigenous communities and relevant actors in data governance for generative AI systems. This study proposes two research questions to discuss tribal knowledge cocreation in generative AI systems: (1) what are the biases in the system responses from the tribal perspective? (2) what are the potential resolutions for these problems? The findings from in-depth interviews with tribal members in the U.S. indicate that the insufficient articulation of tribal culture, the lack of crucial tribal historical events, and the inappropriate appellation of tribal nations are the primary drawbacks in the system responses. From the Indigenous perspective, tribal oral traditions, native publications and documents, and collaboration with tribal governments can address the problems of generative AI responses. This study contributes to the theory development of digital equity and knowledge cocreation in tribal generative AI system responses. Policy recommendations and future research agendas are included in this research.

CCS CONCEPTS

• **Social and professional topics**; • **Computing / technology policy**; • **Government technology policy**;

KEYWORDS

Generative artificial intelligence, Digital equity, Knowledge cocreation, Tribal Sovereignty

1 INTRODUCTION

The emergence of generative artificial intelligence (AI) systems has transformed various dimensions of our society. Information provision is the most critical change associated with generative AI systems. Individuals can utilize generative AI systems like Chat-GPT to learn knowledge from responses. Generative AI systems can simulate different scenarios for users to prepare for specific events or respond to various requests [1]. Also, this technology affects organizational management. Organizational leaders need to develop strategies, adapt functions, and adjust administrative routines to incorporate generative AI systems [2]. Similarly, public organizations face challenges from generative AI. Over-reliance on this technology in the decision-making process causes unfair treatment resulting from biased responses and recommendations from the system. Generative AI system responses usually present the perspectives of dominant populations rather than vulnerable individuals. Generative AI systems' data governance rarely includes vulnerable communities in information management and sharing. For instance, tribal nations cannot contribute to policy planning and implementation with their wisdom in the U.S. [3]. Similarly, tribal information is limitedly represented by online platforms or websites [4]. Therefore, generative AI systems can threaten to public decision making with the insufficient knowledge presentation of tribal communities.

Digital equity and knowledge cocreation serve as strategies to address the generative AI challenges. Digital equity integrates

knowledge representation as one essential element, and knowledge cocreation can assist underrepresented groups in proposing their perspectives and insights in data governance. For instance, Indigenous communities can collaborate with governments and technology companies to cocreate tribal knowledge and represent their voices in generative AI systems. Also, tribal nations can improve their sovereignty by cocreating with relevant actors to develop generative AI responses. However, little existing research explores Indigenous communities' knowledge representation and cocreation. Based on this research gap, this study proposes two research questions: (1) what are the potential biases in generative AI system responses from the perspective of tribal members? (2) what are the strategies for resolving the challenges?

We conducted a series of in-depth interviews with tribal members from different tribal nations in the U.S. to identify generative AI system response problems and propose several strategies for addressing these issues. The research results indicate that the responses from generative AI suffer from insufficient introduction of tribal culture, missing information about tribal history, and colonized appellation of tribal nations. Also, tribal members suggest that generative AI systems can collect accurate information and knowledge from tribal oral traditions, Indigenous writings and publications, and collaboration with tribal governments. Based on the research findings, this study contributes to the theory development of digital equity and knowledge cocreation in the tribal and generative AI contexts.

2 GOVERNANCE CHALLENGES OF GENERATIVE AI

Generative AI systems have the potential to transform public governance in many ways. Compared to traditional programming, generative AI utilizes deep learning to generate various outcomes, such as texts, codes, and images, from multiple data sources [1]. The most popular application is the chatbot system, which integrates generative AI and large language model (LLM) techniques to respond to user requests [1, 2]. For instance, users can ask ChatGPT for various questions and require the system to provide customized information. In other words, generative AI is more autonomous and independent in data processing and outcome generating than traditional programming systems. With the strengths of generative AI, this system can bring various challenges, including over-reliance, unfair treatment, colonized response, and data governance issues.

2.1 Over-Reliance

The introduction of generative AI systems changes bureaucratic discretion in the decision-making process. Public employees can seek advice from generative AI systems and then determine whether to use these recommendations in public service delivery. They can use the system to simulate various scenarios to improve policy implementation [1]. When street-level bureaucrats rely on the information from generative AI to make decisions, their discretion is threatened or replaced with machines. Human agents may gradually cede their discretionary power in the public decision-making process. The roles of AI in human-and-machine collaboration become leading or dominant depending on the levels to which public employees lose their discretionary power [5]. The loss of

bureaucratic discretion varies in various public task characteristics. Humans maintain more discretionary power in unpredictable and unanalyzable tasks, but AI obtains more bureaucratic discretion from public employees once delivering routine and straightforward public services [6-8]. With the development of generative AI, machines are more capable of tackling complicated tasks than in the past. For instance, a traditional AI system requires more human input to generate responses, but generative AI can collect various data from the internet and other sources to provide comprehensive answers without human intervention. When the system collects and analyzes multi-dimensional information, the responses can be applied to more complicated issues and social problems. Public employees receive more recommendations to make decisions. This pattern means that generative AI can take more discretionary power from human agents. In other words, generative AI can lead human-and-machine collaboration in more public service delivery because of technological advancements. When public employees refer more to generative AI in the decision-making, the system responses substantially affect policy implementation. Generative AI systems can decrease bureaucratic discretion to acquire more power in service delivery. Based on Bovens and Zouridis [5], the development of generative AI transforms bureaucrats' role from a leader to a follower in the human-and-machine collaboration. Therefore, human agents overly rely on generative AI systems to make decisions.

2.2 Unfair Treatment

However, relying on generative AI in the decision-making raises concerns about social inequality. The generative AI responses may replicate or exacerbate existing bias and discrimination in the collected data. Like all AI systems, generative AI suffers from insufficient data quality. Generative AI systems train themselves with information from numerous websites, news, and other sources, but algorithms may not address ethical problems within existing datasets [1, 9]. Due to unfair treatment of vulnerable populations (e.g., Native Americans, Blacks, and Hispanics), data sources may include bias and racial discrimination [10]. For instance, facial recognition technologies have more errors in processing information about color populations [11]. The recommendations from generative AI systems can guide or nudge users in particular ways [9, 12]. When generative AI systems provide recommendations from biased data, public employees and organizations might make ethically prejudiced decisions, negatively affecting social equity. Hence, the introduction of generative AI in the government increases the risks of unfair outcomes for different social groups in public service delivery.

2.3 Colonized Response

Responses from generative AI systems are usually colonized and Western-centered information. Because of data sources, generative AI systems may provide colonized responses to users. On the government side, Western colonialism jeopardizes tribal sovereignty

and cultural development. Western colonialism establishes legal systems, social rules, and norms that favor dominant populations and marginalize Indigenous communities. Colonialism impedes tribal nations from developing their sovereignty and self-determination [13]. When Indigenous communities are excluded from policy planning and implementation, their perspectives cannot be represented and included in public service delivery. The exclusion marginalizes Indigenous insights and knowledge [14, 15]. Insufficient knowledge representation of Indigenous communities and cultures causes generative AI systems not to obtain comprehensive data sources to present tribal information in the responses. Similarly, western technology companies and commercial entities exclude Indigenous populations based on economic considerations [16]. The exclusion in the private sector also brings deficient representation of tribal information and knowledge, decreasing the response quality of generative AI. Therefore, from the government and private sector perspectives, generative AI systems suffer from inadequate tribal knowledge and information representation in the responses.

2.4 Data Governance

Generative AI systems challenge the government for existing data governance. Data sources for generative AI systems are various and cross-sectoral, such as open government data, information from private entities, and input from nonprofit organizations. When the government and public employees utilize generative AI systems to search for information or obtain recommendations, information management becomes an eminent issue. First, the public sector faces information-sharing challenges between governmental departments and agencies. The wide application of AI systems in decision-making causes blurred intra- and inter-organizational boundaries [5]. Organizations need to share information to train AI systems for various purposes. In the data network, the participating public organizations need to build trust, develop shared understanding, establish rules for use, cultivate joint capacity for technology and resources, and govern interdependency [17-19]. How the government addresses these information management challenges determines the data quality for generative AI system responses. Hence, the performance of information management in the public sector substantially affects recommendation quality in generative AI systems for public decision-making.

Second, the government confronts the challenge of intersectoral and cross-sovereignty data governance in deploying generative AI systems for public service delivery. Various stakeholders get involved in data governance. These actors may have different interests and preferences regarding data infrastructure, management mechanisms, and information-sharing processes. Data governance rules and actors' interactions determine the outcomes [19]. Actors from the public sector, private entities, and nonprofit organizations can contribute to data sources for generative AI systems. Their actions in data sharing, management, and governance may affect how much information is available for generative AI systems. However, intersectoral data governance encounters challenges. For instance, different actors have various preferences and conflicting goals in AI policy development and implementation. The misalignment of

objectives and interests among sectors results in failed AI governance [20]. Similarly, in the era of globalization, data governance requires cross-sovereignty collaboration. With the development of international transactions, governments, companies, and other entities inevitably participate in the cross-sovereignty interaction for data exchange and sharing. However, lacking global data governance rules decreases personal data protection and impedes international data transactions [21]. Also, the interactions between the government and tribal nations shape technology development in Indigenous communities [22, 23]. For example, the distrust of the U.S. federal government decreases tribal member's willingness to participate in AI system codesign for emergency management [3]. In other words, when the government works with tribal nations, the relationship between two sovereignties determines the collaboration outcomes. Most tribal nations have negative interactions with the U.S. federal government, so information sharing and collaboration are rarely feasible and desirable in Indigenous communities [3]. Therefore, data governance challenges may hinder the development of generative AI systems for public use.

2.5 Summary of Challenges

The challenges allow this study to explore existing problems of generative AI systems and propose potential resolutions. Generative AI systems have the great potential to transform the decision-making process. Human agents rely more on generative AI systems to obtain policy recommendations or various information to make decisions. Information quality and accuracy have become crucial issues with the dependence on this technology. However, AI systems may replicate or exacerbate the existing bias and discrimination in the datasets. The predisposed outcomes from generative AI systems generate unfair and unequal treatment of different social groups. Among these social groups, tribal members are the most vulnerable population in the U.S. Historical interactions with the federal government and external populations result in colonized tribal knowledge and information representation. Furthermore, various actors contribute to data sources for generative AI systems. These stakeholders, including different nations, governments, companies, and nonprofit organizations, have various preferences, interests, and objectives that shape and affect data governance. Insufficient tribal knowledge representation decreases the generative AI system response quality. In other words, the increasingly crucial role of generative AI and its replacement effect on human agents highlight the importance of information quality, and the response property is determined by data governance. Hence, from the perspective of social equity and AI governance, the data governance of generative AI systems for the Indigenous community is the focus of this study.

3 TRIBAL-CENTERED KNOWLEDGE CREATION

Tribal knowledge cocreation can be one solution to the challenges mentioned earlier. The fundamental problem of generative AI systems for tribal communities is data governance. Problematic data governance for tribal knowledge and information brings colonized responses, exacerbating unfair treatment and decreasing human discretion in public decision-making. The authors of this research propose knowledge cocreation with Indigenous communities as the

solution to poor tribal data governance for generative AI systems. We discuss the three crucial issues in this section: tribal digital equity, tribal sovereignty, and knowledge cocreation.

3.1 Tribal Digital Equity

Digital equity focuses on whether individuals or social groups have equal accessibility, literacy, and knowledge representation in the information communication technology (ICT) world. With the emergence of social equity research in public administration, e-governance scholars discuss digital divide issues in various ICT applications in the government. Digital divide issues include accessibility and literacy concerns. The former refers to the ICT access gap between dominant and disadvantaged populations, and the latter means the difference in digital skills and knowledge among various social groups [24]. Compared to the dominant populations, the vulnerable individuals have limited access to digital tools and insufficient knowledge to use ICT. For instance, the Asian, Black, and Hispanic neighbors in Boston City cannot use the internet-based 311 system as much as the White populations [25]. Also, tribal nations encounter exacerbated digital divide issues in the reservations. Indigenous communities suffer from restricted resources and limited literacy to use broadband internet [22, 23].

Moreover, scholars include knowledge representation to expand the digital divide discussion to digital equity research, especially for Indigenous communities. Tribal knowledge representation stresses how Indigenous information and wisdom are shown in official documents, government websites, and relevant digital platforms. For example, tribal communities represent information about their reservation, history, and culture in various ways. Some tribal websites provide information consistent with the White population's stereotypes, but others articulate tribal historical relics and cultural events from the Indigenous perspective [26]. Tribal nations in Arizona adopt the latter approach to explain historical development, cultural events, and visitor rules and regulations, emphasizing tribal-centered information representation [4]. Similarly, tribal communities develop strategies to preserve and promote their cultures and call public attention to tribal issues via social media [27]. Therefore, the representation of tribal knowledge in the digital world serves as the latest discussion in digital equity research.

3.2 Tribal Sovereignty

Tribal nations have sovereign power to determine their relationship with the external society. Tribal nations can determine governance mechanisms, social structure, culture and tradition, and the relationship with lands [13]. Indigenous communities are independent nations and govern themselves through political, cultural, and social relationships and arrangements. From the sovereignty perspective, tribal nations have the power to build a government-to-government relationship with various countries. For instance, tribal nations take the nation-to-nation approach to interact with the U.S. federal government [13]. When the U.S. federal government enacts the broadband internet policy on tribal reservations, federal agencies collaborate with tribal governments to accommodate local contexts to policy implementation. Each tribal nation has different contextual characteristics for technology policy enforcement in the reservation [22, 23]. Likely, tribal members prefer to lead AI system

cocreation for emergency management and minimize the involvement of the U.S. federal government based on the considerations of tribal sovereignty and self-determination [3]. These examples indicate that tribal nations have sovereignty to determine the interaction with the government, affecting digital governance and relevant policy implementation. When the government and other stakeholders attempt to improve generative AI system responses related to Indigenous communities, the engagement of tribal nations is one of the necessities for the strategy development of data governance.

Along with the sovereignty discussion, tribal nations have the power to interact with external actors for data governance. In the digital world, individuals control their data to determine whether to share it with others, organizations, and governments, defined as digital sovereignty [28]. Because of tribal sovereignty, tribal nations can govern community data and information, such as history, culture, and social norms [29]. Compared to other populations, tribal members consider themselves to belong to the tribe, so they prioritize community interests instead of personal benefits [3]. This nature causes Indigenous people to emphasize the level of tribal information disclosure. Tribal members collectively determine the information they can share with the general public and the one they want to keep within tribal nations [30]. Based on this logic, the government and technology companies need to collaborate with tribal nations to represent tribal knowledge. Indigenous people understand tribal information and knowledge better than other actors in data governance for generative AI systems. When tribal nations can lead data governance for community information, they can determine how to represent tribal knowledge and information. For instance, tribal communities can introduce their history and culture from their perspective rather than White-washed insights [26]. Hence, the collaboration between tribal nations and relevant actors in the generative AI data governance can address colonized responses from the system and improve tribal sovereignty.

3.3 Knowledge Cocreation

Cocreation centers on the collaboration between various actors to innovate solutions to public problems. The roots of cocreation are collaborative governance and coproduction. Collaborative governance focuses on how actors interact with others for new actions, and coproduction stresses how service providers and users work together to create innovative or improved public services [3, 31, 32]. Cocreation integrates the two concepts to understand how stakeholders and relevant actors develop partnerships, cultivate shared motivations, and contribute their professions to create a new policy or public service [3, 33]. In digital governance, cocreation emphasizes that stakeholders co-define social problems, collaborate with other actors, and co-propose strategies to design and innovate ICT systems or digital services [3]. For instance, citizens can utilize geographic information systems to co-develop traffic policy with local governments. The cocreated traffic policy and routes directly address residents' needs and expectations, improving public service quality [34]. Similarly, tribal members improve trust and public value perceptions when tribes can lead AI-enabled chatbot system cocreation for emergency management [3]. Therefore, cocreation

can be a valuable approach to meeting residents' and citizens' needs and addressing social issues.

Tribal members can contribute to generative AI system response improvement with knowledge cocreation. Indigenous people have their own ways of knowing about the relationship with lands, environments, families, and communities [35]. Tribal communalism, emphasizing the unity of individuals and tribal communities, shapes how Indigenous people interpret social problems and develop strategies to address the issues. For instance, tribal members focus more on elders' needs and other members' expectations in the cocreation of AI systems [3]. Collaborating with tribal communities can bring more local knowledge to improve natural resource management [29]. Also, knowledge cocreation in public services brings more Indigenous perspectives to avoid the negative impacts of Western colonialism on tribal affairs, improving social equity in public policy [3, 29, 36]. For example, tribal members perceive more decision-making power once they can cocreate AI systems for their tribe. They also consider the cocreated system is more tribal-centered and culturally sensitive [3]. Based on this logic, when tribal members can cocreate knowledge for generative AI systems, the responses can represent more Indigenous perspectives rather than colonized viewpoints. Moreover, tribal knowledge cocreation can control tribal data to determine the level of information disclosure to the public [30]. In other words, Indigenous knowledge cocreation improves information representation and tribal sovereignty in the digital world. Hence, cocreation with tribal nations and members can improve generative AI system response quality and social equity.

4 PRELIMINARY FINDINGS

4.1 Interview Processes

We conducted a series of online interviews with tribal members to understand their perspectives on the responses from a generative AI system. The aim of interviews is to understand tribal members' perceptions of generative AI responses about Indigenous communities. The authors of this study utilized Zoom to interview ten tribal members in the U.S. between December 20th and 22nd, 2023. The interviewees are from Cheyenne Arapaho, Winnebago, Navajo, Omaha, Sicangu Lakota, Santee, Yankton, Muscogee Creek, and Kickapoo Tribes. First, the interviewees were asked to review the responses about their tribe's history, culture, and other relevant information from the generative AI-enabled chatbot. Second, the author conducted several semi-structured in-depth interviews to understand their perceptions of the responses. The primary purposes of the interview were to explore missed or biased messages and seek their recommendations to improve the system responses.

4.2 Challenges of Tribal Information in Generative AI

Based on the interviews with tribal members, we summarize the three primary challenges of the generative AI system response from the Indigenous perspective. Tribal members consider the generative AI system introduces tribal culture insufficiently, describe tribal history inaccurately, and call the names of tribes mistakenly.

4.2.1 Insufficient Introduction of Tribal Culture. Although generative AI describes tribal culture in the responses to users, core spiritual elements and events are rarely included. The generative AI system briefly introduces tribal cultures but does not explain these spiritual activities and events' origins, development, or meaning. For instance, the tribal member of the Muscogee Nation considers that the system mentions that their tribe has stomp dance but does not introduce the origin of this activity. The dance is for keeping the everlasting fire, which is the core of their religion. Also, tribal members consider that not all spiritual information should be represented in the generative AI system. For example, the interviewee from the Kickapoo Nation considers that some ceremonies are only for tribal members instead of the general public.

4.2.2 Inaccurate Description of Tribal History. The generative AI introduces tribal history primarily from the U.S. government and outsider perspectives, but the articulation cannot capture the realities in tribal communities. First, the response does not accurately articulate the outcomes of the U.S. Native American policy. For instance, although the government attempted to assimilate tribal members to metropolitan regions, such as Chicago, Denver, Los Angeles, and Boston, with the Relocation Act of 1956, the consequence was that Native people separately moved to various urban areas instead of these big cities. Second, the system lacks the discussion of important tribal historical events. One example is that the system does not include the Washita Massacre, the major historical event for the Cheyenne Arapaho Nation.

4.2.3 Colonized Appellation of Tribal Nations. The generative AI system uses the official names of tribes in the U.S. federal government, but the interviewees recommend that the chatbot adopt the names that tribal members call themselves. The generative AI collects information from the U.S. government, so the response shows the official name of tribal nations. However, the interviewees consider the system can use the names that Indigenous people call their community to respect tribal members. For instance, although the Yankton Sioux Tribe is the official name, the tribal members call themselves "Honkawan" or "Dakota" people. Similarly, the member of the Sicangu Nation considers that the generative AI mistakenly uses "Brule Sioux" as the alternative name of their tribe. "Brule Sioux" is what the White people call them, and this name is disrespectful to the members of the Sicangu Nation.

4.3 Governance Solutions for Tribal Knowledge Representation

Tribal members propose several strategies to improve data sources for generative AI. The interviewees consider cocreating with tribal members by learning from oral tradition, gathering information from tribal documents, and accessing more knowledge from collaborating tribal governments.

4.3.1 Tribal Oral Tradition. Tribal members deliver their knowledge to the next generation primarily through oral tradition. Indigenous people learn their history, culture, and social activities from their elders. The older adults in tribal nations prefer to tell stories to younger generations to preserve and promote knowledge. For example, one interviewee from the Cheyenne Arapaho Nation teaches tribal culture and history to her grandkids via social media.

In other words, generative AI system developers need to talk to tribal senior generations to obtain more accurate information and knowledge to train the algorithms.

4.3.2   Tribal Document. Although the primary source of tribal knowledge is oral tradition, some tribal writers document historical, cultural, and contextual information about their tribes in books, articles, or journals. The texts written by tribal people can accurately document information and knowledge from the perspectives of Indigenous communities rather than outsider or colonial viewpoints. Most interviewees mention that tribal writings can be a crucial source for the generative AI system to deliver more tribal knowledge and information. For instance, the National Museum of American Indian exhibits various collections, and their team conducts research on Native American histories and cultures. Also, tribal colleges and schools can provide information and knowledge about tribes. The member of the Navajo Nation indicates that Dine College people conduct a series of tribal research and design curriculums for Native Americans to learn about their cultures and histories.

4.3.3   Collaboration with Tribal Government. Tribal governments have abundant information for the generative AI system to represent tribal knowledge. First, tribal governments include various information on their official websites. In the digital era, tribal nations usually introduce their tribes on the website, so the information serves as one essential information source. Most tribal interviewees recommend gathering information from the websites for the generative AI system. For instance, the tribal member of the Sicangu Lakota Nation indicates that the government's website and social media pages provide abundant information about their community. Second, contacting tribal governments to visit them for more tribal information and knowledge is another data source. Tribal members prefer to interact with people physically rather than virtually, so visiting tribal governments and people shows respect for the culture. By participating in their daily life and events, system designers and research teams can have more tribal information and knowledge for generative AI system development. Most interviewees highly suggest that generative AI system developers can talk to tribal governments and members directly to improve response quality.

5   DISCUSSION

Based on the research findings, this section discusses the problem identification and strategy development for generative AI system responses, research contributions and policy recommendations, and future research agenda.

5.1   Problem Identification and Strategy Development

From the perspective of digital equity, tribal insights are crucial in identifying the problems of generative AI responses and developing strategies to address these challenges. Based on the existing research, the problems of generative AI originate from data governance. The data governance of generative AI systems lacks the engagement of Indigenous communities, so the responses about tribal culture, history, and governance are Western-oriented and even colonized. The biased responses may result in unfair treatment from the government in the context of the over-reliance on generative AI systems. Cocreation for tribal knowledge representation serves as an essential solution to the problem. Digital equity emphasizes the representation of tribal knowledge in the ICT-based platforms and systems. Tribal nations can determine the information and knowledge they want to share with the external society based on their tribal sovereignty. With the creation of generative AI, Indigenous communities can identify existing problems in the system responses and propose potential solutions. Therefore, problem identification and strategy development result from tribal generative AI response cocreation.

The lack of tribal knowledge representation results in three primary problems in generative AI responses. First, tribal cultures are limitedly represented in the responses. Generative AI system responses do not present the crucial elements of tribal history and do not consult with tribal communities for the disclosure of information about spiritual events. Second, historical events are illustrated from the perspective of the U.S. government and society rather than tribal insights. The system response articulates policy consequences and historical development from the non-tribal viewpoint, exacerbating the knowledge discrepancy between tribal and non-tribal populations. Third, the AI system reflects colonized information instead of tribal self-identity. The system uses disrespectful names to introduce tribal nations, representing colonialized perspectives in responses. Hence, generative AI system responses are problematic without tribal input and insights.

Cocreation with tribal communities serves as a handful approach to address the problem. First, listening to senior generations' oral traditions improves system responses. Second, including tribal documents from various sources, such as museum collections, books, and articles written by Indigenous people, can represent tribal knowledge in the AI system. Third, collaborating with tribal governments to obtain more information and reach out to tribal members contributes to better cross-sovereignty data governance for generative AI responses. Therefore, knowledge cocreation with tribal people can strengthen digital equity and tribal sovereignty in generative AI systems.

5.2   Research Contribution and Policy Recommendation

Two theory contributions and two policy recommendations are identified and discussed in this research. From the perspective of theory building, the development of digital equity and knowledge cocreation contributes to digital governance research. When discussing digital equity issues in tribal communities, knowledge representation is an additional component rather than accessibility and literacy. Tribal knowledge representation affects the quality of available tribal information in generative AI systems. Public services can be improved with better response quality once public employees and organizations increasingly rely on generative AI systems for tribal policy planning and implementation. Also, tribal knowledge cocreation brings the insights of Indigenous communities to improve cross-sovereignty data governance for generative AI. Tribal members can contribute to data sources with oral traditions,

tribal texts and documents, and information from tribal governments and people. With tribal input, the data quality for generative AI system responses can be substantially improved. In other words, knowledge cocreation can be applied to the interaction between different sovereignties in data governance.

Moreover, this study proposes two policy recommendations for the government and tribal nations to maximize the benefits of generative AI systems. First, the government can collaborate with tribal nations and representatives to release more tribal information. Although the government collects fundamental information about tribal reservations, tribal nations own their data and knowledge. When the government can work with tribal communities to provide information for generative AI systems, the responses can be improved and culturally sensitive. Second, tribal nations can utilize cocreation with the government and other actors for generative AI systems to strengthen digital equity and tribal sovereignty. When generative AI systems can provide more accurate information to public organizations, public organizations can improve service quality, benefiting tribal members in the era of increasing reliance on AI in public decision-making. Also, tribal nations can determine what data they want to share with the external world. When they can determine information sharing in data governance, tribal nations strengthen their sovereignty in the digital world.

5.3 Future Research

Finally, future research can explore tribal knowledge cocreation in various policy issues and the role of tribal nations in collaborative intelligence. First, tribal knowledge cocreation in public policy is valuable to research. For instance, tribal emergency management can be a potential field. Each tribe encounters different risks of natural disasters and has a unique governance structure, culture, history, and language. When these tribes can cocreate with the government, system developers, and relevant actors, tribal members can receive better emergency services and assistance. Second, collaborative intelligence research can regard tribal nations as a crucial actor. For example, tribal nations contribute to the human-and-machine collaboration with the unique insight of the relationship to lands, communities, and families. Their philosophies may cause different AI system development and implementation than existing ones.

6 CONCLUSION

Generative AI systems transform public decision-making but bring challenges centered on data governance with vulnerable populations. Insufficient tribal community engagement causes generative AI system responses to be colonized, threatening fairness and equity in policy planning and implementation. Digital equity and knowledge cocreation can be strategies to address the challenges. This study conducts several interviews with Native Americans to understand the biases in generative AI system responses and the potential solutions from the perspective of tribal members. The results suggest that the system responses require a more accurate introduction to tribal culture, a comprehensive description of tribal history, and self-represented appellation of tribal nations. Also, generative AI systems can obtain more information and knowledge from tribal oral traditions, publications, and collaboration with

tribal nations. This study advances the development of digital equity and knowledge cocreation. Moreover, policy recommendations and future research directions are discussed in this research.

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