Knowledge Pyramid Perspective of the Political Data Ecosystem: A Case Study of Bhutan

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Abstract: This study examines the dynamics of data management and knowledge flow in the political data ecosystem through the lens of the Knowledge Pyramid. We used open-government electoral documents and polling data for granular insights into how data, information, knowledge, and wisdom (DIKW) are managed in Bhutan's political data ecosystem. Bhutan's electoral stakeholders and political parties manage and use DIKW of varying types, sizes, and complexities. In particular, political parties use information systems, websites, and social media to manage data and construct and use knowledge for political activities. Democracy is still young and gaining a foothold in Bhutan. The political parties do not employ complex data technologies and rich human resources to manage DIKW emanating from the political data ecosystem. Thus, scope exists for electoral stakeholders and political actors to explore and adopt effective and efficient knowledge management infrastructures to deal with DIKW elements in the political arena, namely the complex dynamics of turning raw data into higher elements of the Knowledge Pyramid. In addition to contributing to the knowledge management literature through an in-depth account of the DIKW aspects in the political space, this paper demonstrated the analytical and explanatory power of the Knowledge Pyramid for discourse on the political data ecosystem.

1 INTRODUCTION

The conventional political environment is gradually transitioning to a data-driven political system. Political actors use data technologies to harness insights and knowledge from electorate data to boost campaign activities and electoral success, such as using big data in the US election (Ruppert et al., 2017). Cambridge Analytica (Dommett et al., 2023; Micheli et al., 2020; Ruppert et al., 2017) had a significant impact on the political stakeholders on exploiting the value of data (Miller and Mork, 2013; Lee, 2017) generated in the political space. The political actors also now recognise data as an intangible asset and use the so-called political technologies (Ruppert et al., 2017) to tap its value to drive campaign activities and enrich decision-making. For instance, during the national campaigns and electoral processes of countries such as the United States (US), data management and analytics were undertaken by a chief analytics offi-

cer and his hub of statisticians, engineers, and data scientists of political parties. Likewise, much of the data analysis tasks of the electoral activities are increasingly delegated to and driven by complex algorithmic processes (Mittelstadt et al., 2016). In the present work, the term *political* was prefixed to the definition of data ecosystem suggested by Oliveira and Lóscio (2018) to define a working definition of *political data ecosystem*—Organisational entities, infrastructural technologies, electoral activities, digital data, and contextual norms in the democratic political space, where stakeholders concerned, political actors, general citizens, and democratic values are in an interplay to create and capture value of sociopolitical data.

The literature on the use of data in democratic politics, such as data-driven campaign activities and targeting potential voters (Dommett et al., 2023; Bennett and Lyon, 2019), is growing, given the significant effect of data analytics, knowledge management, and social media on the electoral process. Dommett et al. (2023) highlight that the prior studies on data use in democratic politics focused on the US and es-

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tablished democracies. In a sense, such US-centric information affects our understanding of how electoral stakeholders and political parties in different regions of the world, namely emerging democracies, use data and related technologies to construct, manage, and use knowledge in their political space. The use of data and analytics by political actors of countries relatively new to democratic values and ethos—that is, where democracy is recently established, to drive electoral process and political campaigns has not received much scholarly attention and is thus an understudied area. For instance, in Bhutan, a small country in South Asia (Bates, 2009; Metz, 2014), democracy was established only in 2008, and, on a political timeline, democracy is only 16 years old. Consequently, discourses on the use of data and analytics in such a political space are limited.

It is timely for literature to be augmented with insights into countries other than established democracies (Dommett et al., 2023) on how they use data and exploit knowledge to facilitate democratic electoral processes. In the present study, we examine Bhutan's political data ecosystem from the perspective of the Knowledge Pyramid (Jennex, 2017; Frické, 2009; Tuomi, 1999) to determine how electoral stakeholders and political parties deal with aspects of data, information, knowledge, and wisdom (DIKW) for informing electoral processes and political campaigns. Data increasingly impact the democratic election, hence data-driven election (Bennett and Lyon, 2019) and campaigning (Baldwin-Philippi, 2017). The ability to turn data into knowledge by contextualising, structuring, and giving meaning to data empowers political actors to use the value of data for various electoral or political activities. Thus, the Knowledge Pyramid (Jennex, 2017; Frické, 2009) is an apt framework to account for data and analytics practices in the political data ecosystem of Bhutan. We address the following research question: *How do electoral stakeholders and political parties use data, analytics, and knowledge to inform decisions and actions in the political data ecosystem?*

The paper is structured as follows: Section 2 discusses the prior literature on data, politics, and Knowledge Pyramid. Section 3 overviews the methodology adopted in the study, and Section 4 presents the study findings. In Section 5, we discuss the interpretation of the findings and connect it with the extant literature, along with contributions to research and practice, limitations of the study, and future work. Finally, Section 6 concludes the paper.

2 RELATED LITERATURE

2.1 Data and Politics

The resources and capabilities for harnessing the political value of data are fundamental in political endeavours. Likewise, intelligent use and related expertise to analyse and turn data emanating from the political space into meaningful information and valuable knowledge is critical to the success of campaign activities, such as Barack Obama's data-driven campaign work in the 2008 and 2012 elections (Baldwin-Philippi, 2017; Bennett and Lyon, 2019; Jin et al., 2015). The phenomenon of data-driven politics is in the mainstream of democratic elections, such as the hiring of Cambridge Analytica by Donald Trump's team during the 2016 US election (Schippers, 2020; Ruppert et al., 2017; Baldwin-Philippi, 2017). It is a real-world case of transforming data into value or extracting value from data (Micheli et al., 2020) and subsequent practical use of the value in the political arena. Similarly, instances of using big data during the US elections (Schippers, 2020; Ruppert et al., 2017; Dommett et al., 2023) and Brexit referendum (Ruppert et al., 2017) are examples of putting data value to use. Constructs such as data-driven campaigning, micro-targeting, voter profiling, email analytics, and data politics (Dommett et al., 2023; Baldwin-Philippi, 2017; Papakyriakopoulos et al., 2018; Ruppert et al., 2017) are also added to the literature. The extant literature discusses how political actors access and analyse data for insights into campaigns and streamline political activities (Dommett et al., 2023; Ruppert et al., 2017). Thus, in-depth knowledge of the processes requires an understanding of the complex nature of the political data ecosystem.

Furthermore, knowledge of the complexities of the political data ecosystems and the use of political technologies (Ruppert et al., 2017) to manage it is a fundamental intellectual capital (Quintas et al., 1997). The ubiquity of digitalisation and the intelligent use of social media (Baldwin-Philippi, 2017), namely analytics of social data (Olteanu et al., 2019), assist political actors in competing with each other during democratic elections by producing, analysing, and using DIKW within context and time frame. For example, Baldwin-Philippi (2017) highlights the novel use of data and analytics for political campaigns and how corresponding analytical insights inform content production and facilitate political advertising (Schippers, 2020; Ruppert et al., 2017; Bennett and Lyon, 2019). In Bhutan's context, the social media regulation of the Election Commission of Bhutan (ECB) also underlines social media as a channel to disseminate infor-

mation, communicate content (Election Commission of Bhutan, 2018), and manage electoral compassing activities (Dommett et al., 2023). Data in the political space was also used to develop prediction models for voters' personality traits and the likelihood of turning out to vote (Bennett and Lyon, 2019). Dommett et al. (2023) suggest using data to formulate campaign strategies and evaluate the effectiveness of a campaign retrospectively.

However, despite growing political discourses on data-driven democratic election (Bennett and Lyon, 2019), searches on citation databases, such as Scopus, IEEE Xplore, and ACM Digital Library, with the search query — *(("Knowledge Pyramid" OR "Knowledge hierarchy" OR "Information Pyramid" OR "DIKW hierarchy" OR "Information hierarchy") AND ("Political data" OR "politics data" OR "Political space" OR "Political data ecosystem*"))*— did not yield useful results[1]. We inferred it as a gap in knowledge on using the perspective of the Knowledge Pyramid (Jennex, 2017) to examine the management and use of DIKW aspects among electoral stakeholders and political parties for informing administrative decision-making and shaping campaign activities.

2.2 Knowledge Pyramid

Knowledge Pyramid is a widely used model to illustrate the logical relationship between DIKW based on meaning, context, and value (Tuomi, 1999; Frické, 2009; Jennex, 2017). The processes to transform data into higher elements of the Knowledge Pyramid reflect creating and building value, thus data value chain (Miller and Mork, 2013). Each step higher in the Knowledge Pyramid answers more questions about a phenomenon captured in the data. According to the Knowledge Pyramid, *data* is a raw or unorganised discrete collection of facts (Zins, 2007; Frické, 2009), such as polling day data of democratic election. The next level is *information*, which is contextual, cleansed, processed, and analysis-ready data (Bellinger et al., 2004; Frické, 2009). In the prior literature (Khatri and Brown, 2010), data and information are often used synonymously and do not differentiate between the two, and the same applies to information and knowledge (Wang and Noe, 2010). Zins (2007) argues that such perception is problematic for articulating data, information, and knowledge. Similarly, scholars also question whether information is data or knowledge (Quintas et al., 1997). *Knowledge* is the consolidation and application of disparate pieces of information, with underlying meanings and

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[1]We adapted the search query across the citation databases, but the search keyword remained the same.

schemas, to perform tasks and achieve goals. When one uses data-driven information and knowledge to solve problems, it is an instance of the possession and use of wisdom (Frické, 2009), which is the apex of the Knowledge Pyramid (Rowley, 2007). In the knowledge hierarchy discourse, *wisdom* is succinctly defined as knowledge applied in action, with the caveat that one appreciates the fallible nature of knowledge (Frické, 2009).

The underlying epistemologies and philosophies of the elements of the Knowledge Pyramid have been criticised and critiqued by scholars (Frické, 2009; Tuomi, 1999; Jennex, 2017). However, Jennex (2017) suggests embracing the debate but does not encourage it. Scholars critique the inherent weakness of the traditional Knowledge Pyramid and propose a revised version of it (Jennex, 2017). The revised Knowledge Pyramid (Jennex, 2017) incorporates aspects of the Internet of Things, data analytics, and big data (Jin et al., 2015). Some critics of the Knowledge Pyramid argue that data is not the building block of the higher elements of the Knowledge Pyramid (Tuomi, 1999; Jennex, 2017). They assert that an individual's prior wisdom and knowledge play an essential role in understanding the world, which drives an individual to gather information to collect data about a phenomenon of interest. Their perspective implies that elements of the Knowledge Pyramid are intricately linked, and one could visualise hierarchy flowing downward rather than upward (inverted) (Tuomi, 1999) or in both directions within the context of the natural or real-world (Jennex, 2017). Some arguments for needing a revised Knowledge Pyramid are supported by mathematical facts and social reality (Tuomi, 1999; Frické, 2009). Given the datafied reality we are experiencing, individuals, organisations, and societies continually gather, process, and analyse DIKW by leveraging their insights and sense-making capabilities, further complemented by infrastructural technologies. It is a cyclical process in that one's prior wisdom and knowledge shape gathering information on what aspects of data to collect to accomplish a task. Although not expressly mentioned, we consider the revised Knowledge Pyramid in the present work.

3 METHODOLOGY

3.1 Study Setting

Bhutan, a country known for the concept of Gross National Happiness (Bates, 2009; Metz, 2014), is relatively new to democracy. The matrix of democratic values and ethos in Bhutan started only in 2008 (Elec-

tion Commission of Bhutan, 2008). Bhutan is a small country $(38,394\ (14,824) km^2(mi^2))$ located in South Asia with roughly about 750,000 population. Regarding governance and politics, Bhutan has a democratic, constitutional monarchy system with a bicameral parliament. The king (*Druk Gyalpo*) is the head of the state, and the Prime Minister is the head of the government. In the bicameral parliament, the upper house, the National Council, consists of 25 elected members (20 non-partisan elected plus five members appointed by the Druk Gyalpo). The lower house, the National Assembly, consists of 47 elected members from the ruling and opposition parties. The use of democratic principles to elect candidates and form a government is a recent phenomenon among Bhutanese citizens. Democracy empowers Bhutanese society to elect 47 candidates representing their constituency at the National Assembly. It also allows the voices and aspirations of the citizens to be heard by the highest legislative and executive bodies. For instance, the fourth democratic election concluded in January 2024, and Bhutan has a new democratically elected government.

The electoral stakeholders such as the ECB (Election Commission of Bhutan, 2024) have increasingly used technologies to streamline democratic electoral processes. In doing so, it facilitates the management of coherent and reliable electoral data for free democratic elections. Data from numerous sources, such as documents of political parties, demographic data of candidates, primary-round polling data (vote for political parties of one's choice), and general election polling data (vote for the candidates fielded by the two political parties that have made it through the primary round) is generated at a relatively significant scale. Meanwhile, Bhutanese political parties also use data to inform campaign activities and enrich decision-making, which resonates with Bennett and Lyon (2019) that modern democratic campaigns use data. To illustrate, the political activities, manifesto documents and party websites suggest that they perform document analysis and descriptive data analytics, with complex analytics delegated to external tools such as Facebook ad analytics (Baldwin-Philippi, 2017) during the parliamentary election, which is discussed further in the later section of this paper. It is worth exploring how Bhutan's electoral stakeholders and political parties manage and use DIKW aspects through the lens of the Knowledge Pyramid (Jennex, 2017; Frické, 2009; Tuomi, 1999).

3.2 Method

We used qualitative research design to analyse archival documents and empirical electoral data, albeit secondary data, to provide an account of data, analytics, and knowledge practices in Bhutan's political data ecosystem through the lens of Knowledge Pyramid (Jennex, 2017). It is worth mentioning that we did not conduct interviews or surveys in the present work. The snowballing technique gathered open-government electoral documents and support materials from the ECB (Election Commission of Bhutan, 2024) and related governmental agencies. These documents were made available on their website. The Independent Verification Committee (Independent Evaluation Committee (IEC), as per section 5.4 of Rules of Election Conduct, 2022) verifies these documents, looking at factual accounts of political ideologies and filtering out unfeasible promises. We also consulted the political parties' 4th Parliamentary National Assembly election manifestos in Table 2 for insights into the use of DIKW and related technologies and their implication on political activities. Likewise, to complement the inductive qualitative inquiry (Thomas, 2006) with quantitative insights and understandings, we manually scrapped the aggregated election result data from the ECB website[2][3]. Indeed, different data sources were central to triangulating data and enriching the description of the democratic electoral process in Bhutan with statistical facts and figures. We also gathered public social media data for information on the profile of Bhutanese political parties across various social media platforms, such as the count of followers and type of posts during the upcoming democratic election.

3.3 Data Analysis

We used a general inductive approach (Thomas, 2006) to analyse the open-access textual documents and numeric polling data to provide an account of aspects of DIKW in the political data ecosystem and to reflect on the data-driven democratic electoral process of electing the 4th National Assembly member in Bhutan. The unit of analysis (Yin, 2014) is the political data ecosystem of Bhutan. Similarly, the unit

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[2]Results of the 4th National Assembly Elections, 2023-2024 (primary round)— https://www.ecb.bt/declaration-of-results-of-the-4th-national-assembly-elections-2023-2024/

[3]Results of the 4th National Assembly Elections, 2023-2024 (general election)— https://www.ecb.bt/declaration-of-results-of-the-4th-national-assembly-elections-2023-2024-general-election/

Table 1: Documents consulted for insights into DIKW aspects in the political data ecosystem of Bhutan.

Documents	Source	Description
Election Act of the Kingdom of Bhutan, 2008	ECB	Serves as the overall guiding principle for all election-related activities, including constituency information, nomination processes and disqualifications, memberships and campaigning, advertising rules, and dispute settlements
Information, Communications and Media Act of Bhutan 2018	BICMA	Mandates the Bhutan Information Communication and Media Authority (BICMA) to maintain the required standards and prudent use of ICT and media facilities and mechanisms for data sharing and protection
ECB Social Media Rules and Regulations of the Kingdom of Bhutan, 2018	ECB	Documents rules and regulations for political advertising, the use of social media by the ECB and Election Officials, mentions the period of no campaign (48 hours), and provisions of reporting violations
Election Advertising Regulations of the Kingdom of Bhutan, 2018	ECB	Lists out election advertising particulars, online election advertising, the use of posters and banners, and highlights the use of the Internet or social media only for the election advertising
Electronic Voting Machine (EVM) Rules and Regulations of the Kingdom of Bhutan, 2018	ECB	Serves as a manual for the proper use of electronic voting machines to train polling personnel and voter education, and also outlines the procedures for safeguarding machines and handing-taking over election materials
Strategy for the Implementation of the Provisions Related to Election Advertising, 2021	ECB	Provides more clarity on the implementation of the election advertising provisions in the spirit of fairness and equality and also specifies the extent of time and ceiling amount allocated to the political parties for elections
Media Coverage of Elections Rules and Regulations of the Kingdom of Bhutan, 2021	ECB	Illustrates provisions for fair and equal access to paid election advertising and equal allocation of broadcasting time and space by both ECB and a political party, including restrictions imposed on each
Rules and Regulations on Content	BICMA	Outlines the content specifics to empower content providers and ensure accountability and encourage creativity and innovation
Rules and Regulations on ICT Facilities and Services in Bhutan	BICMA	Informs the general public of ICT facilities and services available and protocols/eligibility to obtain licenses for providing such facilities
e-Governance Policy for the Royal Government of Bhutan	GovTech Agency	Aims to leverage existing and emerging information technology for increasing competitiveness, enhancing productivity, and improving service delivery through online services and sustainable governance

of observation is the different information technologies and related techniques used by various electoral stakeholders and political actors to manage and use DIKW for the democratic electoral process. Since a democratic election is a high-stakes task, aspects of the electoral processes and associated data in Bhutan are well documented in the election-related acts, policies, and guidelines (Table 1). Thus, data sources for this study are analysis-ready for in-depth insights into the intricate dynamics of humans, technologies, and DIKW in the political data ecosystem. All the documents were closely read and analysed (Thomas, 2006) to explicate the phenomenon (Yin, 2014)—that is, the use of DIKW aspects among electoral stakeholders and political actors to facilitate the democratic electoral system in Bhutan. In doing so, the current work upholds the rigour and trustworthiness of a qualitative study (Yin, 2014; Nowell et al., 2017). Through the perspective of the Knowledge Pyramid (Jennex, 2017; Tuomi, 1999), we zoom in on how data emanating from the political space is managed, analysed, and turned into information, knowledge, and wisdom

among electoral stakeholders and political actors. We performed qualitative coding (only open code) of the data set for information on action patterns and DIKW flows in Bhutan's political data ecosystem. In order to consolidate our analytic output, a flow chart was used to model the complex DIKW-driven interplay of human, technological, and organisational actors in the democratic electoral process in Bhutan.

4 FINDINGS

4.1 Political Data Ecosystem of Bhutan

The open-access documents and aggregated polling data (primary and general elections) from the ECB are infused with valuable information to examine the data-driven democratic electoral process in Bhutan. In fact, the activities of electoral stakeholders and political parties are well documented by capturing the subtleties of the electoral process, from the announcement of the upcoming National Assembly election to declaring primary and general election results and confirming the ruling and opposition parties. This end-to-end democratic electoral process is informed by various data such as party information, candidate profiles, polling data, and election results. Table 2 provides an overview of the registered political parties, the 2023-2024 National Assembly election results, and the use of various information technologies in the political data ecosystem. The collation, analysis, and interpretation of electoral data in the third and fourth columns and last row of the table are performed by stakeholders at ECB. The gathering of the polling data and corresponding rigorous analytics to transform data into higher elements of the Knowledge Pyramid, namely information (such as aspects of the respective constituency) and knowledge (such as electoral trends and patterns), of the 4th National Assembly general election can be viewed elsewhere (https://www.ecb.bt/geresults2024/). Regarding the wisdom aspects of the Knowledge Pyramid, upon rigorous analysis of electoral results and methodical assessment of the situation, the electoral stakeholders in Bhutan work on tasks of ensuring that the Bhutanese society has a new government and an opposition party, as illustrated in Figure 1.

Social media platforms have a significant impact on the political data ecosystem (Bennett and Lyon, 2019; Baldwin-Philippi, 2017). The political parties in Bhutan recognise the opportunities afforded by social media platforms, albeit wary of the downside of such tools on democracy. Bhutanese political parties use social media, such as Facebook, What-

sApp, and Messenger, extensively for crowdsourcing information on political activities, collecting constructive feedback on pledges, and gathering knowledge of community needs. For instance, during the 4th National Assembly election, the BTP conducted election-related ad campaigns on Facebook (Baldwin-Philippi, 2017). Meta Ad Library automatically calculates values for metrics such as platform (Facebook, Instagram, and Audience Network), categories (social issues, elections or politics), ad audience size, amount spent, impressions, gender, and location. The merit of such tools is that ad delivery information is presented well in a digestible format (in summaries, charts, and graphs), such as the 'Impressions' of the official BTP Facebook page was 700K–800K. The post mainly appeared in social media posts and feeds of people in Thimphu *dzongkhag* [4] (37%) and mostly covered people aged 18-44[5]—that is, the digital ads of BTP was displayed on Facebook users in the aforementioned region and demography (see *microtargeted Facebook ads* in Baldwin-Philippi, 2017, p. 629). Similarly, the political parties also use *Kuensel*'s[6] Facebook page for digital ads during the democratic election.

Additionally, from our lived experiences of democratic election reality in Bhutan, political parties use insights assembled from social media for microtargeting (Bennett and Lyon, 2019), albeit rudimentarily, through personalised text messages for potential electorates, audio chats in social media groups, and emails to potential individual electors (Papakyriakopoulos et al., 2018). All these activities to leverage social media for political endeavours are guided by the ECB's in-house social media policy (Election Commission of Bhutan, 2018). The policy also stipulates that if the security level of social media platforms and access privilege of the desired information is uncertain, persons with a stake in the electoral process should not share confidential information on such tools. Considering literacy aspects of potential electors and other factors such as geography, Bhutanese political parties generally prefer Facebook posts on political activities, expressly or implicitly gathering information and knowledge for political ends. They or their party workers are also active across social media groups for insights into and synthesis of the political debates and discussions among group members on needs and demands in the community. In a

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[4]*Dzongkhag* means a district in Dzongkha language

[5]BTP conducted an ad campaign on Facebook during the 4th National Assembly Election in Bhutan—https://www.facebook.com/ads/library/?active_status=all&ad_type=all&country=ALL&view_all_page_id=101216219504499&search_type=page&media_type=all

[6]*Kuensel* is the national newspaper of Bhutan

Table 2: Overview of the political parties that contested in the 4th National Assembly election in Bhutan.

Political Party	Political Slogan	Primary Election*	General Election+	Remark (Use of data analytics, social platforms, and other technologies)
Bhutan Tendrel Party (BTP) (Founded: November 2022)	Your Voice, Your Hope	61,331 (19.58%)	Votes— 147,123 (45.02%) 17 (Opposition)	Conducted ad campaigns related to social issues, elections, or politics on Facebook; 31K followers on Facebook; 18 followers on X (formally Twitter); and 132 followers on Instagram
Druk Nyamrup Tshogpa (DNT) (Founded: 20 January 2013)	Putting Nation First	41,106 (13.12%)		41K followers on Facebook, 5.8K+ followers on X, and 52 followers on Instagram
Druk Phuensum Tshogpa (DPT) (Founded: 25 July 2007)	Economic Prosperity and Social Well-being; Development with Equity and Justice	46,694 (14.91%)		8.9K followers on Facebook and 1.6K+ followers on X
Druk Thuendrel Tshogpa (DTT) (Founded: 2 May 2022)	Sunomics: Buddhist Capitalism with the spirit of GNH	30,814 (9.83%)		34K followers on Facebook, no X account, and 459 followers on Instagram
People's Democratic Party (PDP) (Founded: 24 March 2007)	For a Better Drukyul. The Promise we will Deliver.	133,217 (42.53%)	Votes—179,652 (54.98%) 30 (Ruling party)	Maintains an active political party website —https://pdp.bt, 61K followers on Facebook, 7.3K+ followers on X, and 117 followers on Instagram

*: Eligible Voters—497,058; Total Votes—313,162; Voter Turnout—63% (EVM: 195,719; PB: 117,443)
+: Eligible Voters— 498,135; Total Votes— 326,775; Voter Turnout— 65.6% (EVM—218,273; PB— 108,502)

sense, Bhutanese political parties use social media as an information-eliciting and knowledge-building platform.

4.2 Data Practices Among Political Stakeholders

Bhutan's electoral stakeholders and political parties manage data and associated knowledge for various political activities. Figure 1 illustrates a flow chart of the recurrent action patterns in the electoral process of political parties filing to contest in the upcoming democratic election at the ECB through the primary and general rounds of casting votes to the declaration of results to the formation of ruling and opposition parties. The data, that is, votes from EVM and postal ballots, is consolidated by following schema and parameters developed by ECB (see Fig 5.1 in Election Commission of Bhutan, 2013, p. 16). ECB gathers massive amounts of data during the election period, such as party registration, electorate registration, and in-country or overseas postal ballot voters. They also maintain an information system (https://dramig.ecb.bt/membership/check) for registering political party members. The party members can use the system to check their membership status. If it is valid, the system displays information

about their political affiliation. ECB also has a web-based system (https://berms.ecb.bt/enrollment/check) whereby electorates can check their enrolment status to vote in the upcoming democratic election. In Bhutan, voting is not compulsory, and the electoral system does not permit proxy voting. If an electorate wants to cast a vote via postal ballot (in-country or overseas), the system records the details of elector information and allows changing postal addresses based on the voters' choice.

The political actors of Bhutan now recognise the importance of tapping the value of data generated in the political data ecosystem. It is evident from their campaign activities and manifesto document that they perform analytics of data on socioeconomic developments in Bhutan, such as descriptive statistics and figures, to inform campaign activities, drive decision-making, and develop party pledges. Such activities are consistent with Bennett and Lyon (2019) that all modern democratic election campaigns use data. The website of some political parties has a feature that allows potential electors to join as party members. For example, the PDP's website has a 'Join Us' feature. It asks for CID, name, contact no, *gewog* (county), and *dzongkhag*. After entering this information, the system automatically fetches the name of the party candidate in the constituency of an elector. In effect, such activities are instances of using information technology, such as voter relationship management system (Bennett and Lyon, 2019), and DIKW aspects for informational canvassing and steering political campaigns through targeting and testing (Baldwin-Philippi, 2017). Similarly, the DTT's website uses cookies to track web traffic and click streams, which could be used to analyse the digital footprint of potential electors. The actions and dealings with data suggest that the political parties expressly or implicitly elevate data gathered from democratic politics to the higher elements of the Knowledge Pyramid (Jennex, 2017). However, since democracy in Bhutan is relatively embryonic, the analytical maturity of political parties is rather low in that no political parties use complex data analytics technologies to analyse political data for building predictive models or scoring to target voters during the democratic election (Bennett and Lyon, 2019).

4.3 DIKW in the Political Data Ecosystem

The data-driven democratic electoral activities of the political actors indicate how they deal with the DIKW elements of the Knowledge Pyramid (Jennex, 2017). The strategy to manage knowledge in the data analytics processes is a critical success factor (Jennex, 2017) as it has implications on exploiting DIKW for campaign activities and decision-making, such as insights into electorate voting (EVM and postal ballot) pattern and election trend analysis. Fig. 1 illustrates the interplay and dynamics of various sociotechnical actors during the democratic electoral process in Bhutan. It also embodies a complex exchange of DIKW among numerous stakeholders, such as the ECB, political parties, and the Office of the Returning Officer. Data such as manifesto documents for registration to contest in the election, primary and general round polling day data, and comprehensive data of the electorate are generated, managed, communicated, and used during the democratic election period. The political parties also bootstrap available resources and technologies to gather, manage, and turn data into higher elements of the Knowledge Pyramid (see Table 2). For instance, they use websites, social media, and other information systems to manage and operationalise DIKW in Bhutan's political data ecosystem. Their social media posts of the political activities during the upcoming election, such as photos from community *zomdu* (translates to inclusive decision-making) and updates on personal meetings with party workers in the 47 constituencies, also illustrate that the predominant method that political parties use for gathering aspects of DIKW is in-person campaigning or door-to-door canvassing (Dommett et al., 2023; Baldwin-Philippi, 2017; Bennett and Lyon, 2019).

Furthermore, polling day is one instance where data must be as accurate as possible; otherwise, it would endanger the democratic electoral process. The demographic information of electorates is carefully vetted through the voter identity card at the 809 polling stations. ECB follows first-past-the-post voting, where the voter votes for a single candidate, and the candidate with the maximum votes wins the election. On the polling day of the primary and general elections (Fig. 1), data from 47 constituencies and 809 polling stations across the country are transferred to the Department of Election of ECB for tallying the votes. The stakeholders in the department collate, analyse, and add meaning and context to the polling day data, which is an instance of dealing with elements of the Knowledge Pyramid (Jennex, 2017). For example, analysis of the polling data from the primary round is used to declare the winning and runners-up parties where they are eligible to participate in the general election to form the government, as illustrated in Fig. 1. Overall, the flowchart captures the logic of how democratic election decisions are made in the primary and general rounds to form the ruling and opposition parties. These recurrent action patterns in the
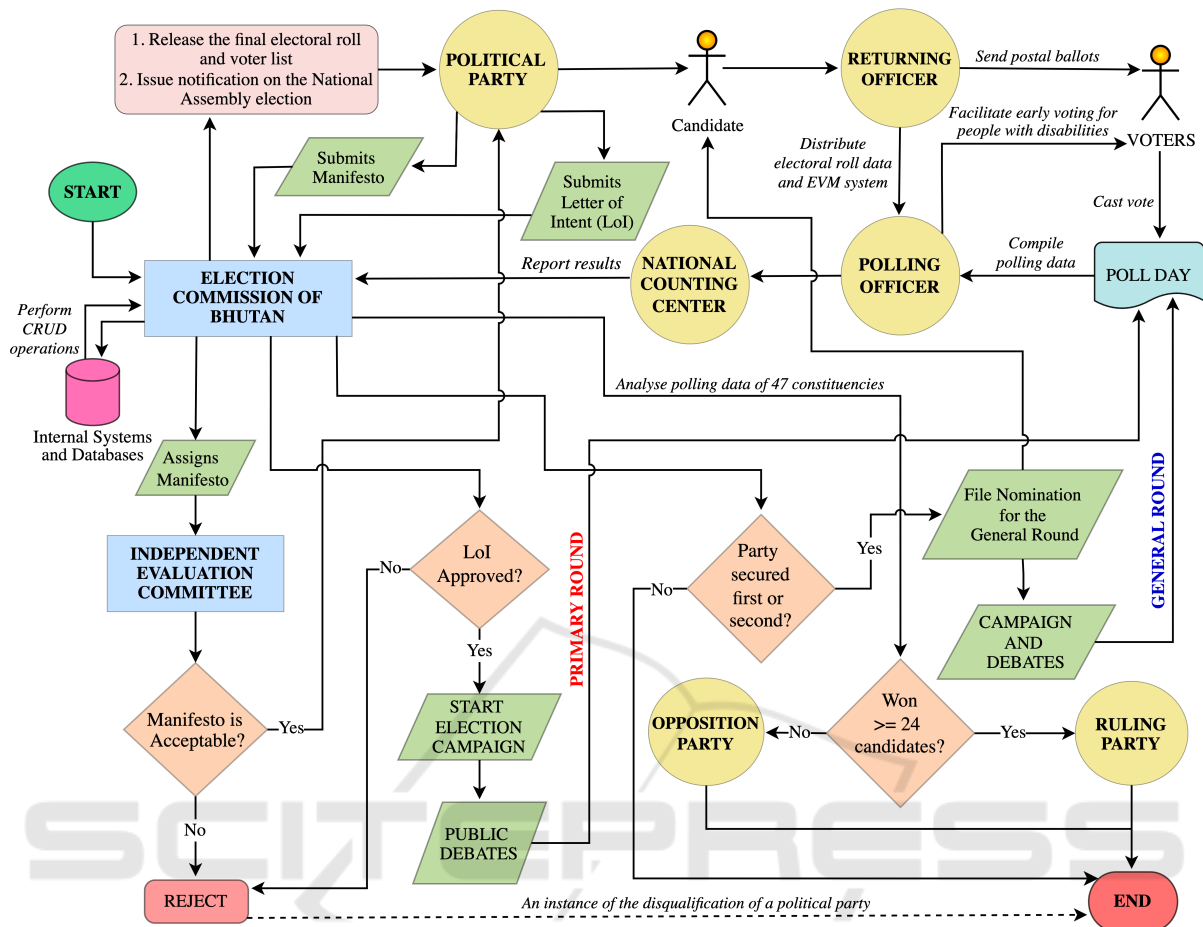
Figure 1: Dynamics and flow of DIKW in Bhutan's democratic electoral process.

flow chart every five years require electoral stakeholders and political parties to wrestle with DIKW tirelessly in the political data ecosystem of Bhutan.

5 DISCUSSION

5.1 DIKW-Driven Political Data Ecosystem

Considering the considerable influence of and discourses on data and analytics during the democratic election (Papakyriakopoulos et al., 2018; Baldwin-Philippi, 2017; Bennett and Lyon, 2019), electoral stakeholders and political actors must determine the actual and potential value of DIKW and its implications on political activities. Moreover, understanding DIKW (Jennex, 2017; Tuomi, 1999) would avoid duplicative efforts and ease the extraction of the value of data (Micheli et al., 2020) emanating from the political data ecosystem. It is also timely for the nascent

political data ecosystem in emerging democracies, such as Bhutan, to determine barriers and opportunities to share and use political data for facilitating democratic election and avoid issues of information asymmetry (Mittelstadt et al., 2016)—that is, unequal distribution of or access to information. Indeed, doing so would enrich the open data attitude and culture in the political space, especially exploring possibilities for DIKW sharing and reuse among political actors. Furthermore, individuals entrusted with data analytics among political parties should conceive data-driven politics-related activities in terms of DIKW. Political parties with resource constraints need more technical know-how to perform complex data analytics and use analytical results to manage campaign activities and target electors during democratic election campaigns (Bennett and Lyon, 2019; Baldwin-Philippi, 2017). In Bhutan, given the smallness of the constituencies, geographic-based electoral targeting is a predominant method among political parties for voting intelligence of potential electors. They also gather DIKW of potential wins for their candidates in certain strongholds

through their party workers as information conduits, albeit surprises are not uncommon during elections.

The political data ecosystem needs a systematic approach to managing the DIKW elements of the Knowledge Pyramid (Jennex, 2017; Frické, 2009). For instance, a contextual framework to manage DIKW (Jennex, 2017) is essential to facilitate the frictionless flow of data within political parties for decision-making and campaign activities (see Nissen, 2002 on the relational link between data, information, and knowledge). Likewise, electoral stakeholders and political parties must know what DIKW is needed and where it is available. Hence, providing support systems, such as developing capabilities for acquiring data from different sources and subsequent transformation into the higher levels of the Knowledge Pyramid (Jennex, 2017), is also crucial to tap the value of data emanating from various sources. Moreover, a coherent and reliable DIKW will positively affect electoral activities, such as DIKW-informed, analytics-driven, and cost-effective campaign activities (see Table 6 in Dommett et al., 2023). Additionally, mechanisms should be in place to protect DIKW from imitation by others (Gelhaar and Otto, 2020), which calls for proper inventorying of DIKW in the political environment (see Miller and Mork, 2013 on data inventory) to avoid the risk of accumulating ineffective DIKW and mistargeting electors. Regarding voter analytics and political micro-targeting (Bennett and Lyon, 2019), clear legislation is fundamental about the ethics and legitimacy of using electorate data and related databases for data analytics to shape political campaigns and inform decision-making (Dommett et al., 2023; Baldwin-Philippi, 2017). In Bhutan's context, some safeguards, such as acts, policies, and guidelines, as summarised in Table 1, are in place to deal with the misuse of so-called political technologies (Ruppert et al., 2017) during the democratic election.

5.2 Knowledge Management in the Political Data Ecosystem

The complex interplay of various individuals, organisations, and institutions is fundamental for fostering the growth of an ecosystem (Gelhaar and Otto, 2020) and creating and sharing knowledge. Thus, it is crucial to ensure that tacit (experiences and insights) and explicit knowledge (knowledge formalised and codified in electronic systems) (Choo, 1996; Nonaka, 2007; Nissen, 2002) is used effectively and efficiently in the political data ecosystem. For example, in Bhutan, the ECB gathers political documents (such as manifestos, charters, and party membership) and

polling data and accordingly shares them on its website. Political parties could explore opportunities to encourage knowledge sharing and use through collaboration with other parties. It would provide an avenue to exchange services whereby political actors share and exchange skills, capabilities, and knowledge that benefit each other. Some political data have a short shelf life in that data value decays over time (Namgay et al., 2023; Lee, 2017). Hence, political actors must also deal with boundary paradox (Quintas et al., 1997), where boundaries should be open for DIKW flow among the relevant stakeholders, but at the same time, political parties also have to protect and nurture their DIKW and intellectual capital. Quintas et al. (1997) argue, 'It is upon the dynamic preservation of the latter [protect and nurture knowledge base and intellectual capital] that survival depends.'

The issue in the political data ecosystem is how to manage knowledge using effective and efficient technologies, which tools and techniques to use for managing DIKW, and what DIKW related to politics is needed for decision-making and campaign activities. Moreover, knowledge generation and application is a cyclical process, which alludes to the critique of knowledge hierarchy (Frické, 2009; Tuomi, 1999; Jennex, 2017). It costs resources, effort, and time to analyse data and turn it into knowledge. Therefore, it is imperative to have a practical plan or strategy to deal with and work on DIKW Jennex (2017), especially knowledge in the political data ecosystem, such as identifying metrics for managing and gauging DIKW. If there is shareable data by de-identifying certain attributes, such as personally identifiable information, stakeholders such as ECB and other governmental organisations should share it with political parties. Doing so prevents the political parties from performing needless tasks such as setting up infrastructures to collect and analyse data for insights and knowledge. It is also imperative to incentivise political parties to use data analytics and foster a culture of sharing and using knowledge (Wang and Noe, 2010), albeit for sociopolitical good. Otherwise, in emerging democracies with limited resources, mobilising data and analytics at scale for political ends is resource intensive, and inaccessibility to rich DIKW risks data-driven democratic politics favouring established political parties (Bennett and Lyon, 2019) with means to use complex political technologies and employ human resources to manage aspects of DIKW in the political data ecosystem.

5.3 Contributions, Limitations, and Future Work

This study contributes to the literature on knowledge management via insights into DIKW aspects (Jennex, 2017; Tuomi, 1999) in the political data ecosystem of emerging democracies that use data and analytics for political activities. We answer the call by Dommett et al. (2023) for exposition on data practices in democratic elections in different countries and contexts, especially 'less US-centric studies'. The present work also contributes to the discourse on the evolution of the nascent body of knowledge on the political data ecosystem. It is also timely for researchers interested in data-driven politics (Bennett and Lyon, 2019; Baldwin-Philippi, 2017) to rethink how the Knowledge Pyramid elements (Jennex, 2017) are managed and used in the political space. The study likewise augments the theory and praxis of the Knowledge Pyramid in research. Regarding implications for data stakeholders as well as policymakers, this study provides a platform to reflect on their current data practices from the frame of the Knowledge Pyramid (Jennex, 2017; Tuomi, 1999; Frické, 2009) to unlock the actual and potential value of data emanating from the political data ecosystem. The in-depth description of facets of and relational links between DIKW also sheds light on how political actors can administer data-driven electoral processes and manage knowledge for decision-making and campaign activities.

We acknowledge that this study has some limitations. The current research is based on a country where democracy is not even two decades old. Likewise, the present work only used open-access governmental documents and aggregated polling data to provide an account of the political data ecosystem from the perspective of the Knowledge Pyramid (Jennex, 2017). The subjectivity of the DIKW elements of the Knowledge Pyramid (Frické, 2009) could also affect the interpretations of the findings and discussions in the present work. An area worth exploring is using empirical data such as interviews and surveys to examine data-driven democratic political activities via the lens of the Knowledge Pyramid. Another research direction is algorithmic processes that underlie the data analytics systems in political technologies, namely the handling of sensitive electorate data. Moreover, insights into the suggested study will illustrate how individuals, political actors, and institutions in other countries manage and use different facets of data for electoral and political activities without compromising privacy and security.

6 CONCLUSION

In this paper, we analysed Bhutan's political data ecosystem through the lens of the Knowledge Pyramid to examine the dynamics of DIKW generated in the political data ecosystem to facilitate democratic electoral activities and political campaigns. The democratic electoral process of the 4th National Assembly Election in Bhutan was unpacked for insights into the practices of transforming data into higher levels of the Knowledge Pyramid. In Bhutan, the electoral stakeholders and political parties deal with DIKW on a relatively small scale and with varying infrastructural complexities. The political parties use websites, information systems, and social media to manage aspects of DIKW, facilitate decision-making, and administer campaign activities. However, considering the nascency of democracy in Bhutan, no extensive data technologies or human resources are employed to harness the actual and potential value of data generated in the political space. In this regard, electoral stakeholders and political actors could explore opportunities to adopt robust data analytics technologies and knowledge management infrastructure to manage DIKW emanating from the political data ecosystem. This study advances the literature on knowledge management through a fine-grained account of the democratic election in a country experiencing the significant effect of political technologies to turn political data into higher elements of the Knowledge Pyramid for various ends in the political world.

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