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ALIGNING IRAN'S LEGISLATION WITH SUSTAINABLE DEVELOPMENT GOALS: A TOPIC MODELING APPROACH

by

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This study examines the extent to which national legislation in Iran aligns with the Sustainable Development Goals (SDGs) within the framework of Multi-Level Governance (MLG). Employing a mixed-method computational approach—combining thematic analysis and topic modeling—the research explores the argumentative and content structures of legislative texts. Findings reveal partial alignment in areas such as education, health, and environmental protection, while significant gaps remain in community empowerment, gender equality, climate action, and participatory governance. From a policy perspective, the study highlights the need to revise legislative processes to systematically integrate SDG principles, establish mechanisms for assessing legal compatibility with SDG indicators, and build the capacity of lawmakers. It also emphasizes the importance of enhancing the participation of local institutions and civil society in the legislative process and recommends developing data-driven platforms for continuous monitoring of legal alignment with the SDGs. Theoretically, the study contributes to the application

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of the MLG framework in legal and development studies by offering empirical insights into the interplay between governance levels and legal systems. However, the research is limited by its exclusive focus on formal legal texts, limited interpretive depth of topic modeling, and its single-country scope. Future studies should explore comparative legal assessments, critical discourse analysis, and network-based approaches in other developing countries. Additionally, analyzing sub-national laws and their implementation could provide further insights into the challenges and opportunities of SDG localization.

KEY WORDS

Sustainable Development Goals (SDGs), Multi-Level Governance (MLG), Topic modeling, Latent Dirichlet Allocation (LDA)

1. INTRODUCTION AND MOTIVATION

The Sustainable Development Goals (SDGs), established in 2015, provide a comprehensive and integrated policy framework to be achieved by 2030. Realizing these goals requires the alignment of national laws and policies with the principles of sustainable development. In this regard, the local government plays a critical role in achieving the global agenda for sustainable development by 2030, particularly in underdeveloped nations. The existing literature highlights¹ the importance of governance and policy coherence, emphasizing the SDG localisation approach in place and calling for specific attention to be given to the effective localization of the SDGs within countries.² While the multi-level governance(MLG) framework is the dominant perspective in these studies, little attention has been paid to the alignment of national legislation with the SDGs.³

¹ UN. (2015) *Transforming our world: The 2030 agenda for sustainable development*. [online] Available from: <https://sdgs.un.org/2030agenda>; Tosun, J. and Leininger, J. (2017) Governing the interlinkages between the sustainable development goals: Approaches to attain policy integration. *Global Challenges*, 1(9), p.1700036; Bilsky, E., Moreno, A.C. and Tortosa, A.F. (2021) Local Governments and SDG Localisation: Reshaping Multilevel Governance from the Bottom up. *Journal of Human Development and Capabilities*, 22(4), pp. 713-724; Sarkar, M. S. K. et al. (2022) Localisation of Sustainable Development Goals (SDGs) in Bangladesh: An Inclusive Framework under Local Governments. *Sustainability*, 14 (17), p. 10817.

² *Ibid.*; Biggeri, M. (2021) A “Decade for Action” on SDG localisation. *Journal of Human Development and Capabilities*, 22(4), pp. 706–712; Xie, H., Wen, J. and Choi, Y. (2021) How the SDGs are implemented in China? A comparative study based on the perspective of policy instruments. *Journal of Cleaner Production*, 291, p. 125937; see also 5.

³ UN. (2015) *Transforming our world: The 2030 agenda for sustainable development*. [online] Available from: <https://sdgs.un.org/2030agenda>; Tosun, J. and Leininger, J. (2017) *op. cit.*, p.1700036; Bilsky, E., Moreno, A.C. and Tortosa, A.F. (2021) Local Governments and SDG Localisation: Reshaping Multilevel Governance from the Bottom up. *Journal of Human Development and Capabilities*, 22(4), pp. 713-724; Sarkar, M. S. K. et al. (2022) *op. cit.*

Over the past two decades, the concept of MLG has played a pivotal role in analyzing the dynamics of intergovernmental relations, including engagements with supranational organizations. In the context of sustainable development, MLG provides a comprehensive framework for understanding the interactions between various actors – public institutions, private entities, and civil society – across different levels of governance. This perspective is particularly valuable for assessing how policy coherence and institutional coordination influence the effective localization and implementation of the SDGs.⁴ This approach facilitates the establishment of operational mechanisms where local, national, and international institutions collaborate in a coordinated manner to advance these objectives. Despite the widespread focus on the implementation of the SDGs, few studies have explored the alignment of national legislation with these goals within the framework of MLG.⁵

This research gap could significantly impact the success of sustainable development policies, as the lack of alignment and coordination between the legislative process and the SDGs may lead to considerable challenges in their implementation. Therefore, further research is necessary to analyze the compatibility of national legislation with the SDGs, as this issue could have a significant impact on the effectiveness and efficiency of sustainable development policies and contribute to improving the implementation processes. This research gap is not only important globally but also in developing countries such as Iran, where many of the challenges and opportunities for sustainable development are particularly manifested at the local level. In this context, focusing on the legislative process and its alignment with the SDGs can help better identify social and cultural needs and priorities, thus improving the effectiveness of SDG implementation.⁶ This leads to the following research question: To what extent do national legislation in Iran align with the principles of the SDGs and how can they facilitate the effective localization of these goals?

To address the research question, this study employs a data-driven approach, specifically topic modeling, to analyze the alignment of national legislation with the principles of the SDGs in Iran. The study focuses on extracting key themes and patterns from national legal texts to assess their compatibility with SDG principles. The dataset includes a large corpus of national laws and regulations, which is processed using natural

⁴ Bilsky, E., Moreno, A. C. and Tortosa, A. F. (2021) *op. cit.*; Allain-Dupré, D. (2020) The multi-level governance imperative. *The British Journal of Politics and International Relations*, 22(4), pp. 800-808.

⁵ Xie, H., Wen, J. and Choi, Y. (2021) *op. cit.*

⁶ Biggeri, M. (2021) *op. cit.*

language processing (NLP) techniques. Topic modeling is applied to identify underlying topics within the legal texts and assess their alignment with the SDGs. The analysis reveals several key areas where national legislation aligns well with SDG principles, but also highlights significant gaps, especially in addressing local-level challenges. These findings emphasize the need for stronger coordination between national legal frameworks and local governance mechanisms to enhance the effective localization of the SDGs.

The findings highlight the critical importance of fostering stronger coordination between national legal systems and local governance mechanisms, ensuring that the SDGs are localized effectively and in a manner that addresses both national and local-level challenges. This research contributes to the growing body of literature on MLG by extending its application to the alignment of legislation with global goals. The implications of this study are significant, indicating that for the successful achievement of the SDGs, particularly in developing countries, policymakers must prioritize legal reforms that promote greater policy coherence and improve coordination among institutions.

In the following sections: We first provide a review of the related work on the localization of the SDGs, the multi-level governance (MLG) framework, and recent approaches to legal text analysis using topic modeling. We then elaborate the methodology, detailing the contextualized topic modeling approach employed. The next presents the key findings of the study. Finally, we discuss the implications of these findings and offers recommendations for future research and practice.

2. RELATED WORK

This section reviews the relevant literature in three main areas: (1) the localization of the Sustainable Development Goals (SDGs) and the role of national legislation, (2) the multi-level governance (MLG) framework and its relevance to sustainable development, and (3) recent advances in legal text analysis, with a focus on topic modeling approaches. These three strands of literature provide the theoretical and methodological foundation for our study.

At the national level, the achievability of the SDGs is closely tied to the policy pathways by governments. Existing research emphasizes that the realization of the SDGs depends not only on high-level political commitment but also on the capacity of local and regional governments

to promote integrated, inclusive, and sustainable development strategies.⁷ National legislation plays a pivotal role in institutionalizing these strategies, transforming global goals into legally enforceable commitments. In this regard, governments act as both implementers and enablers—bridging the gap between international development agendas and local realities.⁸ Recent studies have stressed the need for legislatures, particularly in developing countries, to assume a proactive role in aligning legal frameworks with the SDGs. This includes duties such as enacting laws that promote inclusive governance, securing budgetary resources for implementation, and performing oversight functions to hold executive agencies accountable.⁹ In contexts like Iran, where sustainable development challenges intersect with governance constraints, this legislative alignment becomes even more crucial.

Despite decades of reform efforts, the field of law and development has historically lacked a unified theory capable of explaining why some legal interventions succeed while others fail. Scholars have identified three interdependent factors as critical to the success of legal reforms: regulatory design, compliance mechanisms, and the state's institutional capacity for law enforcement.¹⁰ This triad provides an analytical lens to understand how legal systems can either facilitate or hinder sustainable development.

The SDGs, in turn, offer a coherent and widely accepted global framework that bridges the conceptual gap between legal reform and development objectives. As a set of interrelated goals focusing on social justice, equity, environmental sustainability, and human welfare, the SDGs provide normative guidance for evaluating national legislation. They enable researchers and policymakers alike to assess whether existing legal structures are adequately supporting sustainable development across sectors. Thus, in the absence of a unifying theory within law and development, the SDGs can function as a *de facto* framework for aligning legal reform with broader development outcomes.¹¹

⁷ Sarkar, M. S. K et al. (2022) *op. cit.*; Moyer, J. D. and Bohl, D. K. (2019) Alternative Pathways to Human Development: Assessing Trade-Offs and Synergies in Achieving the Sustainable Development Goals. *Futures*, 105, pp. 199-210.

⁸ Galli, A. et al. (2018) Think Globally, Act Locally: Implementing the Sustainable Development Goals in Montenegro. *Environmental Science & Policy*, 84, pp. 159-169; Wiegant, D. Dewulf, A. and Van Zeben, J. (2024) Alignment Mechanisms to Effectively Govern the Sustainable Development Goals. *World Development* 182, p. 106721.

⁹ Ladan, M. T. (2018) Achieving Sustainable Development Goals through Effective Domestic Laws and Policies on Environment and Climate Change. *Environmental Policy and Law*, 48 (1), pp. 42-63.

¹⁰ Lee, Y. S. (2017) General Theory of Law and Development. *Cornell International Law Journal*, 50 (3), pp. 416-471.

¹¹ Bilsky, E. Moreno, A. C. and Tortosa, A. F. (2021) *op. cit.*

The multi-level governance (MLG) framework offers a valuable conceptual lens through which the implementation of the SDGs—especially those requiring coordinated legal and policy efforts—can be understood. MLG refers to the dispersion of authority and policy-making across multiple levels of government: supranational, national, regional, and local. It emphasizes the interdependence and negotiation between actors operating at these various levels, often across traditional sectoral boundaries.¹²

Within the context of the SDGs, MLG helps explain how global development goals are translated into national legislation and localized action. It recognizes that while the goals are globally defined, their realization is inherently dependent on governance capacities and institutional dynamics at the subnational level.¹³ This is particularly relevant to legal alignment with the SDGs, as laws are both created and implemented across different layers of government. Hence, an MLG perspective moves the analysis beyond the national level and draws attention to the legal frameworks and compliance structures at the regional and local scales.¹⁴

Furthermore, MLG highlights the importance of vertical and horizontal coordination in sustainable development efforts. Vertical coordination refers to alignment between different levels of government, while horizontal coordination involves collaboration across sectors and institutions at the same level. In the case of legal reform, both dimensions are crucial: vertical coordination ensures that national laws empower and support local implementation, while horizontal coordination facilitates cross-sectoral integration, for example between environmental, economic, and social policy domains.¹⁵

The MLG framework complements the SDG-based approach to law and development by emphasizing the institutional arrangements and governance mechanisms required to operationalize the goals. It supports the premise that laws do not operate in isolation but within a complex ecosystem of actors, institutions, and norms. As such, the integration of MLG into the analysis helps account for variation in legal effectiveness across national systems.¹⁶

¹² Croese, S., Oloko, M., Simon, D. and Valencia, S. C. (2021) Bringing the Global to the Local: The Challenges of Multi-Level Governance for Global Policy Implementation in Africa. *International Journal of Urban Sustainable Development*, 13 (3), pp. 435-447; see also 3; Allain-Dupré, D. (2020) *op. cit.* pp. 800-808.

¹³ Galli, A. et al. (2018) *op. cit.* pp. 159-169.

¹⁴ Wiegant, D. Dewulf, A. and Van Zebe, J. (2024) *op. cit.* p. 106721; Ladan, M. T. (2018) *op. cit.*; see also 9.

¹⁵ Tosun, J. and Leininger, J. (2017) *op. cit.* p. 1700036; Moyer, J. D. and Bohl, D. K. (2019) *op. cit.* pp. 199-210.

¹⁶ Biggeri, M. (2021) *op. cit.* pp. 706-712; see also 6; Allain-Dupré, D. (2020) *op. cit.*

Recent developments in computational methods have opened new avenues for analyzing legal texts at scale. Among these, topic modeling—especially Latent Dirichlet Allocation (LDA)—has emerged as a powerful technique for uncovering latent thematic structures within large corpora of legal documents.¹⁷ These unsupervised learning methods enable researchers to extract recurring themes, identify trends over time, and explore how legal content aligns with broader policy goals such as the SDGs. Previous Studies demonstrated the applicability of topic modeling in legislative analysis by examining the temporal evolution of legal themes and their alignment with national and global development agendas, including the SDGs¹⁸ In the context of this study, topic modeling serves both an analytical and exploratory function. Analytically, it provides an empirical basis for mapping the extent to which national legislation reflects SDG-related priorities, such as climate action, gender equality, and access to justice. Exploratorily, it allows for the identification of emerging or neglected areas in legal discourse, which may signal gaps in governance or mismatches between legislative intent and development objectives.¹⁹

While the literature provides a broad and multifaceted perspective on the localization of the SDGs, the current study adopts multi-level governance (MLG) as its primary theoretical lens. This framework is particularly suitable for addressing our research question, as it foregrounds the institutional complexity and coordination challenges inherent in aligning national legislation with global development agendas.²⁰ The theory of MLG allows us to conceptualize national laws not merely as top-down instruments but as part of an interactive system that includes regional and local governance layers.

¹⁷ Blei, D. M. Ng, A. Y. and Jordan, M. I. (2003) Latent Dirichlet Allocation. *Journal of Machine Learning Research*, 3 (Jan), pp. 993-1022; Chauhan, U. and Shah, A. (2021) Topic Modeling Using Latent Dirichlet Allocation: A Survey. *ACM Computing Surveys (CSUR)*, 54 (7), pp. 1-35.

¹⁸ Greene, D. and Cross, J. P. (2017) Exploring the Political Agenda of the European Parliament Using a Dynamic Topic Modeling Approach. *Political Analysis*, 25 (1), pp. 77-94; Sanders, J., Lisi, G. and Schonhardt-Bailey, C. (2017) Themes and Topics in Parliamentary Oversight Hearings: A New Direction in Textual Data Analysis. *Statistics, Politics and Policy*, 8 (2), pp. 153-194.

¹⁹ Invernici, F. et al. (2024) Capturing Research Literature Attitude Towards Sustainable Development Goals: An LLM-Based Topic Modeling Approach. *arXiv*. Available from: <https://arxiv.org/abs/2411.02943>

²⁰ Allain-Dupré, D. (2020) *op. cit.* pp. 800-808.

Within the MLG framework, three core constructs guide our analysis:

- Policy Coherence – the degree to which national legislation aligns with overarching SDG principles across sectors and governance levels;
- Institutional Coordination – the mechanisms and processes that facilitate collaboration between different governmental tiers in translating legislative provisions into local action and
- Legal Responsiveness – the extent to which legal texts reflect and adapt to context-specific development priorities, particularly those emerging from subnational levels.

These constructs are embedded in a set of premises grounded in the theory: (1) that legal effectiveness is contingent upon multi-level coordination, (2) that vertical (national–local) and horizontal (cross-sectoral) integration is essential for sustainable outcomes, and (3) that the institutional context in which laws are enacted and implemented significantly affects their alignment with global norms like the SDGs.

Unlike general discussions of law and development, MLG offers a structured pathway to evaluate how national legal texts contribute to or hinder sustainable development. It emphasizes dynamic interactions rather than static legal content and frames legislation as part of a broader governance architecture. By integrating this framework with computational topic modeling, this study moves beyond descriptive analysis to offer theoretically informed insights into the alignment of Iranian national legislation with the SDGs.

3. METHODOLOGY

To explore the alignment between national legislation and the Sustainable Development Goals (SDGs), this study adopts a mixed-method computational approach to legal text analysis. Our methodology is grounded in two complementary strands: thematic analysis and topic modeling, each providing unique insights into the argumentative and content-related structures of legislative texts. We begin with a thematic approach to analyze the argumentative and deliberative structure of legislative texts. Thematic analysis is particularly well-suited for settings in which the form, sequence, and reciprocity of arguments are of central importance, such as parliamentary debates and oversight hearings. By preserving linguistic features such as punctuation and syntax, and reducing words to their lemmas, we can track how ideas develop, how actors respond to one another, and how argumentation unfolds across time. This approach employs co-occurrence

analysis to map conceptual relationships within the corpus. Textual units are clustered based on their semantic similarity, allowing us to identify recurring argument patterns and key thematic clouds. Visualization techniques such as correspondence analysis and dendrograms are used to examine interrelations among themes and contextual variables such as speaker identity, political affiliation, or institutional role.²¹

To complement our thematic findings, we apply topic modeling techniques, particularly LDA, to uncover the latent thematic structures in a large corpus of legal documents.²² Topic models treat text as a collection of probabilistic word distributions, revealing the underlying content of the discourse rather than its interactive structure. While these models do not capture reciprocal argumentation, they are powerful tools for detecting broad policy trends and thematic evolution across time. In contrast to lemmatization, topic modeling typically involves stemming words to their root forms to simplify vocabulary and facilitate probabilistic classification. This enables us to observe how themes related to the SDGs emerge, persist, or evolve within legislative texts.²³

Our corpus consists of national legislative documents. In this study 11760 laws collected from July 2016 to July 2023 are examined. Data extraction was performed using two Python libraries, BeautifulSoup and Request. The dataset contains a variety of features, such as title, content, lead (a summary of law), tags, classes, types, categories (law source organization), and date. Translations of samples of collected laws are shown in Table 1. A variety of legal texts are presented in dataset, including news, drafts, votes, plans, laws, bills, parliament deliberations, regulations, and opinions. Topic modeling was conducted by LDA using Python programming language only for regulations.

²¹ Blei, D. M. and Lafferty, J. D. (2007) A Correlated Topic Model of Science. *The Annals of Applied Statistics*, pp. 17-35; Grimmer, J. and Brandon, S. M. (2013) Text as Data: The Promise and Pitfalls of Automatic Content Analysis Methods for Political Texts. *Political Analysis*, 21 (3), pp. 267-297.

²² Blei, D. M. Ng, A. Y. and Jordan, M. I. (2003) *op. cit.* pp. 993-1022.

²³ Blei, D. M. and Lafferty, J. D. (2007) *op. cit.* pp. 17-35.

Table 1: Sample of collected laws.

Title	Content	Tags	Classes	Date
Deliberations summary of the public session of the Islamic Council on Tuesday, July 6, 1402.	Deliberations summary of the public session of Tuesday, July 6, 1402 of the Islamic council was published. The main discussions of this meeting are as follows: 1. The report of the judicial and legal commission on the performance of the bar associations and the union of bar associations of Iran - in the implementation of Article 212 of the internal regulations law. 2. Reading the report of the commission on Article 90 of the constitution regarding air pollution. 3. Announcing the receipt of a project item: Plan to amend articles of Iran's aquatic resources protection and exploitation law. 4. Written reminders of parliamentarians to executive officials of the country.	Air pollution, 90th principle commission, Water resources, Water resources of Iran, Bar association	The deliberations of the Islamic Council, The Islamic Council	Saturday, July 10, 1402
Seventh five-year development plan bill (1402-1406).	The bill of the seventh five-year development plan (1402-1406) was sent to the Islamic Council by the president on 03/28/1402 for legal formalities.	Development, The seventh development plan, The development plan, The country's development plan, The economic, Social and cultural development plan	Bills news, Economic group, Cabinet	Monday, June 29, 1402
The opinion of Islamic Council Chairman regarding the approval of the Supreme Council for the implementation of the general policies of Article 44 of the Constitution on the issue of determining the mechanism for the transfer of equity shares to qualified individuals.	The opinion of Islamic Council Chairman regarding the approval of the Supreme Council for the implementation of the general policies of Article 44 of the Constitution on the issue of determining the mechanism for the transfer of equity shares to qualified persons was announced by letter No. 20146/HB on 03/17/1402.	Shares, Justice shares	News, Legal opinions, Economic group, Islamic Council Chairman, All executive organizations	Monday, June 22, 1402

Title	Content	Tags	Classes	Date
The Executive Regulations of Clause A, Note 6 of Article One of the Budget Law of 1402 for the whole country.	The approval letter of the Council of Ministers meeting dated 04/04/1402 regarding the "executive regulation of paragraph A of note 6 of the single article of the budget law of the year 1402 of the whole country" was notified by the first vice president in letter number 59606 dated 04/07/1402.	Budget, 1402 budget, 1402 budget law, 1402 budget law of the whole country, Villa garden, Authorized villa garden, Unauthorized villa garden	Regulations news, Financial and Economic Group, Cabinet of Ministers, Ministry of Economic Affairs and Finance, Ministry of Justice, Ministry of Agricultural Jihad, Ministry of Roads and Urban Development, Ministry of Interior, Ministry of Industry, Mining and Trade, Organization of Records and Real Estate of the country	Sunday, July 11, 1402
Designing a list of invalid rulings in the field of business.	The draft of the list of invalid rulings in the field of trade was received in the public session dated 03/22/1402 of the Islamic Council.	Trade, Invalid rulings in the field of trade	News of projects, Economic group, Islamic Council	Sunday, June 28, 1402

Data preprocessing is essential, which involves transforming raw data into a format that can be understood by machines. Unstructured text data can be preprocessed to extract non-trivial information. In order to prepare the data for topic modeling, the following steps were required to preprocess the data:

- Checking for empty records. The dataset did not contain any NULL values;
- Punctuation Removal: Unstructured documents have numerous punctuations such as apostrophes, commas, and so on, which are not understood by the machine;
- Tokenization: A stream of text is broken down into words, phrases, symbols, or other meaningful elements, which are referred to as tokens;
- Stop Word Removal: In textual documents, these words are often used to join words together, but they don't add much value to the content. There is a list of Persian stop words which has been used in this study;
- Lemmatization: It involves breaking down words into their root.

The data was preprocessed using the Hazm and Parsivar Python libraries. Next, vectorization is performed using TF-IDF, which converts the texts into numbers. Through the TF-IDF, we are able to determine the amount of information that a word provides about the context. Term frequency refers to how frequently a term appears in a document, and how relevant the term is to the document. As a result of using the TF-IDF, relativeness of the words in the document is determined, and the more informative words rule out the frequent word.

4. RESULTS

We retrieved 11760 laws from Dotic, categorized into different types. Figure 1 shows the evolution of types of laws (2016-2023). There is an increase in the number of laws issued from 2016 to 2018 except for those related to news and voting. From 2018 to 2019, the number of laws being made decreased, then increased until 2021. Following that, the number of laws is reduced. The majority of the laws are issued in 2021. Regulations are the most common type of law.

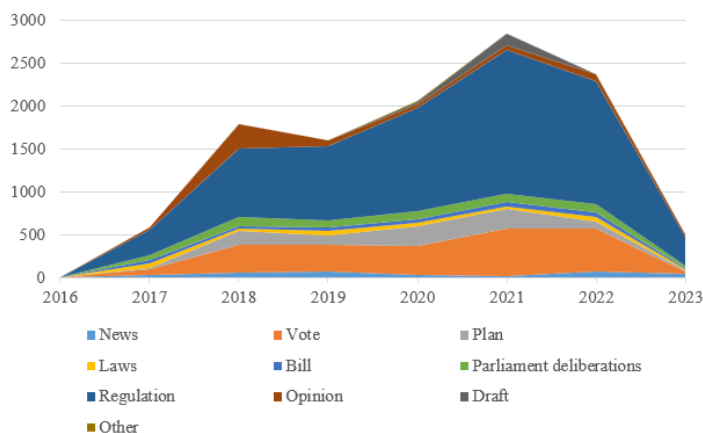


Figure 1: The evolution of laws over time.

Each type of law has its own characteristics, resulting in a variation in the size of text in the title and in the content. In Figure 2, each law is presented in a ratio of title size to content size. For example, the title of a news is usually brief, whereas the content is usually far more extensive. The title of Parliament approvals tends to be longer than news titles, as the longer the title is, the more understandable the approvals become, and they often contain numbers as well as parentheses. The title of Parliament approvals tends to be longer than news titles, as the longer the title is, the more understandable the approvals become, and they often contain numbers as well as parentheses.

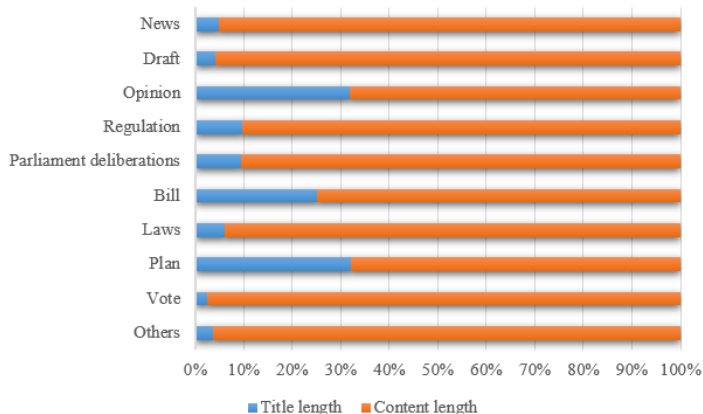


Figure 2: Title length to content length ratio.

The difference between law and regulation based on the definition provided by the Dotic website should be noted. Law refers to the decisions that create rights and duties for individuals (real and legal), or for the three powers (legislative, executive, and judicial) and other institutions, from which other regulations are derived. Regulations are the decisions that determine the method for the implementation of one or more laws, the regulation of administrative organizations, and other decisions that are made and implemented by the competent authorities.

Topic modelling was conducted using the title and content of regulations, since these features contain the most useful information that enhance the analysis. A total of 6599 records of regulations were analyzed using the LDA algorithms. Regulations make up a greater percentage of the law, and their content is more detailed and targeted, which makes their text more suitable for processing. Ten main topics were identified from these records. The frequency of each topic is shown in Figure 3. The most regulations relate to economics (29%), customs (26%), and housing and urban development (16%).

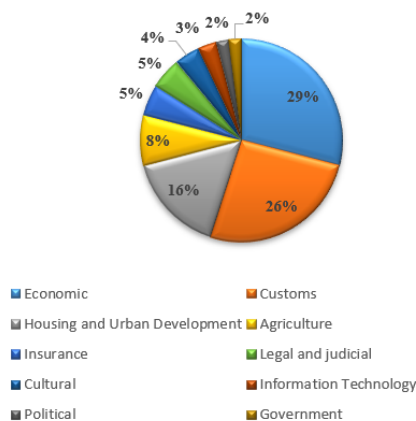


Figure 3: Title length to content length ratio.

According to Figure 4, all topics has minimum law in 2016 which is consistence with Figure 1. A total of 47% of regulations in 2017 related to political issues, and 35% in 2018 related to customs issues. The Insurance topic has the highest number of regulations in 2019 with 49%. The most important topic in 2020 was Legal and judicial, which accounted for 56% of the regulations. The most regulations in 2021, 2022, and 2023 will come from Economic (47%), Agriculture (59%) and Cultural (53%), which is completely consistent with the conditions of the Iran society. A number of events occurred in 2021, including the presidential election and the change of government, protests of farmers due to the drought and their problems, as well as the suspension of negotiations to revive the JCPOA. In addition to affecting economic conditions of the country, these problems have resulted in an increase in prices, which could be a factor in the increase in economic regulations.

Drought and rising temperatures created many problems for farmers in 2022. Agricultural products are also damaged by these droughts, which can lead to food shortages in the country. Agricultural regulations may be increased as a result of these problems. Also, these regulations may have been effected by protests that took place in 2021 in Khuzestan and Isfahan.

Guidance patrols were reinstated with a large extent in various cities at the middle of 2022, resulting in widespread protests across the country. This led to the hijab becoming one of the most important issues in the country. The presence of the most regulations for the cultural topic in 2023 can be attributed to these cases.

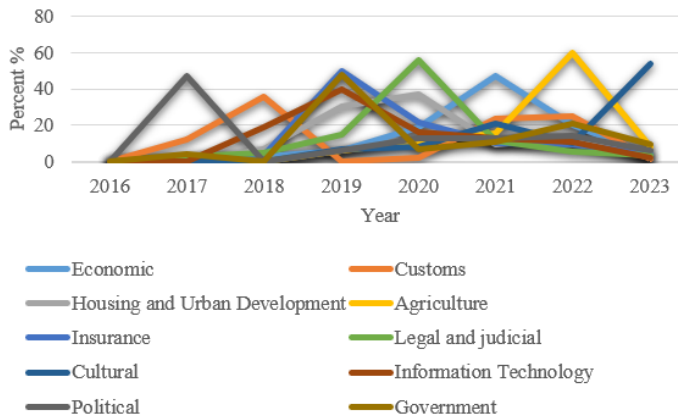


Figure 4: The percent of regulations per year for each topic.

Figure 5 illustrates the top word clouds in the ten identified topics, which are explained in the following.



Figure 5: Topics identified by combining LDA+TF_IDF algorithms.

Topic 1. Economic: Economic structure plays an important role in determining economic growth, energy demand, and the environmental footprint of countries. An increase in domestic production leads to economic growth and increase the budget. Governments plan their spending based

on the budget each year. But in recent years, the Iran government has run a severe budget deficit as a result of economic problems. The government debt has risen, businesses have reduced many of their products, and domestic production has decreased as well. Many governments use the budget deficit policy to eliminate temporary revenue shortages and to achieve targeted economic growth. Recent years, the Iranian government has received some parts of the budget deficit from a variety of sources in order to address different economic problems. An important source of deficit financing is foreign borrowing, which should be used to increase employment. Legislators need to revise the laws in order to address these issues for achieving economic growth.

Topic 2. Customs. Customs is a term used internationally. According to the Customs Co-operation Council (C.C.C.), customs is an organization tasked with enforcing customs laws, collecting import and export duties, as well as importing, transiting, and exporting goods. Based on resources and facilities available, countries design and implement a variety of programs in order to achieve their development goals. One of the key pillars of trade facilitation and growth in countries, especially developed ones, are free zones, which also play a crucial role in increasing exports and trade volumes. A free zone's establishment and continued operations will be supported by the facilitation of laws and structural protections. Export and import policies should be developed in a manner that results in exports in excess of a country's needs, and imports in excess of the country's needs. For this reason, legislators are responsible for specifying duty laws according to the country's needs for various products, including steel, petrochemicals, cement, metals, and motorcycles and bicycles, so that society's needs can be met and smuggling is prevented. In its most basic form, smuggling is the illegal importation of goods from one jurisdiction to another. A transaction that is illegal occurs in order to avoid legal taxation and duties. It is necessary to set laws and penalties in order to prevent smuggling.

Topic 3. Housing and Urban Development. Today, urban development is growing at such a rapid rate that the earth appears to be becoming an urban environment. It has become increasingly common for municipalities to rely on the financial resources of property developers and investors to implement comprehensive urban development plans. Several studies have been conducted to analyze the different methods used to charge developers so that the expenses of municipalities can be funded.

Most countries are transitioning from relying exclusively on traditional sources of funding (e.g. property taxes, duties, and intergovernmental transfers) to alternative sources of revenue generation. It is likely

that property taxes will not be sufficient to cover the expenditures of municipalities in most cities due to a reduction in intergovernmental transfers. As a result, municipalities seek alternative ways to access private capital in order to make up for this deficit. A major source of municipal income is the issuance of building and construction permits. There must be laws governing the issuance of permits and the collection of duties. Infrastructure costs, such as roads, can be covered by these charges, as well as the costs of public services, such as schools and parks.

Topic 4. Agriculture. The impacts of climate change are already being observed around the world, including an increase in the frequency of weather events such as droughts, floods, heat waves, wildfires, rising sea levels, and reductions in biodiversity. As a result of these events, people's lives can be negatively impacted in a number of ways, including health problems, economic losses, loss of labor productivity, damage to housing and critical infrastructures, as well as social disruptions.

As a result of climate change, droughts and water scarcity have caused extensive damage to agriculture. It is important to note that each province has different capacities in terms of agriculture and water resources. Therefore, laws can be enacted to specify the types of products that are allowed for agriculture in each province. The provinces of Khuzestan, Isfahan, and Fars are experiencing water scarcity, and farmers have had to deal with many challenges as a result. To support them, legislation must be enacted, which can support pricing and provide banking services. In order to solve the problem of water scarcity, there should be laws governing water saving, water efficiency, water pricing policy, cost-effective alternative solutions, and water hierarchy.

Topic 5. Insurance. The purpose of insurance is to provide financial protection against any type of risk. As part of the insurance contract, the insurer agrees to take on the risk of an insured entity against future events in exchange for monetary compensation. Various types of insurance policies are available depending on the type of risk involved, including life insurance, travel insurance, health insurance, and property insurance. Laws must be specified for each type of insurance, so that insurance companies can correctly assess the amount of damage and beneficiaries can receive their compensation when needed.

Topic 6. Legal and judicial. There are many areas of government, politics, and civil rights that are covered in the constitution, which is the highest legal document of a country. To provide fair judicial decisions in criminal and legal cases, judges refer to the constitution and its regulations as official documents of the country. A large number of issues relating to people's social lives are

covered in the constitution, including family, marriage, divorce, as well as the conditions of employees and retirees. Since there are many types of lawsuits, it is necessary to specify the applicable law for each.

Topic 7. Cultural. The concept of culture can be described as multifaceted, encompassing behaviors, values, and attitudes that are intrinsic to a particular group of people. There are many components of culture, including knowledge, belief, art, morals, law, custom, and any other abilities or habits that the individual has acquired as part of his social environment. In recent years, the world has become a much smaller interactive arena due to the convergence of new media. Social networks have enabled individuals to transcend geographical boundaries. As a result, individuals with different cultural backgrounds are able to respect and understand each other's traditions and norms of living. Social networks have provided an ideal platform for learning about different cultures. There are many posts about movies, music, local clothing and other cultural aspects of countries published daily on social networks such as Facebook, Twitter, Instagram, and Telegram. It is common for people to promote handicrafts on social networking sites and facilitate the purchase and sale of these products. Therefore, it is necessary to provide laws supporting social networking exchanges. In addition, regulations must be created in order to ensure that the culture of a country is properly introduced in social networks, since these contents have both a positive and negative impact on people's judgments and perceptions of countries.

Topic 8. Information Technology. The advancement of technology has had a significant impact on the way we acquire knowledge and learn. In recent years, online technology has become increasingly important in the field of education and learning. Using electronic resources to facilitate formal education is known as e-learning. During the COVID-19, traditional educational methods were replaced by e-learning, which became the primary solution for schools and universities. Due to the widespread use of e-learning, there should be laws regarding plagiarism, copyright issues, and data protection.

Additionally, telehealth and telemedicine services were widely used during the COVID-19 pandemic. Patients and clinicians have been able to come together without the fear of contracting COVID-19 through telehealth services. However, there are some concerns regarding reimbursement for services, patient privacy, and data sharing that require regulatory intervention. Having private information leaked affects the individual's personal life, leading to bullying, an increase in insurance premiums, as well as the loss of employment due to medical history. Hence, ensuring the

security, privacy, and trustworthiness of information is important. The lack of qualified personnel in the cybersecurity field makes it difficult for many organizations to adopt a standard approach or framework for cybersecurity. Cyber threats must be protected by law in order for organizations to remain safe.

Topic 9. Political. A major issue in Iran in recent years has been the nuclear negotiations. A number of agreements have been signed in accordance with the negotiations, whose non-compliance has resulted in sanctions against Iran. Typically, sanctions involve restrictions on trade as a means of coercing another country to comply with an international agreement or norm of conduct. In the absence of a decision from the United Nations Security Council, these measures which called countermeasures are taken against international wrongdoers. There have been comprehensive unilateral economic sanctions imposed on Iran in recent years by groups of countries (not the United Nations). From 2012, they have intensified as a result of international uncertainty regarding Iran's nuclear program's peaceful purpose, as well as the inadequacy of the country's trust-building efforts. Iran's free trade has been affected by these sanctions. Iran can benefit from partnerships with neighboring countries such as Iraq, Qatar, Oman, Pakistan, Tajikistan and Uzbekistan to reduce the impact of sanctions. To conduct negotiations effectively, it is necessary to establish laws for better communication with other countries.

Topic 10. Government. It is essential for the government to have laws in order to govern. There are several entities within the government, including government boards, government companies, and government property. In order to run government affairs, people are employed by government companies. Although some of the work can be handled by these government forces and companies, due to the high volume of work, some work must be assigned to the private sector.

In recent years, privatization has gained popularity as a panacea for resolving the organizational problems of governments by reducing the role of the state and promoting private sector enterprise growth. As stated in the Iranian Constitution, No.144, public companies must become private and a rapid program of privatization was launched by the government, including major industries, banks, insurance companies, airlines, shipping companies, etc. Following the government's decision to privatize 80% of the state's assets in 2003, the privatization of the healthcare system rapidly increased with the purpose of improving efficiency, social welfare, and system quality. It is urgent that the government of Iran expands and develops its private sector, increases the efficiency and effectiveness of infrastructure

and utility provision, and increases investment from both domestic and foreign sources. Privatization in Iran is intended to increase efficiency. A privatization program usually begins with a period of partial privatization, when only non-controlling shares of firms are sold on a stock exchange. This privatization will require legal requirements in order for monitoring and evaluation mechanisms to be effective, otherwise it will result in a reduction in the quality of services and social welfare.

5. DISCUSSION AND CONCLUSIONS

The main objective of this study was to examine the extent to which Iran's national legal frameworks align with the principles of the Sustainable Development Goals (SDGs), and to assess the capacity of these laws to facilitate effective localization of the goals. Using data-driven methods and topic modeling, a set of legal texts was analyzed to extract key themes and assess their correspondence with the SDGs. The findings suggest that while there is relative alignment in certain areas such as education, health, and environmental protection, significant gaps remain in key domains including community empowerment, gender equality, climate action, and participatory governance.

Within the theoretical framework of Multi-Level Governance (MLG) that underpinned this study, the results emphasize that core components such as policy coherence, institutional coordination, and legal accountability play a critical role in the successful localization of the SDGs. Notably, the lack of vertical coordination between governance levels (national-local) and horizontal misalignment across sectors and peer institutions emerge as major challenges hindering alignment between legislation and sustainable development goals in Iran.

From a policy perspective, the study offers several key implications. First, it is essential to revise legislative processes in Iran in a way that systematically embeds sustainable development principles within legal and executive structures. This requires mechanisms to assess the compatibility of existing and proposed laws with SDG indicators and principles, along with building the capacity of lawmakers to understand and internalize sustainable development imperatives. Second, mechanisms must be established to enhance the participation of local institutions and civil society in the legislative process, ensuring that national laws reflect local needs more accurately. Third, the development of data-driven platforms for continuous monitoring and assessment of legal alignment with SDGs could serve as a critical support tool for policy-makers.

From a theoretical standpoint, this study contributes to the application of the MLG framework in legal and development-related analysis. By providing empirical insights into the interplay between governance levels and legal frameworks, it demonstrates that without a systemic and inter-level understanding of legislative processes, the effective realization of the SDGs in developing countries remains limited.

Despite its valuable findings, this study faces some limitations. First, it focused exclusively on formal legal texts, with limited attention to customary laws, local regulations, or executive bylaws. Second, while topic modeling provides strong exploratory capabilities, it may offer limited interpretive depth in certain contexts. Furthermore, the study was limited to the Iranian context, and its findings may not be directly generalizable to other countries.

For future research, similar studies using network analysis, critical discourse analysis, or comparative legal assessments in other developing countries are recommended. Additionally, analyzing local-level laws (provincial or municipal) and exploring their practical implementation could offer new insights into the challenges and opportunities of SDG localization.

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