Advancing Land Administration System - Implications of Recent International Trends

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SUMMARY

Land is the ultimate resource that needs to be managed in sustainable and efficient ways. A Land Administration System is a fundamental component of any country's social, economic, and environmental management aspects. By documenting and securing the humankind to the land relationship, and improving land records, the Land Administration System provides social justice, stability, and resilience. Land Administration Systems are also extremely important for disaster management, improving resilience, and meeting Sustainable Development Goals-(SDGs). However, the right systems must be designed to be successfully implemented. Our societies today face many challenges like population growth, disaster occurrences, and scarcity of land resources. Therefore, the significant role that land administration and land records play in every society, and considering global initiatives in sustainability and community resilience, current Land Administration Systems may not always be efficient and adequate enough to overcome the societal challenges and their requirements. Therefore, Land Administration Systems need to be reassessed and redesigned according to those challenges. This will ensure a reliable, and advanced system that delivers comprehensive and authoritative geospatial data, as well as land tenure, land valuation, land use, and land development information. Such a reassessment is becoming more urgent as the national and international authorities and land professional communities have put significant efforts into improving the practices in land administration, by introducing several new global frameworks and models, such as SDGs, the Integrated Geospatial Information Framework (IGIF), the Global Land Indicators Initiative (GLII), the Fit-For-Purpose (FFP) Land Administration Declaration, the Doing Business Report of the World Bank, and the New Urban Agenda (NUA), which are all directly or indirectly affecting Land Administration Systems. This paper aims to discuss the advancement of land administration models to be aligned with the current trends, initiatives, and the implications of new technology on land and to support sustainability and community resilience. The paper proposes a set of factors that help to reform the Land Administration Systems. The selection of factors is also a key step to reassess and reform the Land Administration System. In this ongoing research, the selection of factors is performed by mapping on Land Management Paradigm.

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1 INTRODUCTION

Land is an essential component of any country's economy and stability, for without it, life on earth cannot be sustained. Taking care of the land is essential both for current and future generations [1]. To administer and manage land sustainably, there are several mechanisms, of which the Land Administration System (LAS) is the prime one. Land administration is the process of determining, recording, and disseminating information about the tenure, value, and use of land when implementing land management policies [1, 2]. It also provides infrastructures to maintain the relationship between land and society [3] and provides social justice, and stability by documenting and thus securing the humankind to the land relationship by improving land records for people's rights restriction responsibility. Also, these systems are extremely important for disaster management, achieving resilience, and meeting Sustainable Development Goals, but the right systems must be in place to develop and successfully employ them [4]. The United Nations and organizations such as the FIG have for many years undertaken studies to understand and describe LAS [5]. The increasing need for clients for land information and the creation of new land-related commodities and interests challenge the land administration system [6].

1.1 Land and Sustainable Development Goals

Land and land Information are core elements for achieving sustainable development in any jurisdiction. The United Nations' Sustainable Development Goals (SDGs) are considered a framework that is widely regarded as a major global accord that has been endorsed by the majority of UN members [7]. The SDGs' objectives constitute a solution to the difficulties of sustainability in nations' economies, natural environments, and communities. However, progress towards these objectives has not been as efficient as initially planned. One of the main worries is whether the SDGs will be met worldwide by 2030 [8]. This framework outlines a need for new data acquisition and integration approaches, including supporting developing countries to strengthen the capacity of their national data systems to ensure access to high quality, timely, reliable, and disaggregated data [9]. It is anchored by 17 Sustainable Development Goals, 169 targets, and 231 indicators as a global indicator framework for measuring and monitoring progress. This includes national land and geospatial information, and the application of these data to support and address the identified sustainability Goals. Achieving sustainable development gives the global community a set of significant social, economic, and environmental challenges that are almost entirely geographic in nature. According to Rajabifard [10], to support SDGs, countries require access to an effective, efficient, and modernized LAS based on a cadastre engine that contains geographically accurate

land parcels and associated rights, limits, and responsibilities. Figure 1 shows the major interlinkage of goals in SDGs, which are directly and or indirectly relevant to land.

1.2 Disaster Management

In the context of an efficient land administration system, any unplanned urbanization, unsuitable land use, deforestation, unsustainable agriculture production, population increase, and overexploitation of natural resources are all examples of land-related human activities, the effects of which are all aggravated by climate change [4]. Communities and regions that suffer from extraordinary misfortunes from disasters, won't have the capacity to meet the SDGs at a similar pace if risks are not substantially reduced. The aspiration for many communities is not merely to enhance disaster resilience and their adaptive capacity, but to 'build back better' or to reconfigure their communities (physical, social, economic, and environmental systems) so that expand their ability to adjust to disaster-induced changes and chronic stress, in this manner, improve their chances of achieving the SDGs [11]. With catastrophe occurrences becoming more frequent and severe throughout the world, improved access to land and spatial information is vital to disaster risk management operations ranging from disaster preparedness and risk mitigation to recovery and rebuilding. Using land and geospatial data for disaster and emergency management applications can enhance operations and results [12]. The land is involved in all phases of disaster risk management, including prediction, prevention, preparedness, and mitigation of some types of disasters, through emergency response, search and rescue, evacuation, and temporary shelter, and post-disaster restoration, reconstruction, and recovery. Robust Land Administration Systems help improve resilience through the provision of detailed and comprehensive information [4].

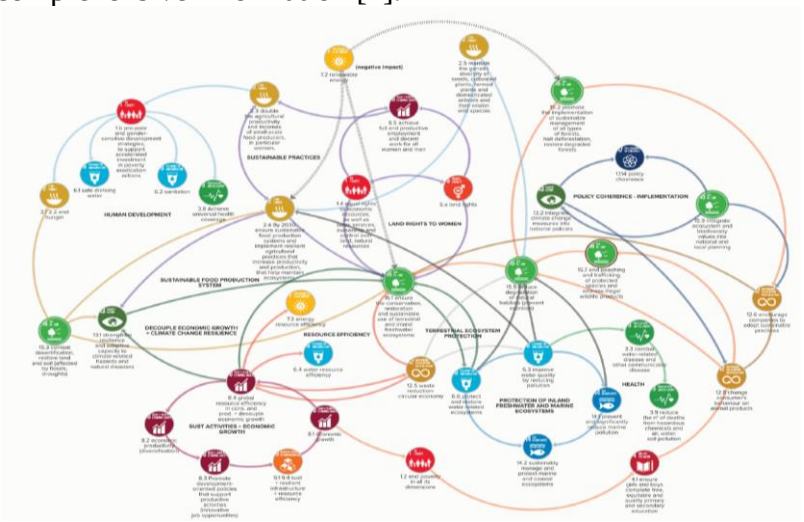

Figure 1. Interlinkages between SDG 15 and the other SDGs [13]

Due to the increasing challenges that our society is facing, such as population growth, disaster occurrences, and land resources scarcity, and the important role that land administration and land records play in every society, and considering the global initiatives in sustainability and community resilience, which are affecting the ways that land is managed, current LASs needed to be reformed as they may not always be efficient and adequate to address these trends and issues and requirements. This reassessment is becoming more urgent as the international authorities and land professional communities have put significant efforts into improving the

practices in land administration, by introducing a series of new frameworks and models, such as the UN 2030 Agenda for Sustainable Development, the Integrated Geospatial Information Framework (IGIF), Framework for Effective Land Administration (FELA), and the New Urban Agenda (NUA), which are all directly or indirectly affecting Land Administration Systems. In addition, the advancement of technology in the modernization of LAS is also offering new capabilities that can help improve current approaches and practices. Therefore, current LASs need to be assessed and adjusted in line with the global trends and advancements.

The need for changes in land administration is highlighted in many reports and declarations and is increasingly the focus of organizations such as the United Nations, the World Bank, and the International Federation of Surveyors [14]. Much of the recent information on land administration and the analysis of its importance form the basis for reform efforts. By its very nature, land administration reform is a long-term process, and a clear roadmap is essential to ensure that all developments and changes contribute to the overall vision of the LAS [2]. There is much research investigating LASs and suggested methods for reforming, assessing, and evaluating.

In 2001, I. P. Williamson and L. Ting suggested a framework for redesigning land administration and cadastral systems [15]. D. Steudler et al used the framework's concept and developed a practical framework that evaluates LAS activities or outcomes at the policy, management, and operational level. Also, in his evaluating matrix, some external factors and review processes were considered [16]. In 2003, The Cadastral Template Project was established to understand the role of a cadastre in a state or national SDI and to compare best practices as a basis for improving cadastres as a key component of SDIs [17]. The web-based platform of the Cadastral template was launched in 2014 to reflect the increasing acknowledgment of the relationship between cadastre and the concept of spatially enabled society [18].

In 2005, S. Enemark presented the concept of the Land Management Paradigm and described that land administration includes an extensive range of systems and processes to manage land tenure, use, valuation, and development. This paradigm is commonly used for describing different parts of LAS [19]. In 2010, I. P. Williamson et al published the "Land Administration for Sustainable Development" book which contains information about land management activities, 10 principles of Land administration, LAS processes, and evaluation [2].

Another example of an evaluation framework is the Land Governance Assessment Framework (LGAF). It evaluates the legal framework, policies, and practices related to land governance and monitors improvement over time. This framework consists of five broad thematic areas that have been identified as key areas for land sector policy intervention [20].

In 2019, Discussions about integrating land into measuring progress towards a few of the Post-2015 Sustainable Development Goals led to the creation of the Global Land Indicators Initiative (GLII) to monitor land governance globally. The United Nations Habitat and the Global Land Tool Network (GLTN) commissioned an assessment of the incorporation of 15 indicator sets developed by the Global Land Indicator Initiative (GLII) for monitoring land governance, methodologies, tools, and guidelines for monitoring and reporting while coordinating and convening land and data community. Another tool that assesses the quality of land administration was the Doing business of the World Bank which is paused now because of some irregularities in data. This tool looked at the policies that help and hinder business activity

and provides quantifiable data on business policies and property rights protection that can be compared across 190 economies and historical periods [21].
The other study which was a “compass” for use by national land administrative authorities to navigate the megatrends and some suggested drivers and benefit from them, is the scenario study on future land administration in the UNECE region which be done in 2021 by The United Nations Economic Commission for Europe (UNECE) Working Party on Land Administration (WPLA). According to this study, land administration is affected by global megatrends and specific drivers which are mostly related to technology advancement. In this study, for recognizing the factors that have an impact on future land administration, firstly the megatrends were selected by scoring by their importance to land administration, then some land administration-related drivers were added to the selected megatrends. The global megatrends and specific domain drivers constitute the basis for forming the scenarios [22]. The importance of this scenario is in identifying the important factors that affect land administration by an expert team. The other report which is published by the Food and Agriculture Organization of the United Nations (FAO), improves the governance of tenure to achieve food security and nutrition, and improvement in the use of the environment by focusing on the best practices, innovations, and challenges are investigated. It consists of information about policy and legal reform, tenure governance and land administration, capacity development, conflict resolution, gender equity/women’s land rights, improving governance of pastoral lands, etc., [23].
As mentioned, there are several studies on the land administration process, evaluation, assessment, and reforming. These studies emphasize the importance of the Land Administration System, according to it, updating and reforming of LAS is non-negligible. Also, land professional communities have published some global initiatives which consist of different factors to consider in improving land management. there is not a comprehensive study about reforming land administration according to these global initiatives’ factors. Therefore, the objective of this study is to reform LAS to support sustainability and community resilience by considering the implications of new technology and the latest global initiatives on land.

2 METHODOLOGY

This study has investigated the current practice of land administration through the literature review and document analysis strategies. Document analysis is a form of qualitative research that uses a systematic approach to examine documentary evidence and answer specific research questions. Like other learning strategies in qualitative research, document analysis requires repeated review, examination, and interpretation of data to gain meaning and empirical knowledge about the construct being studied [24].
To find the implications of global initiatives on land administration, the first step is identifying the latest global initiatives. According to the publications of land professional communities, and according to the citations, the latest international frameworks, models, tools, and reports are extracted. Figure 2 shows the selected geospatial and land information global initiatives. Covering such important communities as the World Bank, United Nations, FIG, and FAO, and even covering different types of initiatives such as global agenda, performance evaluating tools, assistance reports, and inventory of LAS are important for this research to cover different factors which affected land administration and achieve more precise results. These global initiatives consist of factors that reflect the content, concentration, concern, and suggestion

about the improvement of sustainability and community resilience, and land management in the specific area. According to the aim of the research, which is reforming land administration, the filtering of factors according to direct relation with the land is implemented and non-direct related factors of each trend are not considered in this research's assessment.

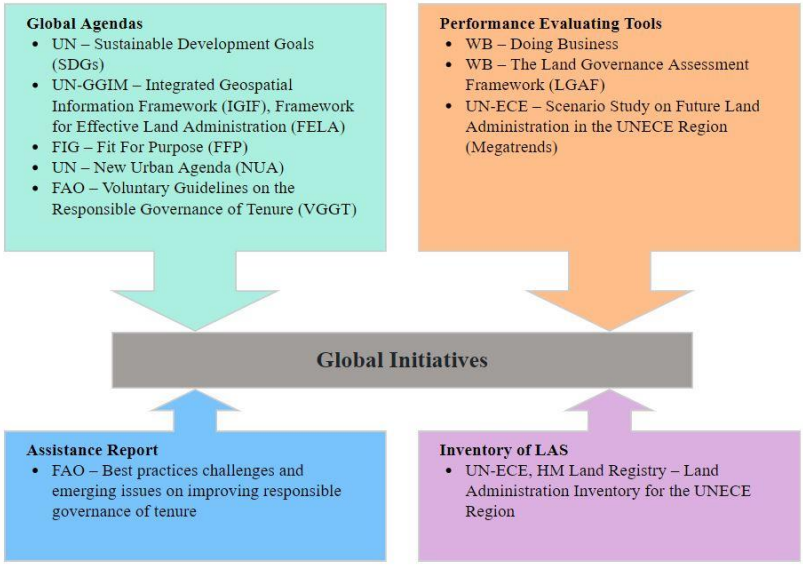

Figure 2. Selected geospatial and land information global initiatives

Specific questions of this study for the selected methodology are considered as which factors are related to land administration? and in which group of Land Management Paradigm these factors could be categorized? The reason for selecting the land management paradigm as the criteria for categorizing is its coverage of whole aspects of land management as functions, policy, and infrastructure. So, it could be the fittest model for all land-related global initiatives. According to the researcher's interpreter, factors show a strong relation to the Land Management Paradigm and could be mapped to this paradigm. After filtering and selecting land-related factors of global initiatives, it is necessary to find out the category of each factor in the Land Management Paradigm. The purpose of this analysis is to identify important parts of land management in terms of global initiatives for more improvement and focus. Categorizing the factors and mapping them in Land Management Paradigm is an important step in this study. There is a close relation between Land Management Paradigm components, for instance, land rights could be categorized in land tenure because it is a subdivision of land registration that will be implemented by the cadastre in the land tenure function, on the other hand, these rights should be made by policymakers to implement in the functional part of land management and could be categorized in the land policy group. In this situation, this research assigns the factor to the closer category. Regarding land rights, making rights is the first step, and implementing land administration functions is the next one, so land rights making will be considered in the land policy group.

Finally, after categorizing the factors in the mentioned groups (Land Policy, Land Information Infrastructure, Country Context, and Land Administration Functions), the most mentioned group by factors are identified. This identification is made by giving equal weight to all factors in each group and increasing the weight of each reputation in initiatives. This analysis could be

done by different methods such as using some visualizing applications which get the weights and determine the most repeated factors. In this study, the visualizing application is used to identify the most repeated groups and factors. After identifying the group, the related factors to the selected group are extracted. These factors help decision-makers to consider them in reforming LASs and plan to achieve improvement according to the latest global initiatives. The methodology of this research is shown in Figure 3.

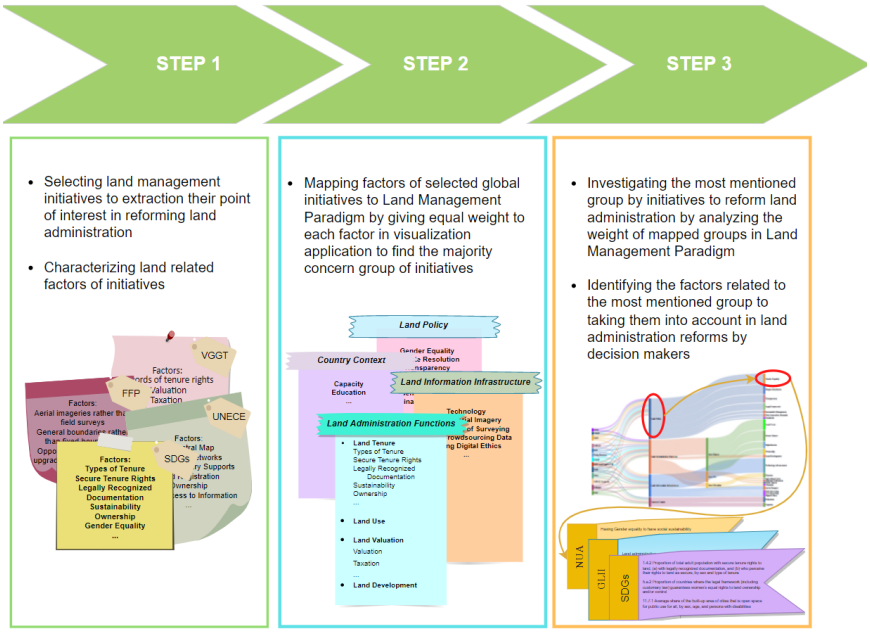

Figure 3. The methodology of identifying global initiatives factors to advance land administration

3 IMPLEMENTATION AND RESULT

The land-related factors of selected global initiatives are more than 100 factors. For example, in the SDGs framework, the factors which are related to land management are shown in Figure 4. All the factors of selected initiatives are mapped into 4 groups of Land Management Paradigm which are Land Administration Functions, Land Policy, Land Information Infrastructure, and Country Context.

According to the mentioned example, the first factor of SDGs is talking about secure tenure rights to land with legally recognize documentation and adds the point sex matters in this factor, by analysing this factor, this study points out that this factor could be categorized in land tenure group, because by having land registration which is a subdivision of cadastre, the secure tenure and legally recognize documentation will be achieved, and the cadastre is considered as a part of land tenure function, so this factor is categorized in land tenure group. Furthermore, to make policies and rights about land rights and gender equality, land policymakers should be getting to work. So, this factor has two parts which are categorized as land tenure and land policy. This methodology is applied to all factors to achieve the main concept each global initiative is talking about.

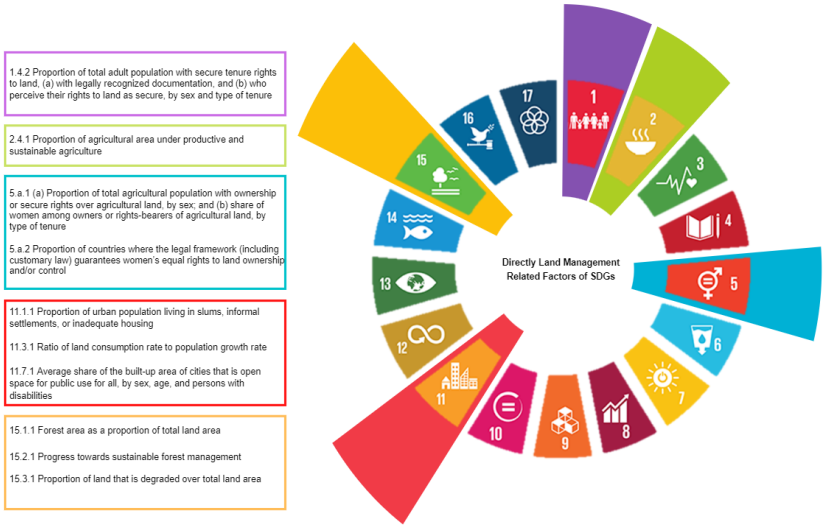

Figure 4. Directly land management related factors of SGDs

The final categories are analyzed in the visualization application. Each component has equal weight in this application, but by frequent use of each component, the weight of each category increases, and the most interested group by initiatives is extracted. Figure 5 shows the result of this analysis. In this Figure, each initiative is connected to some categories due to its factors. The results show that most of the global initiatives have paid more attention to land policy, then the most focus is on land tenure and having a cadastral system. Each category will be discussed in more detail.

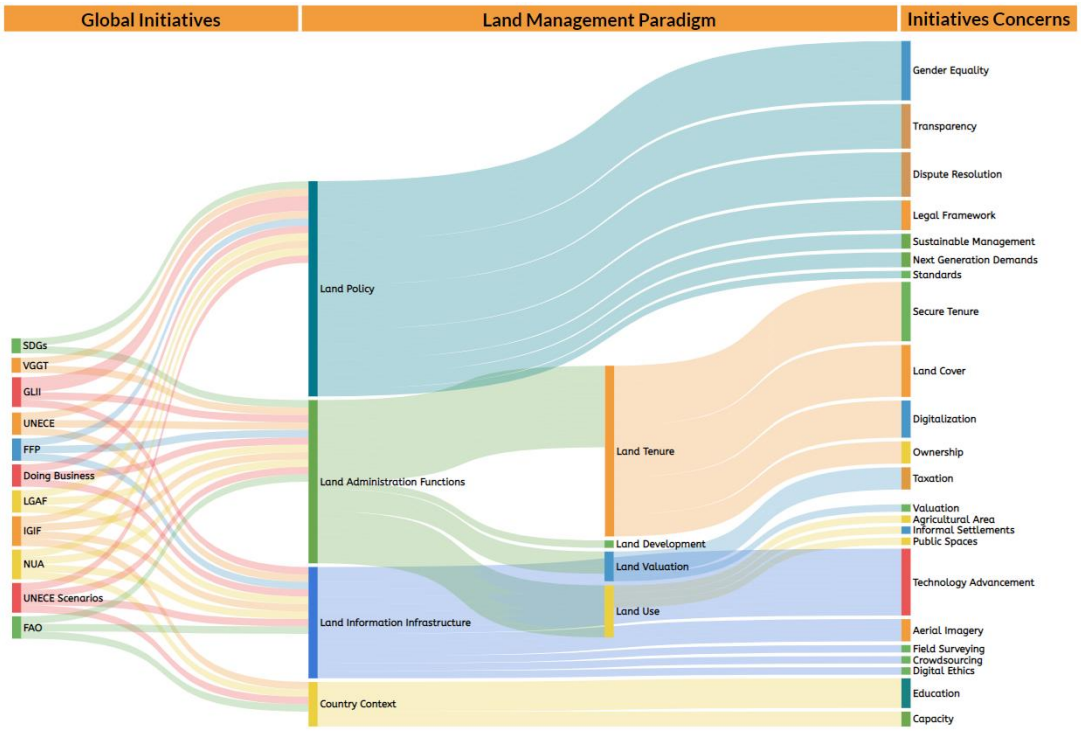

Figure 5. The categorized factors of global initiatives according to the Land Management Paradigm

3.1 Land Policy

In this study, land administration functions are considered tools, and land policy is considered as a framework to let functions be implemented. The major consideration of this study is if there were no policy LAS could not implement the functions and policy underpins the functions of LAS. Land policy is mentioned in all the selected global initiatives. According to the Land Management Paradigm, the land policy is associated with tenure security; land markets, property taxation; sustainable management and control of land use; and measures to prevent land speculation and resolve land disputes [19]. In this study, according to the analysis, the factors which mention gender equality, dispute resolution, legal framework, transparency, and standards are categorized in the land policy group.

3.1.1 Gender Equality

Gender equality is the factor mentioned in most global initiatives. This factor is considered in the land policy group because firstly there should be made policy about equal rights of women and men, then land administration functions provide the necessary infrastructure to implement it. Gender equality could be mentioned as a right in land tenure or land use, but these are just implementing functions and the background issue is existing of this right. Gender equality is mentioned in 7 of 11 global initiatives which are shown in Table 1.

Table 1. Global initiatives regarding gender equality

Global Initiatives	Gender equality information
SDGs	1.4.2 Proportion of total adult population with secure tenure rights to land, (a) with legally recognized documentation, and (b) who perceive their rights to land as secure, by sex and type of tenure
	5.a.2 Proportion of countries where the legal framework (including customary law) guarantees women's equal rights to land ownership and/or control
	11.7.1 Average share of the built-up area of cities that is open space for public use for all, by sex, age, and persons with disabilities
NUA	Having gender equality to have social sustainability
GLII	Land administration availability Level to which all users, including women and vulnerable groups, have equal access to LAS
	Disputes or conflicts in the past X years Percentage of women and men Indigenous Peoples who have experienced land housing or property disputes or conflict in the past X years
	Availability of dispute resolution mechanisms Percentage of women and men have access to effective dispute-resolution mechanism
	Land dispute resolution effectiveness Percentage of women and men indigenous who reported a conflict in the past X years that have had the conflict or dispute resolved
	Equal rights of women Level to which women and men have equal rights to land including rights to use control own inherent and transact these rights
	Perceived tenure security Percentage of women and men who perceive their rights to land are protected against dispossession or eviction
Doing Business	Equal access to property rights index

	Do married men and married women have equal ownership rights to property? Do unmarried men and unmarried women have equal ownership rights to property?
LGAF	Equity and non-discrimination in the decision-making process
UNECE Scenario Study	Societal disparities as a megatrend
FAO Assistance Report	Gender equity/women's land rights
	Bridging gender equity gap

3.1.2 Dispute Resolution

Conflict management and dispute resolution mechanisms are mentioned as important factors in the selected initiatives. To consider the dispute resolution in reforming land administration and providing the necessary infrastructure to implement it, there must be defined related policies. So, dispute resolution is considered in the land policy group. The information on dispute resolution in global initiatives is shown in Table 2.

Table 2. Importance of dispute resolution in global initiatives

Global Initiatives	Information on dispute resolution
VGGT	Resolution of disputes over tenure rights
GLII	Disputes or conflicts in the past X years
Doing Business	Land dispute resolution index
LGAF	Dispute resolution and conflict management Clear assignment of responsibility
UNECE Scenario Study	Societal disparities
FAO Assistance Report	Conflict resolution

3.1.3 Legal Framework

An effective LAS relies on legal frameworks. This framework is needed to ensure gender equality through customary laws, recognition, and enforcement of rights, mechanisms for recognizing rights, restrictions on rights, clarity of institutional mandates, and managing cooperative efforts and collaborations. Implementing the legal framework and preparing the infrastructure are the responsibilities of the Land Administration System, but formulating the framework is the role of policymakers, As well as creating standards that require the collaboration of policymakers. In Figure 6 we see that having a legal framework to achieve sustainability is one of the factors listed in the 4 initiatives.

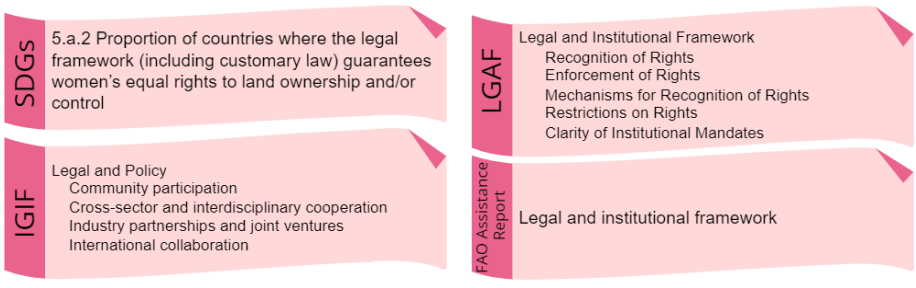

Figure 6. Legal framework associated factors in global initiatives

3.1.4 Transparency

In light of the scarcity of clear and credible information on land availability and transactions, as well as the lack of dissemination of public information on land rights and policies, transparency is a critical element of a functioning land administration [25]. Open access to information, registration, and systems, as well as having transparency is important for sustainable land management in most global initiatives as shown in Table 3. Policymakers set the scope of open access and transparency, while LASs are in charge of implementing it. As a consequence, if LAS is to be reformed to achieve transparency, it is necessary to adopt related policies.

Table 3. Transparency information in selected global initiatives

Global Initiatives	Transparency information in global initiatives
UNECE	Land and title registration Registers open but with restrictions Registers wholly open to public inspection
IGIF	Transparent and accountable
GLII	Transparency of land information Level to which land information is available for public access
Doing Business	Transparency of information index
LGAF	Land use planning management and taxation Transparency of land Use restrictions Efficiency in the land Use planning process Speed and predictability of applications for restricted land uses Transparency in land valuation and tax collection efficiency
	Management of public land Identification and clear management of public land Justification of time efficiency transparency and fairness of expropriation procedures Transparency of public land allocation

3.2 Land Tenure

After land policy, land tenure appears to be the main concern of selected global initiatives. In the land management paradigm, land tenure consists of assigning and securing land rights; determining parcel boundaries through legal surveys; transferring title or use from one party to another by sale or lease; resolving doubts and disputes relating to rights and property boundaries [19]. It is essential to have secure land tenure to achieve sustainable development, improve resilience, and adapt to climate change. In addition to supporting women's social and economic well-being, securing women's land tenure is critical to mitigating and adapting to sustainable climate change by reducing land degradation and increasing resilience to natural disasters [26]. Without a cadastral system, land tenure cannot be guaranteed.

The cadastral system is a key component of land management functions because it identifies the basic building block of the LAS, the land parcel. Cadastral systems integrate the identification of land parcels, ownership, land rights registration, valuation, and taxation, as well as the current and possible future uses of land [19]. As previously mentioned, the cadastral system is associated with all functions. However, in this study, it is included in the land tenure group. It is related to this group due to its common functions. In this regard, all factors related to cadastral systems and land registration are classified into the land tenure group, which

includes secure tenure, ownership, land cover, and digitization. The following is an order of importance of different trends in land tenure.

3.2.1 Secure Tenure

Security of tenure is one of the most important issues mentioned by several factors in the selected initiatives. To have secure tenure, land rights must be recorded. It is through land registration, which is part of the cadastral system, that land rights are recorded.

3.2.2 Land Cover

Quantitative data on forests, agriculture, and urban areas are essential for decision-makers and aid in sustainable management. There should be infrastructure that records land covers to have this sort of information. If there is land registration as part of the cadastral system, the land cover could be extracted.

3.2.3 Digitalization

Complete digital map coverage, fully digital scans of specific land use, digital registration, and using photogrammetric data rather than field surveying are signs of the trend of the studied global initiatives towards digitalization. This type of digitalization could be achieved during land registration in cadastral systems.

3.2.4 Ownership

Ownership information is provided by recording land in cadastral systems. Most global initiatives mentioned ownership as a key factor in their framework and having ownership information is necessary to improve and make an effective LAS.

3.3 Land Information Infrastructure

To have reliable, efficient, advanced, time-saving infrastructure which could support aerial imagery, field surveying, and crowdsourcing data, the technology has to be up to date. Also, providing cybersecurity, privacy aspects, digital ethics, artificial intelligence, and robot process automation which are mentioned in one of the selected initiatives, there is a need for advanced technology [22]. To have reform in land administration, technology is a key factor to be considered by decision-makers.

3.4 Country Context

The last concern group in selected global initiatives is country context. The importance of capacity development and education are discussed in many factors and categorized as this group. According to the investigation of factors, considering the capacity and education to reform land administration is necessary.

4 CONCLUSIONS AND FUTURE WORK

In conclusion, the purpose of this study was to advance the Land Administration System by considering the implication of the latest global initiatives on land. To achieve this aim, global selected initiatives include the most influential land community frameworks, reports, and tools. By mapping the factors of the mentioned initiatives in the Land Management Paradigm, this study shows that the first concern of initiatives is land policy which consists of having gender equality, dispute resolution, transparency, legal framework, standards, and providing next-

generation demand for land. Then the initiatives are talking about the importance of land tenure and having a cadastral system to achieve sustainability and resilience. The land tenure function in the land administration system provides quantitative information about different types of land cover, makes secure tenure by recording land rights, implements digitalization, and records ownership by recording lands. The third concern group of the global initiatives is land information infrastructure, which is involved with technology. As a way to achieve sustainable management, all global initiatives cited using advanced technology as a key factor. The last group, country context, discusses the importance of capacity and education in land management. To reform land management, this study recommends that decision-makers focus more on land policy and land tenure, as well as its indicators. This study shows that land tenure is the most important function of the LAS and having a cadastral system to have secure tenure and ownership is the most concern of the global initiatives which is needed to be addressed more.

For future study, this research will continue investigating on latest global trends and extracting the most influential factors of global trends according to the analysis of an expert team and will focus more on land records. Land Records are one of the main parts of LAS and are important for people's rights restriction responsibility, managing sustainable urban growth, empowering dwellers, and increasing resilience to a health crisis that can cause loss of rights, territorial disputes, and displacement. Each country needs to maintain comprehensive and up-to-date land records.

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