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Nepal's E-Government Development: A Comparative Assessment of Digital Governance Readiness Using the UN E-Government Development Index

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Abstract— Nepal has introduced several policies and institutional initiatives to promote e-government, beginning with the Information Technology Policy and continuing through the e-Government Master Plan, Government Enterprise Architecture (GEA), and Digital Nepal Framework. However, policy adoption does not necessarily result in measurable digital-government capability. This study examines Nepal's e-government development from 2003 to 2020 using secondary data from the United Nations E-Government Surveys and supporting national and international sources. The analysis focuses on the E-Government Development Index (EGDI) and its three components: Online Service Index (OSI), Telecommunications Infrastructure Index (TII), and Human Capital Index (HCI). Nepal is also compared with other South Asian countries to identify its relative position. The results show an uneven but generally positive long-term trajectory. Nepal's EGDI increased from 0.2684 in 2003 to 0.4699 in 2020, although the country experienced significant fluctuations, including a low of 0.2344 in 2014 and a high of 0.4748 in 2018. Telecommunications infrastructure recorded the strongest long-term improvement, while online-service development remained less stable. Human capital was comparatively more stable but did not improve at the same rate as infrastructure. Nepal remained below India, Sri Lanka, Maldives, Bhutan, and Bangladesh in 2020, but remained above Pakistan and Afghanistan. The findings indicate a gap between policy ambition and measurable capability and suggest that infrastructure investment alone is insufficient without institutional coordination, human resources, service integration, security, and sustained implementation.

Keywords— e-government, EGDI, Nepal, online services, telecommunications infrastructure, human capital, digital governance

I. INTRODUCTION

Information and communication technologies (ICTs) have changed how governments provide public services, manage information, and communicate with citizens. E-government is therefore not only a technological activity but also an administrative reform that requires appropriate institutions, skills, infrastructure, policies, and security. The United Nations (UN) measures this development through the E-Government Development Index (EGDI), which combines the Online Service Index (OSI), Telecommunications Infrastructure Index (TII), and Human Capital Index (HCI) [1].

Nepal began formal e-government development with the Information Technology Policy of 2000 and established the National Information Technology Centre (NITC) in 2001. The Government of Nepal subsequently adopted the e-Government Master Plan in 2006, followed by additional ICT policies, institutional initiatives, enterprise architecture activities, and the Digital Nepal Framework in 2019. The 2006 plan emphasized citizen-centred services, transparent government, networked government, and a knowledge-based society. Its priority areas included government networks, portals, national identification, enterprise architecture, public-key infrastructure, and an integrated data centre [2].

However, the existence of policies and digital systems does not necessarily demonstrate successful e-government implementation. Previous Nepal-focused studies have identified weaknesses in institutional readiness,



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infrastructure, human resources, security, leadership, and organizational change [3] [4] [5] [6] [7] [8]. Nepal's Digital Nepal Framework also recognized the need to improve the country's UN e-government ranking and move government services from information provision toward interactive and transactional services [9].

This study therefore asks whether Nepal's policy ambition was supported by measurable digital-government capability. It examines Nepal's EGDI trajectory from 2003 to 2020, analyzes its three components, compares Nepal with South Asian countries, and relates changes in EGDI to major policy milestones.

II. LITERATURE REVIEW

The literature on e-government identifies technology, institutional capacity, human resources, infrastructure, governance, and organizational change as important conditions for successful implementation. Dada [10] described e-readiness as the ability of an organization or country to participate successfully in the digital environment. Heeks [11] similarly argued that developing countries often experience a gap between the design assumptions of e-government projects and the actual conditions in which projects are implemented.

Nepal-specific studies provide evidence of this implementation gap. Gupta and Shakya examined information-system auditing in Nepal's e-government environment and emphasized the need for appropriate controls, accountability, security, and alignment between ICT systems and organizational objectives [3]. Their later work identified information-security challenges that can affect the reliability and trustworthiness of government information systems [4]. Cloud-computing research further highlighted data security, privacy, control, and service-provider risks that become important when public systems depend on shared infrastructure [5].

Readiness studies provide additional evidence. Gupta, Marasini, and Shakya assessed e-readiness in Nepalese ministries across software and information systems, hardware, networks, ICT policies, security, and human resources [6]. Marasini and Shakya separately examined human-resource readiness and infrastructure readiness and identified both as important requirements for e-government implementation [7] [8]. These studies support the argument that digital-government capability is multidimensional.

Other Nepalese research has emphasized institutional and political factors. Basyal and Seo [12], using the Analytic Hierarchy Process, identified weak leadership and government commitment, political-administrative instability, and resistance to organizational change among the most serious barriers to e-government implementation. Shakya [13] similarly reported that Nepal's progress was constrained by political instability, infrastructure limitations, low income, and low literacy, although improvements in mobile communication created opportunities for mobile government.

The literature also shows that e-government is evolving from isolated information systems toward more integrated digital government. Gupta and Marasini examined government software development and identified issues associated with project implementation and government software practices [14]. Their work on critical success factors emphasized the importance of planning, management, resources, and institutional conditions [15]. Research on enterprise architecture and digital-transformation readiness in technical and vocational education further demonstrates the importance of architecture, institutional readiness, interoperability, human resources, and sustainable implementation [16] [17].

Emerging technologies also formed part of the pre-2021 digital-government literature. Research by Marasini and Gupta examined artificial intelligence in e-government and its potential for improving government services [18], while related work considered AI for cybersecurity [19]. These studies suggest that advanced technologies can support government transformation, but they depend on a sufficiently mature digital foundation.

The literature therefore indicates that Nepal's e-government challenge is broader than the availability of ICT. The present study contributes by connecting these qualitative findings with the longitudinal quantitative evidence provided by the UN EGDI.

III. METHODOLOGY/ CONCEPTUAL FRAMEWORK

This study uses a secondary-data longitudinal research design. The principal unit of analysis is Nepal's e-government development as measured by the UN EGDI between 2003 and 2020. The UN defines EGDI as a composite measure consisting of OSI, TII, and HCI. The 2020 survey assessed 193 UN Member States and described EGDI as a measure of online-service capacity, telecommunications infrastructure, and human capacity [1].

Data were collected from UN E-Government Surveys published up to 2020, including the surveys for 2003, 2004, 2005, 2008, 2010, 2012, 2014, 2016, 2018, and 2020 [1] [20] [21] [22] [23] [24]. Supporting indicators, including internet use, broadband subscriptions, mobile subscriptions, literacy, and socioeconomic indicators, were considered from international datasets such as the World Bank, ITU, and UNESCO. National policy information was obtained from Government of Nepal documents and relevant institutional sources.

The analysis consists of four stages. First, longitudinal trend analysis was used to examine Nepal's EGDI and component values. Second, percentage changes were calculated to identify the magnitude of long-term improvement. Third, Nepal was benchmarked against the other seven SAARC countries. Fourth, Pearson correlations were calculated between EGDI and its three components. Because EGDI is mathematically constructed from OSI, TII, and HCI, these correlations are interpreted as descriptive associations rather than independent causal effects.

A policy-overlay approach was also used. Major policy milestones were mapped against the closest available EGDI observations. The purpose was not to establish causality but to examine whether measurable improvements were broadly consistent with policy ambition.

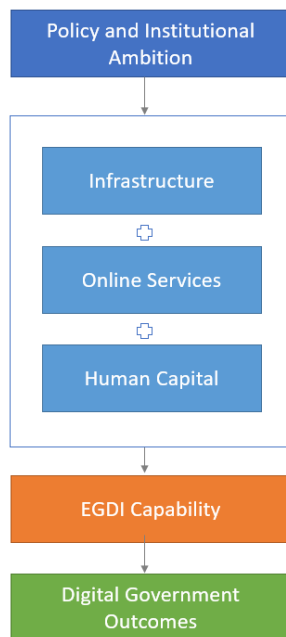


Figure 1 Conceptual Relationship

This framework recognizes that policy documents establish objectives, but measurable capability depends on implementation across several interconnected dimensions.

IV. ANALYSIS AND DISCUSSION

A. Nepal's Longitudinal EGDI Performance

Table 1 shows that Nepal's EGDI did not follow a continuous upward trend. It increased from 0.2684 in 2003 to 0.3021 in 2005, but declined to 0.2344 in 2014. It subsequently increased substantially to 0.3458 in 2016 and 0.4748 in 2018 before slightly declining to 0.4699 in 2020 [1] [20] [21] [22] [23] [24].

Table 1
Nepal EGDI Dataset, 2003–2020

Year	EGDI	Rank	OSI	TII	HCI
2003	0.2684	130	0.3188	0.0064	0.4800
2004	0.2807	132	0.3359	0.0063	0.5000
2005	0.3021	126	0.4000	0.0063	0.5000
2008	0.2725	150	0.2876	0.0119	0.5176
2010	0.2568	153	0.1683	0.0227	0.5821
2012	0.2664	164	0.2876	0.0597	0.4521
2014	0.2344	165	0.1575	0.1684	0.3774
2016	0.3458	135	0.3986	0.1674	0.4714
2018	0.4748	117	0.6875	0.2413	0.4957
2020	0.4699	132	0.4000	0.4691	0.5405

Source: United Nations E-Government Surveys [1] [20]- [24].

Note: The 2003 HCI is reported as 0.4800, consistent with the reported EGDI, OSI and TII values. Some secondary reproductions contain a transcription of 0.0480.

Nepal's EGDI increased approximately **75.1% between 2003 and 2020**. However, this improvement was uneven. The largest recent improvement occurred between 2016 and 2018, when EGDI increased by approximately 37.3%. Between 2018 and 2020, EGDI decreased slightly by approximately 1.0%.

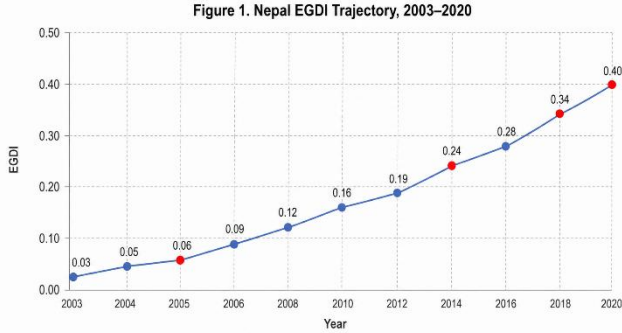


Figure 2. Nepal EGD Trajectory, 2003–2020

The trend suggests that policy adoption alone did not produce a smooth improvement. The decline between 2005 and 2014 is particularly important because the e-Government Master Plan was introduced in 2006. The post-2014 recovery coincided with greater ICT diffusion, policy development, and expansion of online government services. However, the data do not permit a causal claim that any individual policy caused the improvement.

B. Component-Level Performance

The three components reveal a more important story than the overall EGD.

TII increased from 0.0064 in 2003 to 0.4691 in 2020. This represents the strongest proportional improvement. OSI increased from 0.3188 to 0.4000, although its value fluctuated considerably and reached 0.6875 in 2018. HCI increased from 0.4800 to 0.5405 and remained comparatively stable.

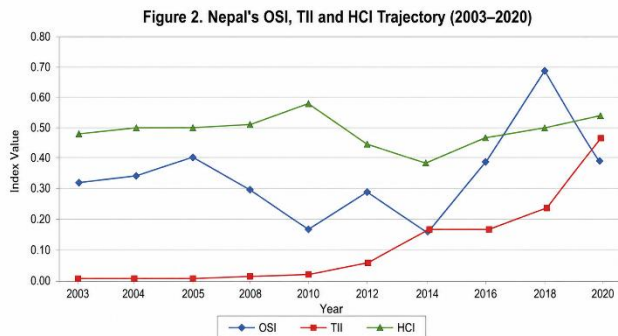


Figure 3. Nepal's OSI, TII and HCI Trajectory

The large increase in TII indicates that telecommunications infrastructure became much less of a

constraint than it was during the early period. This is consistent with research showing significant expansion of mobile and communication infrastructure in Nepal [13]. However, stronger infrastructure did not automatically result in equally strong online services.

The 2018 OSI value of 0.6875 was particularly high relative to Nepal's earlier performance. Yet OSI fell to 0.4000 in 2020. This indicates that Nepal's online-service capability remained unstable. The Digital Nepal Framework itself recognized that many government websites and applications still offered limited interaction and transaction functions and called for a shift toward citizen-centred transactional services [9].

Correlation analysis produced the following results:

Table II
Correlation Analysis

Component	Correlation with EGD
OSI	0.826
TII	0.805
HCI	0.294

The stronger associations of OSI and TII with EGD are expected because EGD is calculated from these components. They should therefore not be interpreted as causal coefficients. Nevertheless, the results support the descriptive conclusion that infrastructure and online-service capacity were the main dimensions associated with changes in Nepal's composite EGD during the period.

C. South Asian Benchmarking

Table III
South Asian EGD Comparison, 2020

Country	EGD	Global Rank	Relative position
Sri Lanka	0.6708	85	1
India	0.5964	100	2
Bhutan	0.5777	103	3
Maldives	0.5740	105	4
Bangladesh	0.5189	119	5
Nepal	0.4699	132	6
Pakistan	0.4183	153	7
Afghanistan	0.3203	169	8

Source: UN E-Government Survey 2020 [1].

Nepal ranked sixth among the eight SAARC countries in 2020. Its EGDI was below Sri Lanka, India, Bhutan, Maldives, and Bangladesh but above Pakistan and Afghanistan [1].

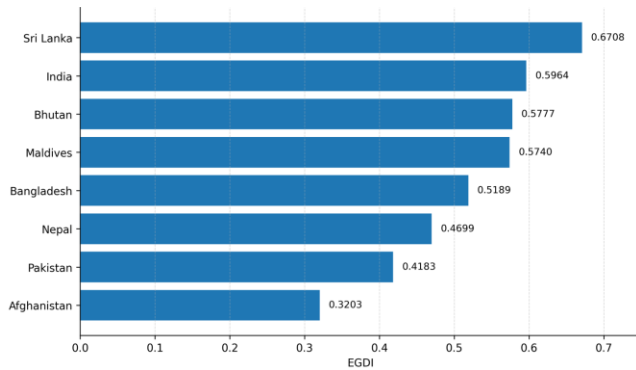


Figure 3. Nepal vs. South Asian EGDI, 2020

The comparison is important because Nepal's absolute improvement did not translate into regional leadership. Bhutan and Bangladesh, for example, achieved higher EGDI values despite facing many of the same developing-country constraints. This supports the argument that infrastructure alone cannot explain national digital-government performance.

V. CASE STUDIES AND EXAMPLES

A. e-Government Master Plan, 2006

The e-Government Master Plan represented a major shift from individual ICT projects toward a broader national e-government vision. It promoted citizen-centred services, transparent services, networked government, and a knowledge-based society. Enterprise architecture and integrated data infrastructure were included among its priority projects [2].

However, the EGDI values following the plan did not immediately improve. Nepal's EGDI fell from 0.3021 in 2005 to 0.2725 in 2008 and then to 0.2344 in 2014. This does not mean the Master Plan failed. Rather, it indicates that policy formulation and measurable national capability progressed at different speeds.

B. ICT Readiness and Institutional Capability

The e-readiness research of Gupta, Marasini, and Shakya identified differences among Nepalese ministries in software, hardware, networks, ICT planning, security, and human resources [6]. Marasini and Shakya similarly

highlighted infrastructure and human resources as important dimensions of readiness [7] [8].

These findings help explain why Nepal's EGDI remained unstable. Government institutions could develop individual systems while the national ecosystem continued to experience differences in capacity.

Information-system auditing research also identified security and governance concerns [3] [4] [5]. Such concerns are important because online services cannot achieve sustainable adoption without trust, security, accountability, and reliable infrastructure.

C. Government Software and Enterprise Architecture

Government software development research identified implementation and management issues in public-sector software projects [14], while critical-success-factor research emphasized the importance of management, resources, planning, and institutional conditions [15]. These findings are consistent with the difference between Nepal's strong policy ambition and uneven EGDI results.

The same principle is visible in the later enterprise-architecture work. The Digital Nepal Framework explicitly called for government IT systems to follow GEA standards and identified better coordination among agencies as an expected outcome [9]. This indicates that by 2019 the government itself recognized that separate digital systems were not sufficient.

D. Digital Nepal Framework, 2019

The Digital Nepal Framework established an ambitious digital-transformation agenda and explicitly targeted improvement in Nepal's UN EGDI ranking. It called for greater access to government data, wider use of online channels, and movement from informational services toward transactional services [9].

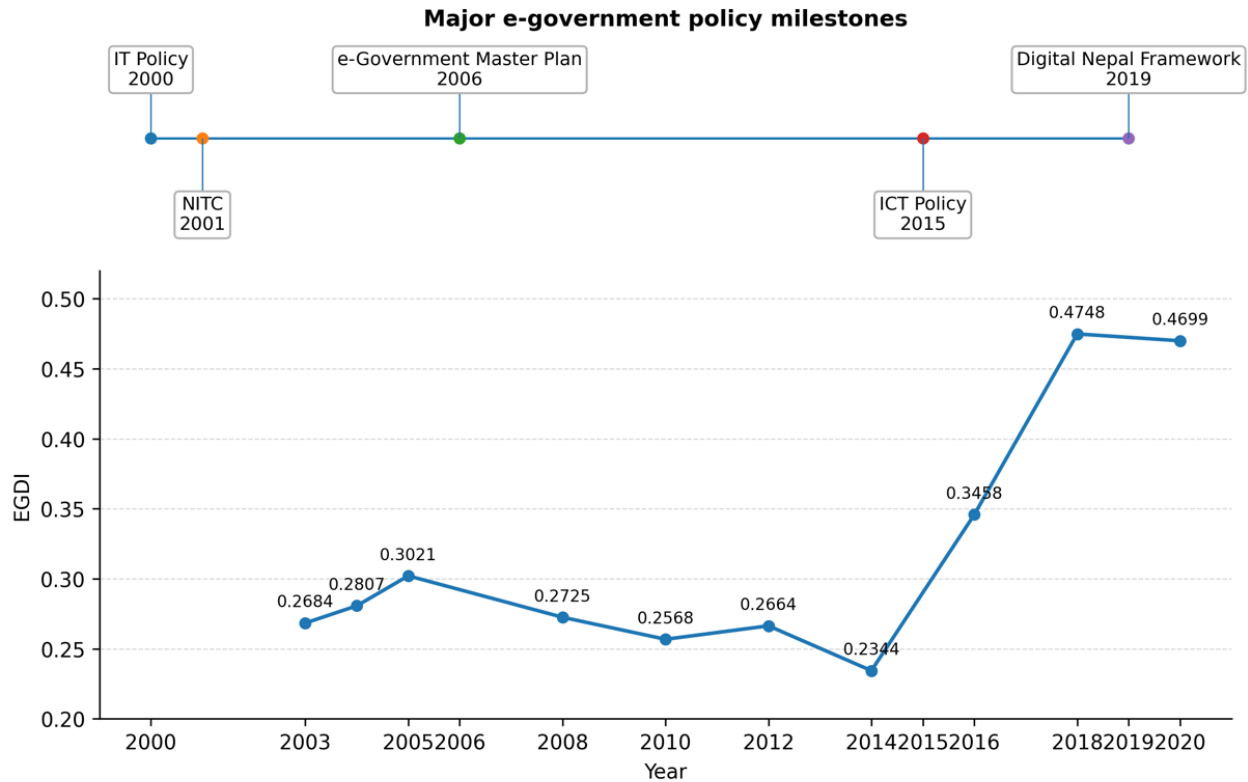
The 2020 EGDI result of 0.4699, compared with 0.4748 in 2018, does not show an immediate increase following the Framework's adoption. However, the period between policy adoption and measurable national outcomes was short. Therefore, the 2020 result should be interpreted as an early baseline for evaluating implementation, not as evidence that the Framework itself was ineffective.

Table IV
 Major Nepal E-Government Policies and Expected Outcomes

Policy/initiative	Period	Main ambition	Expected capability
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IT Policy	2000	Promote ICT development	National ICT foundation
NITC establishment	2001	Government ICT support	Institutional technical capacity
e-Government Master Plan	2006	Citizen-centred, transparent, networked government	Integrated e-government
ICT Policy	2015	Expand ICT use and digital services	Wider ICT adoption

GEA initiatives	Pre-2020	Standardization and interoperability	Coordinated government systems
Digital Nepal Framework	2019	Digital transformation	Citizen-centred and transactional services



Policy milestones indicate temporal sequence only; no causal relationship is implied.

Figure 4. Policy Milestones vs. EGDI Development

VI. POLICY RECOMMENDATIONS

Based on the analysis, five policy directions are proposed.

First, move from project-based e-government to whole-of-government digital governance. Government agencies should use common enterprise-architecture standards and interoperability mechanisms rather than developing isolated systems.

Second, prioritize online-service quality, not only infrastructure. Nepal's TII improved substantially, but OSI remained unstable. Investment should therefore focus on transactional services, integrated portals, digital identity, online payment, data exchange, and user-centred service design.

Third, strengthen digital human capital. HCI improved less dramatically than infrastructure. Continuous training, professional ICT positions, retention of technical personnel,



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and digital skills development should become core elements of e-government programmes.

Fourth, institutionalize information-system security and audit. Secure systems, privacy protection, access control, audit trails, disaster recovery, and risk management are necessary for citizen trust and sustainable digital services [3] [4] [5], [19].

Fifth, establish measurable implementation indicators. Each national digital-government policy should define indicators linked to service availability, transaction completion, interoperability, user adoption, system reliability, security, and institutional readiness. EGDI should be used as a national benchmark, but not as the only performance measure.

VII. CONCLUSION

This study examined Nepal's e-government development from 2003 to 2020 using the UN EGDI and its three components. The evidence shows a long-term improvement in Nepal's digital-government capability, with EGDI increasing from 0.2684 in 2003 to 0.4699 in 2020. However, the trajectory was uneven, and Nepal experienced substantial fluctuations before the strong improvement observed between 2016 and 2018.

The component analysis provides an important explanation. Telecommunications infrastructure recorded the largest improvement, while online services showed substantial but unstable development. Human capital was comparatively stable but improved more slowly. Thus, Nepal's main progress was in establishing the technical foundation for digital government, while translating that foundation into consistent and integrated online services remained a challenge.

The South Asian comparison further shows that improvement in absolute terms did not make Nepal a regional leader. In 2020, Nepal ranked sixth among the eight SAARC countries, behind Sri Lanka, India, Bhutan, Maldives, and Bangladesh.

The policy comparison also indicates a gap between ambition and measurable capability. Nepal's policies consistently emphasized citizen-centred services, networked government, enterprise architecture, interoperability, and digital transformation. The EGDI results, however, suggest that policy formulation was ahead of implementation capacity.

The study's main contribution is therefore the combination of longitudinal EGDI evidence, component-level analysis, regional benchmarking, and policy-timeline assessment for Nepal. The study has limitations. EGDI is a composite international benchmark and does not directly measure service quality, citizen satisfaction, system interoperability, institutional effectiveness, or actual use of services. Correlations between EGDI and its components are also partly mechanical because the components form the EGDI itself. Future research should therefore combine EGDI with ministry-level data, service-usage statistics, interoperability measures, government IT expenditure, institutional readiness, and citizen-level adoption data.

Overall, Nepal's experience up to 2020 suggests that successful e-government requires more than policy adoption or infrastructure expansion. Sustainable digital governance depends on the simultaneous development of infrastructure, online services, human capital, institutional coordination, enterprise architecture, security, and implementation capacity.

VIII. REFERENCES

- [1] United Nations Department of Economic and Social Affairs, "United Nations E-Government Survey 2020: Digital Government in the Decade of Action for Sustainable Development,," United Nations , New York, NY, USA, , 2020.
- [2] High Level Commission for Information Technology and National Information Technology Center, "e-Government Master Plan," Government of Nepal, Kathmandu, 2006.
- [3] A. Gupta and S. Shakya, "Information System Audit: An Overview study in e-government of Nepal," in *IEEE, International Conference of Green Computing and Internet of Things*, Galgotia University, Delhi, 2015.
- [4] A. Gupta and S. Shakya, "Information System Audit: A study for security and challenges in Nepal," *International Journal of Computer Science and Information Security (IJCSIS)*, vol. 13, no. 11, 2015.
- [5] A. Gupta and S. Shakya, "Information System Audit: Cloud Computing Security and Challenges," *International Journal of Computer Science and Mobile Computing*, vol. 4, no. 11, pp. 48-56, 2015.
- [6] A. Gupta, S. Marasini and S. Shakya, "E-Readiness Assessment for Ministries of Nepal for Implementation of e-Government," *2015 International Conference on Data Mining, Electronics and Information Technology (DMEIT'15) August 10-11, 2015 Pattaya, Thailand*, vol. ERPUB, 2015.



International Journal of Recent Development in Engineering and Technology

Website: www.ijrdet.com (ISSN 2347 - 6435 (Online)) Volume 10, Issue 7, July 2021)

- [7] S. Marasini and S. Shakya, "E-Readiness to Implement E-Government: An Overview Study in HR Domain in Nepal," in *Proc. IEEE Int. Conf. Green Computing and Internet of Things (ICGCIoT)*, Noida, Delhi, 2015.
- [8] S. Marasini and S. Shakya, "E-Readiness: A Study of Infrastructure for E-Government of Nepal," *International Journal of Mobile Computing and Computer Science*, vol. 4, no. 12, 2015.
- [9] Ministry of Communication and Information Technology, Digital Nepal Framework, Kathmandu: Government of Nepal, 2019.
- [10] T. H. Dada, "E-readiness for developing countries: Moving the focus from the environment to the users," *The Electronic Journal of Information Systems in Developing Countries*, vol. 27, pp. 1-14, 2006.
- [11] R. Heeks, *Reinventing Government in the Information Age: International Practice in IT-Enabled Public Sector Reform*, London: Routledge, 2002.
- [12] D. K. Basyal and J.-W. Seo, "What Should We Do for E-government in Nepal and How? An AHP Approach," *Journal of Policy Studies*, vol. 31, no. 3, pp. 47-74, 2016.
- [13] S. Shakya, "E-Governance in Nepal: Progress, Challenges and Possibilities," *Public Affairs and Governance*, vol. 6, no. 1, pp. 1-22, 2018.
- [14] S. Marasini and A. Gupta, "Government Software Development in Nepal: Alignment with e-Government Master Plan and Government Enterprise Architecture," *International Journal of Engineering Science and Innovative Research Development*, vol. 5, no. 10, 2019.
- [15] A. Gupta and S. Marasini, "Critical Success Factors of Government Software Projects in Nepal: A Project Management Framework for Sustainable e-Government Services," *International Journal of Engineering Science and Innovative Research Development*, vol. 5, no. 12, 2019.
- [16] A. Gupta and S. Marasini, "A Reference Enterprise Architecture for TVET Digitalization," *International Journal of Recent Development in Engineering and Technology*, vol. 9, no. 10, 2020.
- [17] S. Marasini and A. Gupta, "Digital Transformation Readiness of TVET Institutions," *International Journal of Recent Developments in Engineering and Technology*, vol. 9, no. 10, 2020.
- [18] S. Marasini and A. Gupta, "Artificial Intelligence in E-Government: Emerging Applications, Opportunities and Challenges," *International Journal of Engineering Science Invention Research & Development*, vol. 5, no. 2, 2018.
- [19] A. Gupta and S. Marasini, "Artificial Intelligence for Cybersecurity: Applications of Machine Learning in Intrusion and Anomaly Detection," *International Journal of Engineering Science and Innovative Research Development*, vol. 5, no. 6, 2018.
- [20] UNDESA, "United Nations E-Government Survey 2018: Gearing E-Government to Support Transformation Towards Sustainable and Resilient Societies," United Nations Department of Economic and Social Affairs, New York, 2018.
- [21] United Nations Department of Economic and Social Affairs, "United Nations E-Government Survey 2016: E-Government in Support of Sustainable Development," UNDESA, New York, 2016.
- [22] United Nations Department of Economic and Social Affairs, "United Nations E-Government Survey 2014: E-Government for the Future We Want," United Nations, New York, NY, USA, 2014.
- [23] United Nations Department of Economic and Social Affairs, "United Nations E-Government Survey 2008: From E-Government to Connected Governance," United Nation, New York, NY, USA, 2008.
- [24] United Nations Department of Economic and Social Affairs, "UN Global E-Government Readiness Report 2005: From E-Government to E-Inclusion,," United Nation, New York, NY, USA, 2005.
- [25] Department of Information Technology, Government Enterprise Architecture, Kathmandu: Government of Nepal, 2016.