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Necessity of Big Data Security and its Relation to National Security

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Abstract

Many government organizations like the Ministry of Home Affairs, the Department of Passport, Public Service Commission, Department of Transport Management, Election Commission of Nepal, hospitals, etc. are increasingly relying on data-centric services as the stored data helps to deliver the services effectively and efficiently. Such services are widespread due to increased internet usage, mobile devices, and network-based activities. The rapid expansion of technology usage has led to a corresponding shift in governance towards data-driven services. While adopting the data-driven services it brings forth a critical concern about the security and maintaining confidentiality of the citizens. The paper analyzes the existing policies, laws, and bylaws pertaining to data security and protection. It explores the challenges that exist for data security and protection. Furthermore, the paper identifies the necessity of big data security and its impact on national security due to data theft and breaches. The study has been undertaken by the use of secondary sources of information. While undertaking the research, the paper has delved into secondary sources; encompassing government policies, acts, regulations, reports and directives, international research articles, and views of cyber security experts. The paper has underscored the necessity of big data security measures and has identified the consequences that could be caused due to the inadequate security measures of the data as well as highlighted the importance of data privacy. The study contributes to the broader discourse on protecting data and its relation to national security.

Keywords: Data security, big data, cyberthreats, and national security

Introduction

McKinsey Global Institute (2022) defines “big data” as datasets that extends beyond the ability of typical analysis systems. The nature of big data depends on; the volume of information, velocity or speed, and variety or scope of the data points being covered (Segal, 2022). Big Data is a large amount of digital information from general public and private organizations collected, stored and analyzed for various purposes (Agh, 2020). Due to the rapid increment traditional security and privacy mechanisms may not be able to maintain privacy in such a complex

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computing environment (Venkatraman & Venkatraman, 2019). The authors characterize big data as fast-moving, multi-source origin, tremendously large, and unstructured. However, the definition may vary to its usage and application by the various agencies. Dr. Hemraj Regmi defines data that are generated on a routine basis as administrative data and big data is generated by the latest technologies such as satellite, and social media (ICT Nepal, 2023).

The big data is useful in many ways and valuable from many perspectives. McKinsey Global Institute (2022) claims that big data creates value across many sectors. Private companies can use the data for innovation, productivity, and marketing. Since the importance of big data has been recognized by the government and private sectors, they are trying to extract the maximum benefit from big data. Big data can be used for decision-making by government entities for national security and policy analysis or by private agencies to optimize their production (Agh, 2020). The importance of data security (2023) explains the main three elements of data security and they are confidentiality, integrity, and availability. Confidentiality ensures that only authorized users have access to data with appropriate credentials, integrity ensures that data is trustworthy, accurate, and has no unjustified changes and availability ensures that data is available in a timely and secure manner.

Focusing on the importance of data famous writer Harari (2016) says that hitherto there was limited data so humans used to distill the data into information, information into knowledge, and knowledge into wisdom but as technology is immensely increasing it has reached beyond human capacity now human can't distill the data even into information. Clive Humby, a Sheffield mathematician has coined the sentence "Data is the new oil" to emphasize the importance of data (Arther, 2014).

The governments can utilize the data to boost their efficiency and the value for money to their citizen. Since the data's value and usage have increased day by day its security and protection are must. In this article big data protection and security systems, policies related to Nepal, and probable impacts on national security that may occur as a result of data breaches are analyzed.

Methodology

In this study comprehensive review of secondary-based resources such as government reports, research articles, policy documents that are related to cyber security, big data security, and impacts on national security that may come from the data security are reviewed.

Research Design

This research is based on descriptive and exploratory research design. The research has analyzed the contents that are related to big data and its security further it has explored the necessity the big data security and its impact on national security. The study is based on a qualitative research design to undertake the research.

Data Collection and Interpretation

The study has used secondary sources of information. The study examined the government policies, acts, rules, and regulations to understand the current provisions for data protection and security in Nepal. The study incorporated the existing constitution of Nepal, National Cyber Policy 2080 BS, Criminal Code Act 2075 BS, Personal Privacy Act 2075 BS, National Strategy for Statistics System Development 2075 BS, Voter Name List Act, and other relevant rules, and

regulations pertaining to data protection and security. The policy analysis approach involved evaluating policies to keep the existing data safe and secure. Furthermore, the research has explored the challenges and implications of data protection and security, particularly in relation to national security by drawing on research-based articles, public opinions, and television talk shows that addressed these subjects. The study is exclusively focused on data protection and security measures within government sectors. It is essential to note that the study hasn't considered the private sector's data protection policy and hasn't incorporated the laws or the policies governing social media platforms such as YouTube, TikTok, Facebook, X (previously known as Twitter), Instagram, and other foreign-run social media platforms.

Discussion and Analysis

Data-Based Administration and Services in Nepal

The history of the statistical system in Nepal from the government side was introduced in the 1911 census and in operation for over a century. The government had started conducting of census in 1968 BS. This work was done even before the bringing of the Census Act which came into effect in 2008 (National Strategy for Statistics Development, 2075 BS). However, this strategy hasn't discussed data security, protection, and threats. National Statistics Office is the main government agency that collects, processes, and analyze the data related to various sectors and it provides necessary data to the government agencies to help formulation plans and policy (National Statistics Office, n.d.).

With the increased users and development of technology, gradually government agencies initiated to deliver online services and started to collect and store the data. The National Statistic Office is a responsible government agency to collect, store, and disseminate the data. It conducts periodic census, and various types of surveys of the economic, health, and agriculture sectors. Besides the various constitutional commissions, ministries, departments, and Nepal Central Bank are engaged in activities related to statistics. These agencies are generating and supplying data under their area of administration (National Planning Commission, 2020).

Using and depending on data is a global phenomenon for the people of the world. Due to rapid expansion of technology usage, has led to a corresponding shift in governance towards data-driven services around the world. Almost 97 percent people of the world have access to the cellular mobile network at global scenario. In developed countries, 99.7 percent of people have cellular mobile networks and out of them, 87 percent of people have access to 4G mobile network. Nepalese people's access to cellular mobile and internet services has also increased notably during the last few years (Nepal Telecom, 2022). National census reports 2080 claim that 73 percent of common people carry smart mobile phones in Nepal. The report also says that 15 percent of people have access to computers or laptops while almost 38 percent of Nepali people are using the internet (Census Report, 2022). Nepal's two major cellular mobile service providers, Nepal Telecom claims that it has 21 million users and Ncell states that it has 16.3 million users in Nepal (Nepal Telecom, 2023) (Ncell, 2023).

Giving due consideration on the fast-growing technologies Nepal government provides online services and some of them are: electronic passport, integrated tax system, land record information management, labor work permit system, driving license, and national identity card (Auditor General's Report, 2023). Likewise, the Public Service Commission (PSC) has been

receiving online mode applications from the candidate since 2071 Bikram Sambat (BS) (Public Service Commission, 2023). Though PSC has been serving almost a decade on a web-based platform and providing online service, it has failed to protect and secure the data it has. Due to losing the data of applicants, PSC had to recall for applications as the data recovery process failed (*MyRepublica*, 2023).

Nepal Election Commission has started storing bio-data and publishing voters names on its website too. According to BBC Nepali Service (2022), there are more than 16 million voters in Nepal. Voter list can be found on the commission's website. Likewise, the Department of Passports is another agency that collects and uses citizen's data. On the official website of the Department of Passport, the functions of the department are described as; to issue machine-readable passport, electronic passports, biometric passports and emergency passports, to prepare and submit the appropriate passport specifications to the Nepal government.

Another bigger platform that uses people's data is the financial sector. It has been more than a decade since digital payments were first introduced in Nepal. These days digital payment transactions have increased rapidly. Government's policies have played a crucial role in promoting digital payments (Shrestha, 2023). Both private and government banks are providing internet and mobile banking which promotes digital transactions. Along with the commercial banks now there are more than five digital payment platforms established and operating digital payment services. Central Bank of Nepal "Nepal Rastra Bank" is the regulatory and supervisory entity of Nepal government for the banking sectors. Nepal Rastra Bank formulated necessary monetary policies, increased the access to the financial service, and develop a secure, healthy, and efficient system of payment (Nepal Rastra Bank, 2023).

Even prior to the digital transformation health-related data were important due to the sensitive information of the individual. Now, technology has been transforming and building evolved business processes. Which has enhanced the quality and efficiency of care and treatment and such technologies are playing a vital role in enhancing the immediate recognition of health indicators among patients (Shah, 2022). The individual sees privacy as being objectively valuable in itself. Breaches of privacy and confidentiality affect's person's dignity (Nass, Levit, & Gostin, 2009). There are no rules and regulations for protecting and maintaining the privacy of such sensitive health-related information in Nepal. With the swift advancement of technology, these highly sensitive data volumes have grown substantially and can be spread widely within a very short period. We can take an example of United States law, the Health Insurance Portability and Accountability Act (HIPAA) which was enacted in 1996. This act deals with the privacy and security of health information. The privacy rule protects all types of personally identifiable health information. Personally identifiable health information is defined as demographic information, the physical or mental health condition of any individual. The privacy rule establishes a standard to protect individual's medical records and other personal health information (Nass, Levit, & Gostin, 2009).

Likewise, another government agency that is administering services with the data of people is the Department of Transport. This department has replaced the previous manually issued driving license with a smart license and vehicle registration system. The department collects biometric data of the people to issue smart licenses but no related laws to regulate, protect, and secure such bio metric data can't be found.

Department of Land Management and Archive undertakes land reform, land administration, and management functions. The Asian Development Bank granted ICT Development Project entitled Land Records Information Management System (LRIMS) with the aim of to provide citizen-centric land related services through a web-based application installed in the Government Integrated Data Center (GIDC) to make the information easily accessible to land owners and related authorities.

Another significant government entity involved in data collection is the Home Ministry. The Department of National ID and Civil Registration provides the services of vital registration and issues national identity cards (Department of National ID and Civil Registration, 2023). Likewise, the inland revenue department is responsible for tax-related administration. The department also receives biometric and other personal data to deliver services related to revenue (Inland Revenue Department, n.d.).

Existing Policies on Data Protection and Security

We can find some international agreements on the privacy of individuals. Universal Declaration of Human Rights (UDHR) is a significant international human rights document that has recognized the importance of the right to privacy. In Article 12 of UDHR, it is said that no one shall be subjected to arbitrary interference with his privacy, family, home, or correspondence and their honor and reputation shouldn't be unjustly attacked. Everyone has the right to the protection of the law against such interference or attacks.

On a guidance note, named Data Privacy, ethics and Protection prepared by United Nations Development Group says that the data should always be obtained, collected, analyzed, or used through lawful, legitimate, and fair means. It further explains that when dealing with personal data, necessary actions should be taken to remove or obscure identifying information such as aggregation, pseudonymization, or masking. Such action is done to reduce potential privacy risks and to consider the possible negative consequences (United Nations Development Group, n.d.).

The General Data Protection Regulation (GDPR) (2018) is a European Union (EU) regulation that aims to create a uniform and harmonized level of protection for personal data within the EU. It includes the rules for how a physical or legal person may process personal data and while using personal data it must be in line with integrity-friendly principles and the use of personal data must be legal and respectful to individual rights. The CDPR represents a significant shift in data protection and privacy regulations and it has emphasized the importance of transparency and individual rights while using personal data.

The government of Nepal has enacted some laws that are associated with data privacy, protection, and security. In the constitution of Nepal, the right to privacy is recognized as a fundamental right. This encompasses the limitation on the utilization of private details which include an individual's physical attributes, details of residence, property, character, and data. Such information must be handled in accordance with legal regulations. To implement the provisions of protecting the personal privacy of citizens that was in the constitution, Nepal government introduced the Personal Privacy Act of 2075 BS. The law was developed and enforced to ensure the protect the data of every citizen's life, residence, property, data, any correspondence and issues related to character (Nepal Government, 2075 BS). This law has made provision for the collection and protection of personal information. According to the law,

only individuals authorized by legal provisions or those receive permission from the authorized are allowed to collect, store, protect, analyze, process, or disclose the personal information of any person.

Likewise, Election Commission Nepal is another constitutional entity that collects, stores, and uses data in large size. Voter Name List Act 2073 has provided a legal foundation for Election Commission Nepal to collect, store, and publish the data of the voters. It can collect the name list, photo, and fingerprint of the voters and use them for election purposes. The commission has the authority to publish the name list on its website, making it readily accessible to the general public. Nonetheless, as per section 25 of the Voter Name List Act 2073, if the Nepal Government requests voter details such as names, addresses, and photographs, the commission can provide such information to the government, with the understanding that the government will use it solely for the specific purpose as it was originally requested for with the commission. This act has made provisions for data protection. Publishing or misusing the information of voters, including their names, addresses, photographs, or any other details is considered a criminal offense under this act. Furthermore, individuals who suffer physical or mental harm as a result of data misuse that was provided as per section 25 of this act or any data published through unauthorized means have the right to seek compensation through a district court within a six months time frame.

Statistics Act came into effect with the objective of ensuring the production, processing, storage, publication, and dissemination of statistics in a trustworthy, well-organized, and pertinent manner. This act has defined that any particulars, description, and information that are associated with economics, social matters, physical phenomena, or the environment and the collection, analysis, and presentation of such subjects are called statistics. This act has provision for data collection. It says that the Nepal government can collect data on any individual, house, family, organization, or any government institution with written notice. The Statistics Act includes provisions for maintaining data privacy. Section 10 of this act, states that data can't be disclosed, published, and shared with agencies without the prior approval of an authorized official. It further includes the responsibility of the data collector, user, and producer. In section 10 it is said that the data collector must inform the respondents about its purpose and privacy issues before obtaining the data (Nepal Government, 2022).

Considering increasing activities in the financial transaction sector, the Central Bank of Nepal has issued Information Technology Guidelines. These guidelines have been brought as new delivery systems such as Internet banking, mobile banking, and Automated Teller Machine (ATM) have increased the risk of financial loss and electric fraud along with other risks. The guidelines aim to strengthen the security and reliability of commercial banks in Nepal (Nepal Rastra Bank, 2012). Nepal Rastra Bank has issued other directives, circulars, and notices for its licensed institutions as a role of regulatory and supervisory function. The other legal regulatory structures that are playing a pivotal role in the growth and enhancement of digital payment methods are: Licensing Policy for Payment-Related Entities/Mechanism, 2016, The Payment and Settlement Act 2019 and the Payment and Settlement Bylaw 2020 (Nepal Rastra Bank, 2023).

Nepal Passport Act 2076 BS has made a provision on data storage and protection. Section 27 of the act says that the department of passport should personalize the application of passport and store on electronic archive. Section 28 it says that the papers including applications for

passport should be kept safe for 12 years but there are no provisions regarding electronic personal data and biometric data (Nepal Government, 2019).

National ID and Civil Registration Act 2076 BS was enacted with the aim of recording citizens' identities and issuing national identity cards containing their personal and biometric information. This act has given rights to the concerned offices to register citizen's vital event information. According to this act, Nepalese citizens should provide biometric data to obtain the national identity card. This act has made provision for establishing electronic data storage and the storage would be linked with the data of other various government agencies. The act also includes provisions for establishing electronic data storage, which would be interconnected with databases of various government agencies. Furthermore, the act outlines provisions for accessing and utilizing stored data and ensures the confidentiality of personal and biometric information that is stored in, however, the data can be given when: requested by authorized officers for criminal investigation, by court order, or at the citizen's own request. Section 30 of the act has addressed the issues of data storage security. According to the section, there would be a data security committee to continue the service from data backup storage during the period of disaster. The committee also would be responsible for managing the physical protection of data storage and other technical-related securities such as network and application security (Nepal Government, 2020).

Nepal government has brought the 2019 Digital Nepal Framework with the aim of developing digital connections in every sector. It aims to establish the internet as an essential service, take the lead on a 5G network, high-speed internet connectivity, public Wi-Fi hotspots, National Cyber Security Center, National Biometric ID Card, etc (Nepal Government, 2019). Such a framework is obviously going to build future services more data-based and digital. It is seen that the protection and security of the data is being must due to the widespread data-based services.

Recently, the Nepal government endorsed National Cyber Security Policy 2080. The policy incorporates forming secure cyberspace for the users, reducing risk of cyber-attack, conduct research, develop human resources, and build the capacity of the workforce to create cyber space stronger and more resilient and to make secure and credible online services among others (Nepal Government, 2023). The policy has no issues regarding data security and its preventive measures. Talking about the weaknesses of the policy, Taranath Dahal, chief executive of Freedom Forum Nepal in The Kathmandu Post says the policy has failed to incorporate even the limited feedback and highly influenced by neighboring countries India and China. He further claims that the policy tends towards an autocratic governance system rather than a democratic one (Ojha, 2023).

Nepal's government still lacks enough rules and regulations on the issues of data protection and security. Due to the absence of pertinent laws, cybercrime cases are currently being managed in accordance with the Electronic Transaction Act of 2008. Over the last few years, incidents of data breaches in e-commerce businesses, internet service providers, the Central Library, ATM system hacks, and social media intrusions have been reported due to loopholes in the cyber security system in Nepal. Furthermore, there have been numerous cases where government offices to functionless due to data breaches and hacking incidents (*My Republica*, 2023).

Necessity of Data Protection and its Impact on National Security

Concept of the security is the different bases on which states and the international community as a whole rely for security. Many times, and in many places security concept is complex and controversial. So security should be understood in comprehensive terms, recognizing the growing interdependence of political, military, economic, social, geographical and technological factors. While talking about the national security, it refers to the protection of a nation's sovereignty, people, and interests from various threats and challenges (United Nations, 1986). But these days, security is no longer solely concerned with traditional or military security which suggests that the most significant threats to states are external factors and these threats emanate exclusively from other states with national borders (Mhadeen, 2018). So the prior state's physical border security would be enough as national security but today national security covers quite broader areas. Human Security is a broad conceptual approach to cover all dimensions of security. The human security approach places humans at the center of development (Human Security, n.d.). The United Nations (2016) defines human security as people-centered, comprehensive, context-specific, and prevention oriented and it is based on national ownership. The United Nations further elaborates on the component of human security as economic, food, health, environmental, personal, community, and political.

Nepal's cyber threat is increasing day by day. A report on National Cyber Security Threat Report 2022, indicates that Nepal is mostly facing phishing and malware attack intended for data theft or breaches (Vairav Technology, 2022). In a talk to BBC Nepali, Vijay Limbu who is one of the writers of the report, says that after the Russia and Ukraine war, it has been seen that the cyber attackers are using Nepal's cyber system and tried to attack other places. He says that Nepal Government should be aware as the question may be raised by Nepal government regarding cyber security. The further chapters describe the dimensions of security that may be impacted due to data security.

Personal Security

Many experts are being worried as the threat of cyber-attacks and security challenges are being increased. Giri (2023) suggests introducing strong laws on cybercrime and data security to discourage the misuse of cyber media. He further raises his concerns as it is very difficult to secure the data in Nepal. Giri suggests that cyber security is not only a technical issues but also it's a duty and responsibility of the state. Satish Kharel suggests that as the data of every sector is equally important the government should make sector policy and create data protection standards for every sector i.e., for military, police, civil aviation, hospital bank, etc. (Kantipur TV HD, 2023).

Nepal's government is expanding its digital-based services which include the biometric and personal data including the name, birth date, sex, photo, eye retina, prints of all fingers and digital signature on a computer chip but at the same time digital security experts are raising questions that government hasn't adequately addressed the access, storage, privacy, and security of such big volume of sensitive personal and biometric data of the people (Rai, 2019). Baburam Aryal an advocate, says to BBC Nepali (2018) that issuing a national id card with biometric and personal data could be right however no government hasn't paid attention to such data privacy. He further explains that the constitution has ensured the right to privacy but adequate rules and regulations aren't brought for the data storage, protection, and maintaining

privacy. However, the Director General (DG) of the Department of National ID and Civil Registration claims that existing technologies that are being applied at the department are sufficient to protect the data that are being collected. But people are not convinced from such statements. Being skeptical Ojha (2022) presents the example of the 2018 leak of the National Identify Card (Aadhar Card) data of hundreds of millions of Indians personal data was stolen by hackers and put up for sale. In an investigation report by Chand & Basnet (2023) presents the case of misusing biometric data. Bhopal Police of India had arrested four people who were able to access the Aadhar 'Enabled Payment' system through fake fingerprints and withdraw money from citizens' accounts.

Another crucial aspect of data protection and security is the location of data storage and the server. Nepal's government is frequently facing server down issues and even data breach incidents. Another investigation report by Center of Investigative Journalism Nepal by Bohara (2017) says the personal details of Nepali citizens has control over an Indian company based in Chennai. Nepal's government started issuing smart license cards and vehicle registration systems with the aid of the Asian Development Bank. Madras Security Printers of Chennai, India got the bidding of software development, design, and hardware installment of smart driving license. Personal details such as name, age, address, citizenship number, parent's name, blood group, and biometric data like fingerprint and photograph are included in smart driving license. Such kinds of data are sensitive since they can pose a major threat to the person if it is misused. The report further says that the system of distributing the driving license server is in the office of Madras Security Printers, Chennai, India. Quoting former Nepal Election Commissioner Nil Kantha Uprety, the report says that citizen provides their personal data to the government for a particular purpose so the government can use the data beside that particular purpose. The former commissioner says in the report that, The Election Commission of Nepal has also collected bio-metric data but uses it only for election purposes. The commission later on provided data to the Nepal government after the formulation of the privacy act. However, the Nepal government has kept data base of passports and national ID cards in Nepal.

Economic Security

Due to the advancement of technology, every service and infrastructure is connected to the internet and data. Most of the services and administration are based on the data and the ratio is being increased day by day. It is obvious that in the future the dependency would be further increased. If we see the Nepal government's governance the data-based services are being increased day by day. We can take the examples of passports, immigration, national ID cards, driving licenses, revenue, health care services, vehicle registration, banking system, land registration, public service commission, etc are being administered online basis.

Government and service-related agencies collect citizens' data to ensure the smooth operation of their services. Due to this reason such data holds significant value for businesses, corporations, and any organization. If the data is contributing to running their services it is obvious that the disturbances or loss of data impacts its economic aspect. If we talk at the individual level about how the data breaches or loss of data impacts economically to a person that nowadays every individual is associated in the market with their digital identification. So, if anybody finds the personal data that could be misused to obtain the financial gain.

We can see many instances that citizen are losing their money from the bank either using the data or hacking the banking system. Basyal (2019) writes on 30th August 2019, some hackers hacked the Nepali banking system and took out the money from the ATM. They were able to hack the banking system. Basyal further explains that Nepali Banks do not using standard software, lack skilled human resources, not investing in technology, and try to hide their weaknesses. During the crime investigation, Nepal Police found that a group of hackers were able to hack and transfer money from the American citizen from Nepal. Such incidents are happening in Nepal due to a weak banking security system (Aryal, 2022). Such incidents are frequently occurring in Nepal. Rashmi Panta, Chief Operating Officer of Prabhu Bank reveals that the banking sector has been facing cyber threats on a daily basis (*Kantipur Daily*, 2023).

Health Security

Health care-related data are very sensitive. Due to its sensitive gravity, many countries are implementing regulations to safeguard the information of their citizens. Such as, the United States' healthcare is highly regulated and considered as a critical infrastructure. The healthcare sector is regulated by the HIPAA and recent updates to the HIPAA require entities to maintain reasonable and appropriate protection of electronic health data (Greenlee, 2023). Unlike other types of data that primarily capture surface-level details, healthcare data includes inner biological information collected and stored which is very sensitive and critical. The loss of such data can have a significant impact on any individual. Data breaching is costly in every sector.

According to the Cost of Data Breach Report 2023, healthcare remains a top target for data breaching incidents. Healthcare data breach costs are at the top of any other industries and data breaches in health care have been increased for the 13th consecutive year (IBM Security, 2023). Bijay Limbu emphasizes the criticality of the data and draws distinctions between the banking sector data and hospital data. With respect to hospital data, given its association with health matters which carries vital importance due to the potential life-altering consequences of its misuse (*Kantipur TV HD*, 2023).

Challenges to Big Data Protection and Security

The rapid development of technology is changing the mode of administration in government sectors. Not the Nepal government is also applying digital-based services but while applying such there are no adequate policies, acts, rules, and regulations to regulate the consequences that could be aroused due to the misuse of data or violation of data privacy. One of the major challenges is developing and enforcing rules and regulations in this sector. No standard has been formulated for data protection and security. Those agencies collect and store the information of people but they are silent on the protection and distribution of data. Before enabling data-driven institutions there should be the proper legal foundation for the data protection of the people.

People are using data-based services but they don't know what kind of impact they if they allow others to use their data. Many people's personal details are found on the internet and easily can be utilized those data to other places. In many instances, we can see that even government agencies are unaware of maintaining the privacy of the people. Data that must be protected and secured are found everywhere Citizenship, passports, license where private data are included also posted on social sites. Many people use various applications on their

gadgets but they don't know how to secure their personal data, or how to restrict access to their storage. The government should make efforts to increase digital literacy as well as to change the behavior of the people.

Data breaching doesn't affect people. Hackers often make attempts to acquire the national critical data. In such a case, the country itself may be in threat due to data insecurity. Nepal government agencies that are storing big data, have the critical data of the nation so the protection and maintenance of privacy of such data is the responsibility of the country itself. Still, Nepal lacks legal institutions that can look after the crimes that are related to cyber-crime, data breaches, violation of privacy, etc. There should be IT-based intelligence institution for surveillance and to counter the potential attacks. Likewise, establishing critical infrastructures that are related to data security is another challenge. If we see the government agencies we don't find the positions that are related to cyber security experts. Recognizing and managing skilled human resources and creating positions in government agencies is also another challenge.

Conclusion

Data plays an important role in enabling organizations to make informed decisions and also it contains personal data, activities, and financial status. The data helps to administer the services effectively and efficiently. Due to the advancement of technology and its cheaper and easier availability, it is widespread. However, as the importance of data continues to grow, it also presents challenges alongside of its benefits. Big data is gaining more and more attention as the number of users and devices connected to the Internet of Things (IoT) is increasing.

There are many government agencies whose services are being on digital data-based. Some of the major government agencies which are collecting and store large volumes are; the Ministry of Home Affairs, Election Commission, Internal Revenue Department, Department of Land Management and Archive, Banks, Health related institutions etc. Though there are many agencies which are collecting citizen's personal and biometric data, still there is a lack of legal foundation for its protection and management.

Due to frequent attacks and hacking on the data storage of various agencies, cyber security experts are worrying about the existing scenario regarding the data protection and management system of Nepal. Some of the institution's servers are in Nepal but some of the institution's data servers is outside of the country so media, law experts, and data experts are expressing their grave concerns on the privacy and security of the data.

If we see the global phenomenon the global average cost of a data breach so far in 2023 is USD 4.45 million (Cost of a Data Breach Report, 2023). Studies have shown that the Nepal government's various websites are adversely affected. Nepali people frequently face services are being halted due to the problem of the online system. Such incidents show that government mechanisms lack the standard privacy and security mechanisms to protect the data. In a public function, the minister of communication and information technology, Rekha Sharma admitted that there is no security and key of the data centers with the government (*Nagariknews*, 2023).

The study suggests that Nepal faces a significant threat to its national security due to the absence of comprehensive data protection and security-related laws, cyber security infrastructures, and institutions. The impact of data security breaches extends threats to various facets of society, including personal, economic, and health security. Such threats not only put citizens at risk but also have a potential impact overall on the nation.

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