

BIG DATA ANALYTICS AND E-GOVERNANCE POSSIBILITIES AND BARRIERS IN NEPAL

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Abstract

Big data analytics is the trending technology which helps to process the extremely large and complex data set that traditional tools cannot cope with. The adaptation of big data for the public service delivery has given the opportunity for the citizen engagement with government initiative for the e-governance system. The data driven governance model empower the authorities for decision making and to frame sustainable development strategic through e-governance.

The research paper is divided into six parts. The first chapter has highlighted the Nepal government initiatives and priority towards the technology-based governance model. Qualitative and quantitative research methodology has been used to examine about the opportunity and challenging factors for implementation of big data and e-governance in Nepal by making the survey questionnaire based on the theoretical case study from the research papers published. The statistical factor analysis has justified the research survey outcome that organizational readiness, technology challenges and government policy and regulations are the major challenges and barriers for implementing the big data analytics and e-governance in Nepal. The conceptual model has been also proposed for the practical implication that can be best suited in context of Nepal. The model provides the way how the technology and business process can be aligned together and make the concerned stakeholders accountable for the public service. Furthermore, the research paper can be useful for the researchers and the government agencies to insight about the title and real implementation of the big data platform for the developing nations.

Keywords: Big data, e-Governance, analytical tool, open data, smart governance, data scientist.

1 INTRODUCTION

The advancement and the rapid growth of information technology has brought every service on the tip of the finger to everyone. There has been large amount of data being produced day by day. The data can be in multiple form and size depending upon the application and nature. As per the theory of knowledge management the raw data do not give any information until and unless it is processed (Stuart MacDonald, 2011). After the processing of the data, it gives the information. The information thus produced give the knowledge that is the key factor used for the decision making. Thus, data driven decision-making methodology is the current requirement of today's world. The data generated can be of different form and nature. When the size and nature of the data is limited, it becomes easy to analyze and extract the information. But when the size of data is enormous big, variant types and data are generating from the multiple sources then it became challenging (El Benany Med Mahmoud, 2019). As the penetration of internet and network reached to the maximum geographic area of land, this cause the data to be generated exponentially high enough also (Rani, and Kautish, 2018, 2019). Managing such a huge data, variant nature of data and diverse source of data. Big data is the technology which process the large data set through multiple processing algorithm and thus extracting the information in analytical way. (Preet Navdeep, 2016)The 5V concept of the big data signifies the volume, velocity, value, veracity and variety of the data (Irina Pencheva, 2018). The big data analytics is the way of analyzing the complex data information in much simplified and easy way. It provides the current status and based on the data pattern it also helps for future forecast and trend analysis which helps the organization and government for the decision-making process (El Benany Med Mahmoud, 2019).

1.1 Digital Nepal Framework 2019

Government of Nepal has initiated the Digital Nepal framework 2019 with the view to enable Nepal to harvest the high socioeconomic development through the use of Information technology-based e-governance system. The framework has been proposed and endorsed by government of Nepal (NTA, 2020). It has been expected that that there will be the rapid change in the lifestyle of Nepalese citizenship at the same time the active participation and inclusion of all the stakeholders for this mission is equally important (IT, 2019).

1.2 Ethical issues, challenges

The target audience and the respondents have the leverages to participate in the survey. The respondents are prior informed about the aim and objective of the research. The respondents are free to opt for the disclosure their identity or not. The voluntary participation will increase the effectiveness of the survey. Since the researcher was dealing with the government entities, there was a written consent provided to all the participants and a briefing letter was provided on the significance of the research. The authenticity and confidentiality for the information has been maintained.

1.3 Problem Statement

There has been always the challenging for the implantation of new technology. The research study has discovered out some similar challenges being faced in other countries also. Study of the case studies and articles for the similar topic can be helpful in context of Nepal. The problem statement can be helpful to analyze and segregate about the challenges for the implementation of big data analytics and e-governance in Nepal.

- Implementation of the big data platform is the challenging task. The organizational uncertainties and readiness assessment is necessary prior to implementation of the big data platform (Bram Klievink B.-J. R., 2017).
- Benchmark prerequisite for the execution and implementation of big data infrastructure and e-governance. The challenging factors can be significantly affecting the implementation of big data in government sector (Zaher Ali Al-Sai, 2017).
- Digital transformation of the public agencies is reliant on utilization of the big data for the smart governance (R. Khtira, 2017).
- Lack of professional skill & knowledge and improper use of data analytical techniques cannot give the expected result (Serik Aliaskarov, 2019).

Some of the issues that has not been explored yet is as follows

- The detailed study in the similar topic has not yet been carried to identify the priority and domain of public service for the e governance in Nepal.
- Some research papers have been done on the challenges and opportunity of implementing the big data platform for e governance. The exact outcome of the research study may not be relevant to Nepal context.

The research paper has the set of survey questionnaire to find out the challenging factors and possibilities in context of Nepal to fulfill the research gap of the research study.

1.4 Research Questions

- RQ1. What are the current challenges of using big data analytics for E-governance in Nepal?
- RQ2. What is the current state of IT infrastructure, rate/volume of data generation, data processing and data mining strategies of an organization?
- RQ3. How can the adoption of big data analytics will help government for better public service delivery?

1.5 Aims

The research aims to enlighten on the security challenges and security issues in e-commerce which e-commerce companies or customers might face while using e-commerce for buying and selling goods and services.

1.6 Objectives

The research study has the following main objectives;

- to find out the future opportunity and prospects of using big data analytics for E-governance in Nepal.
- to examine the current challenges and barriers for implementation of big data in Nepal.

Specific objectives of this study are as follows:

- To examine the current challenges and barriers on implementation of Big Data Analytics for E-governance in Nepal.
- To observe the current status of available IT infrastructure, rate of digital data production and processing, relevancy of available IT policy and regulation guidelines for big data implementation.
- To find out the domain area for the adoption of big data analytics which can facilitate the effective public service delivery.

1.7 Scope and significance of research

The research study will focus to find out the challenges and barriers factors that cause the hindrance for the effective implementation of the big data platform. The paper will also highlight about the possibilities and opportunities of using the big data analytics for the e governance in Nepal. The research area has been selected is the capital city of Nepal Kathmandu valley; where government agencies, stakeholders and some private organizations which are directly and indirectly involved to facilitate the public service.

Following is some of the areas where this research paper will benefit are:

- This research study is useful for the researchers who are doing research on further possibilities of using big data in context of Nepal.
- The research study is equally important for the government concerned authority, departments that can be benefitted for the implementation if the big data. This paper can give them the idea about the dimension and use of the big data platform for implementing the e governance in Nepal.

1.8 Limitations of the study

The research has been carried out throughout the period when COVID-19 had affected worldwide. It has restricted the research area of the study and area limited to Kathmandu valley only. The target audience for the research was primarily the professional and employees from the government sector. The big data analytics dimension is not only limited to the government agencies and organization. The big data analytics can be helpful and give more accurate result and analytics when the private, corporate and general public stakeholders do participate for the big area of scope.

2 LITERATURE REVIEW

This section literature review is based on some papers and research studies. The reviews are categorized based upon the case studies, opportunities, barriers and challenging factors, e governance dimension and research gap.

Moroccan government has implemented the big data platform for the public service delivery. The result has shown the very improvement in the public sector. All the administrative and operational tasks are digitized throughout the nation. Big data has been in use for national census, research on sentiment analysis for social media are the source of data for the Moroccan government (R. Khtira, 2017).

Case study of Saudi Arabia have shown the positive impact on implementation of big data. All the learning content and teaching activities are carried through the use of technology and analytics. Besides using the technology in learning, Saudi Arabian government has started to use the IT platform for the other government services. It is one of the strongest ally and richest country of the gulf region (Ms. Ayesha Mukthar, 2017).

For the smart city, the evolution of digital governance is the essential factor It has been also observed that the challenges of big data practices in smart city contexts differ depending on the

stage of the value chain. The analytical tool can be useful which can be used to unpick data analytics in urban contexts. Public and private sector actors need to interact to constitute the foundation and infrastructure of the smart city. The socio-technical integration of big data practices and how these are operationalized in a smart city context. Paper review and qualitative analysis are the research methodology and research model used in the research. The future task and research gap of this research is the socio-technical integration of big data practices and how these are operationalized in a smart city context (Karl Lofgren, 2020).

3 RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

The research methodology is can be defined as the scientific approach through which the researcher collects the data and analyze the finding to interpret for the problem solving and solution finding for the research title. The methodology incorporates the data collection, sample of the process and data, theoretical framework and the data analysis. The effective research design methodology, selecting the appropriate approach and good understanding of questionnaire development and data collection are the essential tasks to be carried for the good research methodology. The section of the research paper will focus on the overall research process and procedures that has been carried out here.

3.2 Research Strategy

The research output is not going to give the empirical finding rather than it is based on the case study and finding the research gap and unexplored elements of the research title. Very few research studies have been done in context to Nepal. There are several researches and studies have been done by the researches around the world. The research strategy followed for this case is to study the case study of the previous research finding. The sample data collection will give the idea to justify weather the previous finding can be aligned and incorporated in Nepal context too. The blended mode of qualitative and quantitate research approach and finding is the best suited framework for this research design.

3.3 Research Methodology (Qualitative vs Quantitative)

The selected title of the research is basically the case study type of research. Based on the previous researches, the finding and research gap has been analyzed and how the finding can be relevant for the present context is verified by the quantitative data collection through the set of questionnaires. The mixed mode of quantitative and qualitative research has been used here. The qualitative research is the best suited for the research where the sample of the data size is comparatively small in size. Since the result is the abstract and qualitative in type it is difficult to show in number and figures. The critics about the qualitative analysis urge that the researcher skillset and the way of interpretation by the searcher can add the value & justify the research finding. The qualitative research is useful for the small data set.

3.4 Data collection method and tools for data collection

The data and the information were collected from mainly two approaches. The study of the academic research paper, case study of different countries on relevant title gave the basic idea how the research could be accomplished in context to Nepal. To justify the previous finding and of the academic research papers some sample data collection was carried to test whether the finding is aligned with the research papers or not. The data collection was carried by preparing the set of questionnaires which was distributed to the respondents through the online Microsoft forms and printed hardcopy. The target audience for the data collection were the working organization IT staff members, developers, managers, department head and chief working in government and non-government organizations which are co-working to facilitate for the public service delivery. The response received from the respondents were from the Microsoft forms exported to excel and the hardcopy data was re-entered into the same excel sheet. The IBM SPSS analysis tool was used to test the reliability and descriptive analysis later part.

3.5 Sample Selection

The research was carried out to figure out the challenges and possibilities for implementing the big data analytics and e governance. The sample of the data was collected mainly from the government organization which are directly associated with delivering the public service. The non-probability sampling technique was used based on the respondent working in the related field of the IT and governance having the experience and good knowledge. The sample was collected within the Kathmandu valley of different government organization and some non-government agencies also who are providing government public services also. The survey question was distributed online and hardcopy also. In total 300 response was expected out of which 185 was received from online survey and 58 hardcopy report was received. Total response for the analysis was 243.

3.6 Reliability and Validity

Reliability assures the correctness and authenticity of the research which very much hold the main importance in academic research. It relates about the truth and consistency of the result. Higher reliability is expected in the research paper. Validation is also the other factor which is needed to check back whether the data has been collected from the authentic source and is real. The questionnaire is prior approved from the research supervisor and after the consultation with the supervisor the survey work had started. The attempt was done to maintain the integrity and reliability of the data collected. The reliability test for the questionnaire was carried out in the next section of the research by using the SPSS tool. Cronbach's Alpha was calculated for the reliability test via SPSS and found to be greater than 0.7. which was significant.

3.7 Analysis Plan

The analysis of the survey was done in next section of the paper. The data thus obtained from the Microsoft form was exported to excel and the hardcopy data was also reentered in the same excel sheet. The multiple level of the data correctness and interpretation was done line meaningful labelling, conversion of the figure and data so that it can be exported to the SPSS for analysis. Hence data normalization was also done to make the data ready for the analysis.

The IBM SPSS is the most advanced and world-wide popular tool for the data analysis. It comprises of sufficient number of data analysis module and plugins to show the data as required. It also helped to form the statistical report out at the same time make the chart and graph of the data. Some test carried out in SPSS was the KMO test, co

The final data set was imported in SPSS and analysis was carried out with extreme caution with the primary purpose of meeting the objectives stated in Chapter 1. Different tests like KMO test, Correlation, Mean, median, descriptive analysis statistical data were extracted.

4 DATA ANALYSIS AND FINDINGS OF RESEARCH

4.1 Reliability test analysis (Cronbach's Alpha Reliability Test)

Reliability test of the survey questionnaire is the test that has been carried out in the research to check its reliability of questions and response received from the responder. The research paper objectives are to find out the challenges and possible opportunity of using the big data analytics for e governance implementation in Nepal. Some variables are interlinked with each other. The value of the Cronbach's Alpha Reliability Test done through the SPSS analytical tool may range as below and its interpretation is as follows. There is a rule set by George and Mallery which states (Bhatnagar, Kim, & Many, 2014). The value greater than 0.7 is considered to be acceptable for the survey and further analysis while less than 0.7 is questionable and not significant for the research.

4.2 Findings of Research

The findings from the questionnaire can be grouped under following category.

Organizational readiness

The values obtained from the questionnaire state that the most of the government organization has not yet undergone through the digitization of tier business work flow. The data generated in their organization is semi digitized. Even though there is high rate of the data production in the

government office the data thus generated is not clean and of quality. Such data need to undergo through the series of the normalization process to make it usable for the information generation. The far most and most challenging aspect is the lack of trust about the reliability of the data. Even the government organization are not reluctant to share the data with other government agencies and stakeholders. This create the scenario that the single information can be stored in variety of way by different organization. The topmost and policy maker's government official and decision makers have lack of awareness about the opportunity and value created by using the big data analytics. The SPSS statistical factor analysis KMO and Bartlett test at Table 5 result value is 0.832 which is greater than 0.7. Hence the organizational readiness factor is the significant factor.

Financial capability

The big data platform is comparatively the intensive resource hungry infrastructure system. The initial investment, yearly operational and maintenance cost, upgradation cost and other outstanding costs leads the system to be very expensive and costly. Even though the Nepal government has started the appreciable steps for the implementation of the e governance. Nepal Government has shown the positive attitude to invest for the big data platform. The SPSS statistical factor analysis KMO and Bartlett test at Table 6 result value is 0.500 which is less than 0.7. Hence the factor financial capability is not the significant factor.

The government of Nepal has put the priority on investment for IT infrastructure development. The ministry of finance has allocated 7.13 billion more budgets than that of previous year (Nepal, 2021). Hence in context to Nepal the financial capability cannot be the hindrance factor for the implementation of big data infrastructure and e-governance.

Technological & Operational Challenges

The government organization does not have the sufficient IT infrastructure to implement the big data platform. The high-quality IT infrastructure with disaster recovery, 24/7 business continuity plan and provision for the IT security and framework are the primary requirements for the big data platform implementation.

There is no legal provision, operational guidelines and IT policies in government organization that can be helpful to share and collaborate the data and information with other organization. Data sharing and collaboration is also found to be the major challenges for the implementation of big data platform.

The lack of skilled human resource to work on big data platform and analytics is also the major challenges in Nepal. Highly skilled and motivated skilled human resource is mandatory to get the benefitted from the big data platform. Even though the government seems to invest for the purchase IT infrastructure, the less priority from government side is experienced on capacity building, training and hiring of the skilled data scientist.

The SPSS statistical factor analysis KMO and Bartlett test at Table 7 result value is 0.794 which is greater than 0.7. Hence the factor technological and operational challenges is the significant factor.

Current IT Policies and regulations

The available IT law and government policies and law is not updated and sufficient enough for the suitable environment for the big data platform implementation. Most of the respondents have agreed that they do not share the data neither have any such documentation to follow such procedures. Data collaboration and sharing with multiple stakeholders is essential for the big data analytics and e-government implementation. The SPSS statistical factor analysis KMO and Bartlett test at Table 8 result value is 0.742 which is greater than 0.7. Hence current IT policies and regulations is the significant factor.

Big data analytics & e governance opportunity

Nepal government has launched some public service application and services based on IT system. It has not yet matured yet enough to meet the expectation of the public requirement. The finding from the survey agreed that big data analytic can be the important tool for the decision-making process for the executive and decision maker. The hassle free, quick service and transparent public service are the key expectations from the e governance. E governance is the only governance model through

which the nation and public prosperity and development can be achieved.

5 Discussion

5.1 Summary

The study has been carried out to identify the importance of big data analytics for e governance. It can eventually bring a lot of opportunity for e governance. The research paper also helped to figure out the factors that can act as the challenges for the implementation of big data. With the growth in information technology and the general public involvement and dependency to IT system of public the data has been growing day by day. Even the government agencies and private organization are found to be working for the better public service delivery. The data can generate the value only if it gives the information that can be used for the decision-making process. The analysis of the data is very important which gives the exact position and future trend and forecast of the activity. The big data analytics can be the important tool for the implementation of the e governance. E governance is the only way through which the people can get the transparent public service and accountable government also.

This part of the research paper will highlight about the challenges and opportunity of using big data analytics. The research questionnaire has been grouped under some category like readiness check of the organization, financial capacity, technology and operational challenges & big data analytics & e governance opportunity.

5.2 Research questions and findings of the survey

The statistical analysis from the questionnaire of the survey has able to provide the relevant and significant answers for the research questions.

RQ1. What are the current challenges of using big data analytics for E-governance in Nepal?

Findings: The statistical analysis from the survey have discovered that RQ1 question about the current challenges of using big data analytics for e governance in Nepal. The significant challenges are grouped and enlisted as below;

Insufficient IT Infrastructure.

Lack of knowledge and awareness.

Low or partial digitization of organization.

Lack of skilled human resource (Data scientists)

Operational Procedures and guidelines.

Lack of data collaboration and integration

Quality and standard of data

RQ2. What is the current state of IT infrastructure, rate/volume of data generation, data processing and data mining strategies of an organization?

Findings: The current state of IT Infrastructure is not robust enough for reliable big data platform. For last couple of years, the power system is getting reliable and the service provided by the ISP and network providers for the internet and connectivity is also satisfactory. The digital data production and processing in government and other organization is relatively in large volume hence the big data parallel processing for the analytics can be significant. Most of the organizations has not used yet the advanced analytical tool that can provide the future trend and analysis of the data. Hence advanced big data ETL tool is also necessary for the big data platform.

RQ3. How can the adoption of big data analytics will help government for better public service delivery?

Finding: Big data analytics can be the important tool for the government which can extract the information from the raw data and make it as the knowledge which can enable the policy makers to take the appropriate decision. Hence data driven decision making can be possible by implementing the big data analytics. Big data analytics can be useful for the implementation of e-governance. E-governance can eventually bring the smart and transparent public service delivery.

6 Conclusion and Recommendation

6.1 Conclusion

Nepal has already taken the step for the digital framework implementation. The current government has also put priority to digitize the business process of the government services and workflow. The Nepal government has already initiated some IT related Dreamline projects that can boost the progress of ICT index of Nepal. The wide and reliable connectivity and power system are some of the good signs for the development of the ICT culture in Nepal. The quality of the mobile internet should be improved and the internet data charge cost need to be revised from the concerned authority.

6.2 Recommendation

Big data is the vague technology of today IT development. It can bring a lot of opportunity for setting up the e-governance in the developing country like Nepal. The challenging factors mentioned in the research study must be addressed by the concerned government bodies and stakeholders. Some of the recommendations are enlisted below.

- The government should emphasize on the priority for the e governance system
- The awareness program and capacity building program are necessary
- The IT policy and regulations should be IT friendly.
- Nepalese university and college should emphasize for the course on data analytics to build the skilled human resource as data scientist.
- The private and non-government organization should also support the government side through their expertise and knowledge area.

6.3 Future work

The big data analytics and e governance has a lot of future scope and tasks to be carried out. Nepal is the developing country where a lot of opportunities are ahead. Nepal being the late starter can also entertain the benefit and advantage of getting the world practiced system experience outcome and feedback. Nepal can develop the implement the most suitable big data infrastructure and other relevant tools to attain the maximum productivity. The technology has been changing day by day; hence the future research much be carried to find the best and appropriate technology model. For the nationwide and sustainable development more the area if research and dimension need to be broadened further.

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