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**CHALLENGES IN PUBLIC ADOPTION OF
DIGITAL BIRTH REGISTRATION.
CASE STUDY OF BANGLADESH**

Master's Thesis

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MSc

Tallinn 2021

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**Väljakutsed sündimise elektroonse registreerimise
rakendamisel
Juhtumiuuring Bangladeshi näitel**

Magistritöö

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Tallinn 2021

Author's declaration of originality

I hereby certify that I am the sole author of this thesis. All the used materials, reference to the literature, and the work of others have been referred to. This thesis has not been presented for examination anywhere else.

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10.05.2021

Abstract

Birth registration delivers an identity certificate that is considered the first legal document for an individual after birth. This certificate helps people to recognize their state and nationality and helps not to fall under statelessness category. The lack of birth registration worldwide has revoked around 230 million children's legal right of their identity, provision of receiving government services, and the distorted the indicators which are directly associated with developments. Realizing the importance of maintaining an accurate birth registration database Bangladesh Government implemented Digital Birth Registration in Back 2013 with the help of Plan international.

The main objective of this research is to analyze the current situation and get an impression of the adoption of Digital Birth Registration (DBR) by the citizens of Bangladesh. To analyze the situation in the context of Bangladesh the main research question formulated is how citizens of Bangladesh reacted to the implementation of this service provision. Within the scope of this research question, the author will try to find out what the current progress of this service is, possible barriers that are impeding to acceptance of this service, and possible ways to enhance the adoption and the benefits that an individual and state can achieve via using this service.

To investigate the process a comprehensive examination was applied, and the case study method was selected. The DBR case study of Bangladesh was investigated here. To conduct the research, qualitative research methodology was chosen based on research questions and findings and concluding. To construct theoretical background, different ICT adoption theories and social-behavioral theories were included along with some successful case study examples. Data collection was conducted by an online survey and interviews with different experts from the associate.

This thesis is written in English and is 71 pages long, including 6 chapters.

List of abbreviations and terms

A2i	Access to Information
BRIS	Birth Registration Information System
CRVS	Civil Registration and Vital Statistics
DBR	Digital Birth Registration
DOI	Diffusion of Innovation
EGDI	E-Government Development Index
ICT	Information and Communication Technology
ILO	International Labor Organization
LLMIC	Low and Lower Middle-Income Countries
NGO	Non-Governmental Organization
RQ	Research Question
SDG	Sustainable Development Goal
SQ	Sub Research Question
TAM	Technology Acceptance Model
TPB	Theory of Planned Behavior
TRA	Theory of Reasoned Action
UN	United Nations
UNCRC	The United Nations Convention on the Rights of the Child
UNICEF	United Nations Children’s Fund
UTAUT	The unified theory of acceptance and use of technology

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1. Introduction

1.1 Background

In South Asia and other regions, a large portion of people never included in the official statistics or legally recorded, they born and die without acknowledging the world or leaving a traceable footprint without attaining any identity document [1].

Birth registration around the world increases but according to United Nations International Children's Emergency Fund (UNICEF) despite the increase still, one-fourth of the world's children continue "invisible". Worldwide more than 166 million children are not officially registered in their country's civil registration system due to a lack of awareness and inefficient registration process [2]. The legal identity for children represents the birth registration certificate. If children are taken away from this identity it means there is a possibility not to ensure fundamental rights, even children may drop out from the government's essential programs like education, health, vaccination, protection from child marriage, child labor, child trafficking, etc. Birth registration is a part of a nation's civil registration and vital statistics (CRVS) system, it is considered as an administrative tool to record major vital events that are continuously occurring (remarkably, births, deaths, adoptions, marriage, and divorces) [3]. United Nations identified this process as "*the continuous, permanent, compulsory and universal recording of the occurrence and characteristics of vital events in a population in accordance with the legal requirements of the country*" [4]. Civil registration offers individuals the legal identity document to establish a broad range of affiliations with proving nationality, human rights, political and public rights in the society. Such identity document is a piece of core evidence for the children, in particular, to protect them from any kind of exploitation and create a path for the government to ensure essential programs-education, health, vaccination, child protection [5].

According to the Convention of the Rights of the Child, Article 7(1) stated that "*The child shall be registered immediately after birth and shall have the right from birth to a*

name, the right to acquire a nationality” [6]. Stateless children have a profound impact to receive the basic human rights which the state generally provides them. To prevent statelessness, it is needed safeguards and birth registration is the most important protection that helps children born in a country’s territory to establish the nationality otherwise they could recognize as stateless. Birth registration confirms the relationship of a person with parents and where a person is born, to acquire a country’s nationality this key piece of information plays a vital role.

According to the United Nations children’s agency, Bangladesh ranked in fourth place among other countries in the world where the child marriage rate is highest [7], [8]. In recent statistics indicates that in Bangladesh 38 million child birds are rising and of these, 13 million children get married at the age of before reaching 15. In the total population, 51% of young women get married before the turn to 18, approximately 5 in 10 girl child give both before reach 18, and below 20 years 8 out of 10 young women give birth [8] To end child marriage by 2030, the UN created the Sustainable Development Goal (SGD) which aims to the Bangladesh government expedite the process to end child marriage by 2041. In Bangladesh, less birth registration results in reinforcing the gender equality gap that causes the dropout of women from the educational institutions.

Observing less birth registered population in Bangladesh government realized the need to initiate a sustainable low-cost Information and Communication Technology (ICT) enabled national birth registration process to speed up the registration process. In the country context and having a large population it was quite challenging for the government how to proceed further. However, UNICEF came forward and supported the government to develop a software programmed Birth Registration System (BRIS). The program was launched in December 2009 on a pilot basis in two areas in Cox’s Bazar and Jessore district (kaliganj). Upon estimated tremendous project success the government of Bangladesh decided to extend the project all over the country and begun digital birth registration implementation in 2013.

Furthermore, the country is still struggling with low birth registration despite the initial two successful pilot projects' output. The government was determined that by 2021, digital birth registration will complete 100% as a part of their political manifesto “Digital Bangladesh 2021”. However, statistics published by the world bank indicate that until 2019 only 56% of the population completed their birth registration [9] this indicated still

a significant number of people exit unregistered.

Registering birth innovation could play a critical part in the process to reduce harmful social practices such as child marriage, a violation against the child stated by Melissa Cederqvist, an innovation consultant from Plan International [10]. Conventional manual approaches for the worldwide birth registration process have not been effective yet thus this reason facilitates to start thinking in innovative ways collaboration with ICT-enabled support to enhance the registration rates [10]. After going through a lot of related materials author identified to expand birth registration in developing countries several ways need to close consideration by the government. Eliminating registration fees, offering cash or gifts, awareness raise, even adopting innovative solution like mobile registration in remote areas can help to increase the adoption of birth registration.

This research intends to evaluate the registration process and identify rationales behind the less adoption even though this well-functioning digital service is in place.

1.2 Research Questions and Objectives

The government of Bangladesh has consistently emphasized the value of e-Government and its effective implementation as part of the Digital Bangladesh agenda [11] that has taken a citizen-centric approach. Government and citizens' work patterns have shifted because adopting ICT in Bangladesh has come a long way in its efforts to achieve its goal of becoming a technologically advanced nation by 2021. Digital birth registration is a part of ICT initiatives and not much research so far conducted to examine the reason behind low adoption. This research aims to identify the probable barriers that result in low adoption of this eservice by the citizens. Also finding innovative solutions to increase the number of registered people is a concern for this research.

Based on the aim to research following research question (RQ) with supportive sub-questions (SQ) was drafted to guide through the entire study:

- **RQ1:** How have citizens of Bangladesh reacted to the implementation of Digital Birth Registration (DBR)?

The local government of Bangladesh recognized the importance of a well-functioning CVRS system to provide a foundation to build a country's population register and to achieve sustainable development goals. Both this motivation influences the government

of Bangladesh to execute digital birth registration a few years back. This research question aims to evaluate the current situation of this service and understand citizens' perceptions towards this service. A systematic comprehensive analysis is needed to answer this research question.

Following sub-research questions are formulated to identify the factors that are affecting the acceptance of DBR in Bangladesh. Also, finding the paths that will enhance citizens' adoption of this eservice.

- **SQ1:** What are the factors affecting citizens' adoption of the Digital Birth Registration (DBR) in Bangladesh?
- **SQ2:** How can citizens' adoption of DBR be facilitated?

The objective of this study covers analyze the citizens' perception towards acceptance or denial of DBR, determining the aligning factors that are influence DBR adoption, and finding out the ways that will facilitate DBR adoption.

1.3 Research Design and Methodology

This chapter reflects on putting together a logical analysis design. It discusses the analytical perspective that has been integrated into the study, as well as the development of research methods and related approaches. The chapter also explains the justification for selecting the research methodology, data collection strategies, and approach to find a solution to the mentioned research question are all detailed in this chapter. In the following chapter, data analysis techniques will be established, which will ultimately lead to data interpretation.

This chapter would also go through the analysis process. The importance of qualitative analysis will be addressed first. Following that, how the data was collected and, finally, how it was analyzed would be discussed.

“A research methodology is direction by which researchers must perform their study. It demonstrates how these researchers articulate their dilemma and purpose, as well as how they present their findings based on the data collected during the study period” [12].

Research analysis is a methodical approach to gathering and analyzing evidence in order to generate new information and present accurate findings in an investigative manner [13].

A good definition is given by Sreejesh et al (2014) *“the strategy, implementation, and report preparation phases of research can all be categorized into three categories. The preparation process starts with the discovery of the problem/opportunity and ends with the selection of the sampling protocol. The data collection and assessment phase of the market analysis process is the implementation phase, while report writing is the final phase”* [14].

The study design aims to provide an appropriate outline for review and assessment. The research method selection is crucial in the research design process because it decides how sufficient information for a project can be obtained; additionally, the research design process needs to overview several interconnected findings [15]. Denzin and Lincoln define *“Qualitative research is multimethod in focus, involving an interpretative, naturalistic approach to its subject matter”*[16].

Qualitative research techniques are fall in a broad range of category that includes small group discussions, semi-structured interviews, in-depth interviews, analysis of journal, texts, and records, etc. Small group discussion focuses on examining behavior, principles, perception on the other hand semi structures interviews mainly focus on background information for main informants or a find out systemic viewpoint. During the in-depth interviews a particular perspective of a subject, experiences, or systematically explain a situation, and the analysis for texts and records are focus on thoroughly going through the newspaper, journals, blogs to learn about formal and informal information [17].

A qualitative data analysis method will be incorporated as this research intends to focus on citizens' perception of the adoption of digital birth registration progress in Bangladesh. The benefit of using this approach is that it considers minute to broader information in interpreting behaviors, interactions, experiences, and social structures, allowing it to be made adaptable and versatile in response to changes in the study context.

The qualitative research study approach can be used to understand the citizen's experience and reaction to the subject, which is the thesis's goal. Qualitative methods offer responses to questions from the perspective of the researcher, and the statistics are non-numeric. This often leads to bias judgment about the subject, so the results derived from these methods are non-factual and sometimes unreliable. It is generally agreed that

qualitative analysis should be legal, significant, and clearly defined, as well as employ suitable and systematic methods [18].

There are a variety of qualitative analysis methods exists, but the focus of this study will be on data collection using key sources, one of the collection methods is the semi-structured interview, in which the interviewer talks about the most critical aspects of the circumstances that being studied. A well-designed semi-structured interview will generally ensure that crucial information is gathered while also allowing participants to contribute their perspectives to the discussion. Lastly, interviews can be more flexible in structure to allow the interviewer more freedom, and essentially conducting this kind of interview is better to ask verbally rather than write down the questions [19].

When the interviewer needs to get a better picture of the interviewee and learn more about them through casual interview and observation, a semi-structured interview is preferred. Open-ended questions are permitted during the interview. As a result, the semi-structured interview used in this study would benefit in gaining a deeper understanding of the interviewee's personal knowledge and behavior.

To receive insight information about the digital birth registration adoption, a representative from five stakeholders was interviewed with the help of semi-structured in-depth interviews and all of them were conducted online as the author could not travel to Bangladesh to conduct these interviews in person:

- A Representative from the Office of the Registrar General Bangladesh under the ministry of LGED.
- A Representative from Public Health Care Sector.
- A Representative from Donor Organization (Plan International).
- A Representative from ITC Division.
- A Representative from Civil Society.

A pre-written questionnaire was prepared to keep the emphasis on the subject, and the interview was done informally to enable the interviewee to openly express their ideas and the interviewer to grasp the context easily. The interview process is conducted in the local language for the interviewee's convenience then cautiously facilitates the transcription and interpretation.

An online survey was conducted during April to examine the ongoing situation of digital birth registration services. To get a clear opinion author used 12 close-ended questions

for participant's convenience. In total 312 responses were stored.

To answer the research questions and analyze the information gathered from interviews, a systematic thematic analysis was carried out in this research. This analysis tries to distinguish some patterns of themes that strive from interview data. According to Braun and Clarke “analysis involves a constant moving back and forward between the entire data set, the coded extracts of data that you are analyzing, and the analysis of the data that you are producing” [20]. Yet a thorough thematic data analysis can generate reliable and informative results for the research [21]. To conduct a thematic analysis a researcher, need to go through some steps that are proposed by Braun and Clarke which are describing below:

- Familiarized with research data: This is the initial phase of data analysis where a researcher needs to carry out a recorded interview, transcribing into text and taking notes from that data. This stage is all about knowing the data very well to go further stage.
- Creating codes: Once data familiarization complete then the information needs to evaluate and divided into a small piece of code to go further analysis. Transcribed interviews have a lot of information that is not all necessary. The extracted smaller piece of codes will express the thoughts of the interviewer and answer the research question.
- Creating themes: Once the researcher sets the codes from data interpretation then it is needed to create some themes. Codes generally represent some interesting aspects of the data whereas themes are wider in aspects, requiring vigorous analysis of the data codes and records.
- Reviewing themes: In this phase researcher thoroughly reviews and then polishes the themes that are identified from the previous phase to correlate if codes support the themes. In case if there are inconsistencies arise or it seems too broad then it needs to be split and fit in somewhere that fits better.
- Define and naming themes: In this phase after improving the themes in the previous stage researcher name the themes in a way that the description of the theme promptly identifies the relationship with other themes to create a new theory.
- Report generation: When the results come out from data analysis, writing the results should have come with enough information that the reader can easily

understand and evaluate the quality of research work. A clear statement of the whole process should be written down for audiences' visible understanding.

To conduct the qualitative data analysis author has used Nvivo 12 for this research and the survey analysis, excel sheets were chosen to complete data analysis and draw different charts from the survey results.

The Structure of this thesis is following. The beginning of the research starts with an explanation and background of the chosen topic and the reason behind the need for research by the author. Considering the research aim and objectives the research questions are generated accordingly. The second chapter contains a theoretical background of this research. Brief background of the current state of the digital birth registration scenario in Bangladesh and comprehensive analysis of previous studies that are aligned with generated research questions. Chapter three contains the outline of the research design and an in-depth discussion of methodology. Chapter four in detail discusses the case of Bangladesh. Chapter five analysis the research findings and limitations. Chapter six covers the conclusion part along with suggestions that could help for future studies.

2. Theoretical Framework

Theories are formed to define, predict, and understand the existing challenges of a concurrent phenomenon. And the theoretical framework generally creates a base that supports a theory in the research study. Also, it elaborately explains why some specific theories are related to the research problem. This research's theoretical framework mainly concerning the citizens' behavior towards accepting digital birth registration in Bangladesh. Thus, the author has presented here particularly theories that originated to support the assessment of the behavioral pattern of citizens. This chapter covers the theories Unified Theory of Acceptance and Use of Technology (UTAUT), Theory of Reasoned Action (TRA), Theory of Planned Behavior (TPB), Diffusion of Innovation Theory (DOI), Technology Acceptance Model (TAM), and Good Governance.

2.1 ICT Adoption Theories

It is important to refer to the available theories to address questions about how and why technology adoption happens. Many hypotheses about technology acceptance do not apply to global ICT adoption, but they are also important when seen in that light. Any of the ideas were created to be applied at a macro level, in the form of economies and countries. In various fields, a wide body of literature on technology adoption theory has developed over time.

According to Simon (2001) *“an opposition to the term refusal and means the positive decision to use an innovation”* [22]. During the phase of the development of technology, the administrative authority needs to make sure the factors that motivate a user to gain interest to use the system [23]. Why should people adopt technologies this has been a long question for scholars and research scientists. Answering this question, they prepare themselves with thinking on new technology design, users' perception, and their motivation towards using new technology [24]. In this sub-chapter, the author gives an overview of how the above-mentioned technology acceptance theories relate to this research.

Theory of Reasoned Action (TRA)

Scholars have been interested in looking at different approaches to defining the aspects of new

technology and its application and adaptation at different levels. The first theory that is going to be discussed here is The Theory of Reasoned Action (TRA), this theory was suggested by Fishbein and Ajzen [25].

This theory assumes a causal chain from beliefs to feeling, "social norm," and purpose, and then to actions. According to this principle, the causal chain of belief is triggered by the introduction of two kinds of beliefs that are the relationship between attitudes and behavior with a specific set of actions [26]. TRA believes that people are sensible and that they weigh the consequences of their decisions before acting. This research aims to investigate the implementation of a Digital birth registration system, which will be assessed by the user's keenness to use specific services. Consequently, according to this principle, a value structure can be developed to assess the user's purpose, which is then sustained by spreading knowledge of the system's benefits. Moreover, citizens' opinions, expert and peer opinions about the service should be included which highly influence the intention of use.

Theory of Planned Behavior (TPB)

The theory of planned behavior is an elaborated version of the theory of reason actions which was proposed by Icek Ajzen [27]. This theory aims to develop a predictive power called "perceived behavioral control" (PBC) that is missing in TRA. This is described as how easy or difficult it is to execute the behavior. PBC is made up of two parts: "self-efficacy" and "facilitating environments." Self-efficacy refers to a person's willingness to carry out a certain action while facilitating circumstances refers to the means required to act [28]. The core component of this theory is based on behavior. Among a wide range of behaviors how an individual acts according to behavioral intentions. The key belief of this theory is the strong willingness of personnel is set under an arrangement of behaviors. Nevertheless, there are some limitations to TRA and TPB in terms of personal and demographic factors, as well as contextual measures of presumed behavioral influence[29]. The author wants to use this theory to identify the individual's behavioral control of using digital birth registration in the Bangladesh context.

Diffusion of Innovation Theory (DOI)

Diffusion of Innovation theory, which describes and forecasts how and when a technology is implemented across various networks. Human nature and its impact on an individual's ability to adapt are covered in other scientific viewpoints [30]. Roger defines the process of innovation adoption as the process by which a company moves from early innovation to having alternative

options, determination to embrace or reject the option, and that understanding of influences on a person's desire to use the innovation [30].

Diffusion, according to Roger, is "the mechanism by which creativity is transmitted through a specific medium among members of society over time." DOI outlines the stages of innovation adoption and dissemination, which involve recognition of the need for innovation, as well as the expected decision to embrace or oppose the innovation.

Adoption of a new technology-related product or idea does not happen at the same time in a social structure; rather, it is a system in which certain people are more prompt to accept them than others to accept the innovation. People who are early adopters of innovation have different personalities from people who are late adopters. In the case of acceptance and use of digital birth registration, the citizens are the driving force of using this e-Service. As a result, hesitancy to use such a service can be seen as a major potential stumbling block.

According to Rogers [30], DOI consists of five major elements and these elements have a positive impact on the acceptance of new technology which describes below:

- Comparative Advantage – The degree of an invention is thought to be superior to the concept, program, or commodity it is intended to replace.
- Compatibility – The degree of how a new technology associate with future adopter's expectations.
- Complexity – The level of difficulty of the new technology that a future adopter perceived.
- Trialability – The total amount of time invested to study a new technology before execution.
- Observability – Assessment of the degree to effect that the invention has created.

Unified Theory of Acceptance and Use of Technology (UTAUT)

There is numerous technology model has been combined with the unified theory of acceptance to understand the individual's behavior towards adoption of new technology. The UTAUT model in general measures the probability of how new technology is accepted by the users and the popularity of this new technology among the users [31]. This model has been demonstrating nearly 70 percent of studies that are examining the technology acceptance in different innovations such as e-learning the field of education [32], e-commerce in the business world [33] online banking in the financial sector [34], [35], [36]. However, so far only a few

experiments have been done to look at the elements that impact the decision to use DBR.

UTAUT holds four key constructs which measure the degree of intention to use technology, these are performance expectancy, effort expectancy, facilitating conditions, and social influence. Additionally, UTAUT incorporates some moderating variables such as age, gender, experience, and voluntariness of use which impact the four key constructs to observe user's aim and behavior towards technology.

Technology Acceptance Model (TAM)

TAM, however, has a significant drawback Davis et al. proposed the Technology Adoption Model (TAM) to predict the acceptance of technology by company workers [37]. The paradigm was focused on an individual's mindset to emphasize how they intended to use the device as well as how they used it.

TAM implies that there are two main factors such as perceived usefulness and perceived ease of use which define whether a user accepts the technology or not. Perceive usefulness distinguishes an individual's perception of using innovative technology or system that may enhance the accomplishment in the workplace [37]. On the other hand, perceived ease of use depicted as using a new system would require less effort to use[37]. These two factors greatly improve people's beliefs, intentions, and attitudes about technology use.

TAM, on the other hand, lacks the TRA model's social expectations. As a result, TAM2 has been expanded to include social variables that are arbitrary norms as additional factors in predicting a person's behavior [38].

in terms of explanatory capacity and extensibility stated by [39]. The model explains only the grounded variables and does not include a way to extend it to include potential variables. TAM has overlooked the emotional aspect of the decision, focusing more on technological adoption rather than consumer behavior. The model explains only the grounded variables and does not include a way to extend it to include potential variables. TAM has overlooked the emotional aspect of the decision, focusing more on technological adoption rather than consumer behavior.

TAM is still valid and one of the most widely used models, even though several scholars have recently criticized it in favor of complex models. However, since social behavior plays such an important role in customer decision-making in both the public and private sectors, analyzing what influences their behavior, whether they want to use or reject new information systems is very

valuable. To find out the citizens' behavioral intention towards adopting digital birth registration this theory still relevant for this research.

To conclude, all the theories mentioned above are fully concentrate on examining the factors that are affecting the user's motivation to accept new technology it could be behavioral, individual attitudes, expectations, and perceived ease of use, and perceived ease of usefulness.

2.2 Good Governance

Since 1991, Bangladesh has made a successful footprint in exercising democracy in the country. Citizens vote and give a mandate to a political party so that they can form a government to function in a country. The government has the authority to reform all sorts of public institutions to be more transparent and effective and reliable to fulfill citizens' desires. As the government is elected by the citizen so they have full trust in the government's initiatives and expect that for their betterment. The country has already started fully implementing e-governance initiatives, especially focusing on citizen-centric service delivery provided to as citizens are the center of good governance. As a part of this citizen's trust towards the government increased and they find e-governance in a meaningful way. However, the country has to go long way to fulfill good governance all principles. Technology is playing a determinant role to increase transparency, accountability, the effectiveness of the public service. Good governance and technology go parallel ways to ensure citizen's trust towards government.

According to World Bank, good governance defines as "*promoting fairness, transparency and accountability*" [40]. Digital birth registration is the Bangladesh government's initiative to make a registration system fair, transparent, and accountable toward society, as manual processes mostly lack these good governance characteristics.

Defining good governance theory establishes certain fundamental rules on which a good government, in whatever form it takes, must be governed. Accountability, regulation, openness, integrity, public engagement, environment, and productivity are examples of those values. To summarize, the philosophy of good governance was developed to embody all of the above concepts, as well as several others [41]. In a nutshell, good governance view as fair public administration processes whose aim is to expands public interests. Collaborative management is one of its critical elements where state and citizens perform their role and brings into new relationships between civil society, political party, and government. According to Keping [42]

to sum up, there are six essentials in the perspectives on good governance.

- **Legitimacy:** It refers to the condition or standard of willingly acknowledging and obeying social order and authority. The higher extent of authority, the higher level of good government.
- **Transparency:** People have the right to know about state policies that affect them, including legislative operations, decision-making, legal requirements.
- **Accountability:** Accountability entails making each person responsible for his or her actions in public service. The more accountability creates in the society the higher extent of good governance establishes.
- **Rule of law:** The ultimate aim of rule of law is to control citizens' actions, administer civil relations, and preserve social order, while the long-term goal is to secure citizens' fundamental political rights.
- **Responsiveness:** The government administration and public servants are solely responsible to reply any kind of query that is raised by the citizens without any delay.
- **Effectiveness:** It primarily relates to the effectiveness of management. Administrative operations that are ineffective or inefficient are incompatible with good government.

The core principle of good governance is building a cordial relationship between the state and the citizens, also the powers involved in democratic administration are critical to its advancement. People will only force the state to maintain democratic authority and mandate if they have gained enough political power to participate in polls, policymaking, administration of the government structure[42].

3. State of the Art

In today's world ICT has a great impact to improve the socio-economic development of a country. Nowadays adaptation of e-Governance is the key role player for smart government and gives access to the citizen to make effective interaction. As a developing country, forming e-governance has been quite challenging for Bangladesh due to its huge population and not having proper communication infrastructure. However, the ICT sector is helping the government to overcome communication barriers and to implementation of e-governance initiatives. In this chapter, the author will focus on how the Bangladesh government has taken initiatives to execute Digital Birth Registration, some great success story of other countries who have achieved success in this service, and a new innovative solution that is implemented in some other part of the world and gaining success which Bangladesh could take as an inspiration to get success in this project.

3.1 Digital Birth Registration

A birth certificate is an important credential that provides an individual legal identity. A birth certificate is required for various purposes such as issuing a passport, school enrollment, marriage registration, applying for a driver's license, tax certificate issuance, etc. More or less every country asks for this document to avail mentioned services. Despite its important value usually this certificate most of the countries especially Asia and Africa still use handwritten or print form which is very easy to duplicate and sometimes it is not possible to authenticate the document. Even the certificate issuance process is decentralized that results in a different kind of format following within the same country. Sometimes people do not value this paper and destroy it having thought in mind that it could be again reissued anytime. Observing all these problems and the intention of increasing the birth registration coverage some of the countries started using the digital birth certificate to secure this paper same as a banknote.

As mentioned by Dharwadker and Mills "*the birth certificate as a digital credential has become relevant in the context of Sustainable Development Goal 16.9: by 2030 provide legal identity for all including birth registration*"[43]. Countries are stepping into the growing digitization of documentation and processes along with the prevailing need for interdepartmental

connectivity. If a DBC is issued securely then it will allow great administering and authentication facilities.

Countries must have the capability and regulatory procedures in place to handle DBCs, as well as a parallel legislative structure to accept DBCs.

South Africa recorded a drastic improvement in the birth registrations after improving the process from manual to online from 2003 through 2008. The data reveals the substantial increases in the registered births from 68% to 85% [44]. In Greece, the ministry of digital governance introduced a new simplified digital birth registration process on a pilot basis to shorten the process. Previously the process was lengthy involving four different entities, however, now the birth registration process will be completed shortly. Greece's Digital Governance Minister Kyriakos Pierrakakis expressed that *"We are testing the new, simplified birth registration system and we look forward to optimizing and expanding it in the coming days as this process is one of the most daunting"* [45].

3.2 Successful Examples of DBR Among Countries

Estonia implemented paperless management at different municipality levels[46][83]and has been using a fully electronic population registry of vital statistics data since July 1, 2010 [47]. Once a mother delivers a newborn, shortly after the identity management process get started from the hospital. The concerned official inserts the detailed information of the newborn in the electronic population registry and validates it with the signature. From the population registry, the hospital receives an identity code for issuing a birth certificate. Since the hospital's registry connects directly with the population register, the generation of the identity code takes just a few seconds. Once the population register included the child's identification code then parents can easily complete the birth registration form online using e-service [47].

Another country progress greatly in DBC is Botswana, a country located at the center of Southern Africa. In 2003 the government of Botswana initiate an interlinked project that links to the population register, birth registration, and death registration where they emphasize linking these three services with a unique identifier that comes from birth registration. Hence birth registration becomes a reliable basis in contrast to vital statistics to ensuring an individual's human rights [48]. In 2011, the Government of Botswana initiate an onsite birth and death registration process in the hospitals to create a database where 90% bith and death occurs. As the health care sector is in the central position in the government which essentially

helps to create this database[49].

In Uruguay, 99% of children are born in the hospital whenever a newborn arrives doctor insert of this vital event to the National Bureau of Civil Records (NBCR) using a computerized system and internet, therefore, children obtain a unique identity number, a national ID card, and a birth certificate while they release from hospital [50].

Recognizing the importance of vital registration, the government of Peru forms the National Identification and Civil Registry of Peru (Registro Nacional de Identificación y Registro Civil, RENIEC) in 1995. The RENIEC acts as an independent entity to facilitate the use of digital identification and online civil registration processes such as birth, marriage, and death certificates, however, so far 98.1% of children obtain a DNI (National Identity Document) which indicates all these children successfully acquire birth registration [51].

3.3 Innovation in Birth Registration

Innovation is a distinctly noticeable evolution pattern that is having growing importance. For over two decades, the aphorism "innovate or die" has been widely used. However, it is a case of "innovate or die" and 98% of all innovation efforts result in fail [52].

Among 230 million infants, one-third of the world's children who are below the five age category do not have had their birth formally recorded, also 50 million children who are born per year are not recorded at all and they are treated as invisible to this world [53].

As stated by the World Health Organization, in South Asia and Sub-Saharan Africa region nearly 80% of children are unregistered and according to UNICEF data, children who are born in disadvantaged families, rural area, or village areas barely have registered their birth, On the other hand, children who born in privilege and educated family mostly have their birth registration completed and owner of a birth certificate [54].

In 2014, UNICEF commissioned a new pilot project in partnership with Telenor Pakistan, a telecommunication service provider with over 42 million subscriber base, and the provincial governments of Sindh and Punjab to see whether mobile technologies could effectively supplement the conventional, paper-based birth registration mechanism. The provinces of Punjab and Sindh were selected as the project's target locations because they are Pakistan's largest and most populated provinces with the highest number of unrecorded births. To observe the birth registration popularity of this four-month pilot project where on average 200 % of

birth registration increased, the program then decided to expand all over Pakistan.

In 2016, the project was expanded to ensure birth registration completion of 700,000, that target was at the end of 2018, nine districts in Punjab and Sindh will have been covered. However, the DBR system managed to complete 77,000 births in autumn 2017 [53].

UNICEF conducted a qualitative survey exercise after the pilot project and found that parents who use the DBR program are more pleased to observe the peoples comment on the efficiency of DBR than who used manual process. It is also discovered that people get significant satisfaction as they save transportation costs, traveling time, waiting time and most importantly they do not take off from work to complete this procedure.

Another example of using innovative solutions for birth registration is happening in Tanzania. Tanzania's vital civil registry agency RITA (Registry Insolvency and Trusteeship Agency) was established in 2011. Partnership with UNICEF funding a five-year plan was set to make the birth registration process more effective, publicly available, and functional. Therefore, RITA and UNICEF worked together to build a mobile application for birth registration that allows receiving birth registration information from remote areas. In this case, Telenor led the application development. Later the project expanded all over across Tanzania as the project was a great success in terms of the increased registered birth [55].

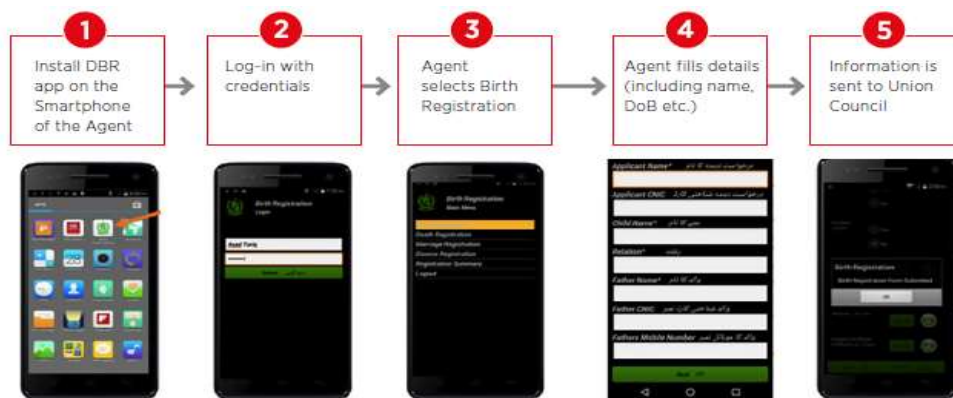


Figure 1:DBR mobile application steps (Source: Roadmap for digital birth registration, 2018)

4. Case of Bangladesh

This chapter includes the background information on birth registration in Bangladesh and the comparison of manual and online birth registration processes. It will also include the benefits and challenges that need to be addressed for the implementation of such services in other developing countries and the corresponding initiative to tackle the challenges. In addition to that, an innovative solution was also proposed that may enhance the online birth registration process.

The People's Republic of Bangladesh is situated on the fertile Bengal delta, with a land area of 144000 square kilometers and a population of 163 million people. That is a legislative system of government. The nation is divided into seven administrative divisions, each of which has 64 districts (zila). Bangladesh's official language is Bengali. Even though Bangladesh outperforms its Asian neighbors on MDG indices, child malnutrition is among the worst in the world. There are 8 midwives per 1,000 live births, and pregnant women have a one-in-110 chance of dying during their lifetime. Bangladesh's male literacy rate is 61.3 percent, while female literacy is 52.2 percent. While the joblessness rate is just 5%, over 40% of the workforce is low-skilled. 31.5 percent of the population lives in poverty [56].

4.1 ICT and e-Governance in Bangladesh

Bangladesh recognizes the importance of ICT when the country began to automate its railway tickets back in the mid-1990s. To achieve economic development the government focused on creating technology experts as the country has huge potential technology resources. The government gives full concentration to export these tech people and creating an ICT-based employment market [57].

The online birth registration project in Rajshahi City Corporation was one of the first pioneer projects on ICT centered. Another experiment involved GIS data visualization of all schools and the gathering of comprehensive information on the schools (such as logistics, staff, and so on), allowing for more efficient curriculum preparation [58].

The National ICT Task Force was formed in 2000 under the prime minister's office, then in 2002, the National ICT policy has been formed as output from task forces. The responsible organization for infrastructure development and process automation was the planning commission and they formed Support ICT (SICT) which give a boost to the process

atomization. The SICT served as an organizational facilitator, assisting line ministries with mission conceptualization, preparation, and prioritization, as well as providing financing and technical assistance.

The Bangladesh Computer Council (BCC) is the responsible organization to enhance the e-government initiatives by providing support to the technology development, delivering assistance to the projects, and creating organizational ability to closely work with e-governance projects, however, many SICT projects sated before but did not last till the end [59]. The UNDP then initiated the Access to Information Program in 2006 (A2I). A national vision for Digital Bangladesh was established two years later (in 2008) as a long-term growth framework for the region [57].

With the caretaker government in place since 2006, the attitude to e-government has increasingly changed from a bureaucratic approach to more participatory attitudes among the public servants. It was found that extensive change management would be impossible to accomplish without internal ownership. The newly elected government's groundbreaking Digital Bangladesh policy created a fresh impetus in early 2009. Digital Bangladesh aimed to transform the country into completely digitally developed by 2021. To gain success in the global economy establishing a transparent and accountable government is needed that can provide services to the citizen. Through the enactment of the ICT Regulation 2009 and the ICT Act 2009, a formal policy and regulatory framework were created.

In 2010 & 2012, Bangladesh ranked 134 & 150 respectively in the e-Governance Development Index [57]. The population's use of the Internet, cell phones, network coverage is reflected in telecom infrastructure. E-participation assesses the level of public engagement and consultation. However, the latest 2020 EGDI index indicates that Bangladesh ranks 119, the least developed country with the highest-ranking which positive aspects if we compare from 2012 to 2020 [60].

The main goals of Digital Bangladesh represent the importance given to the transformation from digital administration to the digital economic system that is expected to be achieved by 2021. Bangladesh is on track to adjust from its position as a developed country by 2024, and projects like this are helping the country get there. The government is improving the structural ability of government departments to address and promote the transition to statistical and citizen-centric strategic planning, public facility design, and strategy execution to achieve its

long-term strategy [60].

The Access-to-Information (a2i) project is Digital Bangladesh's flagship program, responsible for catalyzing citizen-centric public sector creativity in order to ease and enhance the provision of services. The a2i team uses technology-enabled solutions to help governments affiliated organizations meet the goals of their national planning strategies and the Sustainable Development Goals (SDGs). With the assistance of the UN Department of Economic and Social Affairs, the a2i office has commenced abroad collection of capacity-building programs for public bureaucrats at various stages. So far 3600+ public servants received training which helps them broaden their knowledge in simplifying government services, 424 public services categorized to simplify the service for better service delivery, 62+ public offices are in the process to simplify service process, and every year more than 1 service transformed in public offices [61].

4.2 Birth Registration Current Workflow

To apply for a birth registration an applicant must gather the necessary documentation before applying. The supporting documents for those belonging under the age of five are required attested copy of vaccination card/hospital provided birth record/declaration of NGO worker or any other document that is prescribed by the birth registrar. Five years above person require a certificate from a medical practitioner is required as proof of age, and a certificate from a ward councilor is required as proof of birthplace or permanent address or a certificate from headmaster/ principal from the academic institution or passport/secondary school certificate/ NGO workers certification letter.

To start the registration, process an applicant has three ways to apply.

- **Manual process:** An individual can visit the register office physically, collect the application form, and after fillip the form submit it with supporting documents in the register office.
- **Online Process:** An applicant can apply using an online form anywhere in the world where the internet, computer/laptop facility is available. After completing the form, it is necessary to take a print copy of the submitted form. Also, if someone has no internet and computer facilities then they can go to Union Digital Centers, take support from them.
- **Handwritten:** There is another option that citizens can submit the application form with

necessary information using the handwritten application.

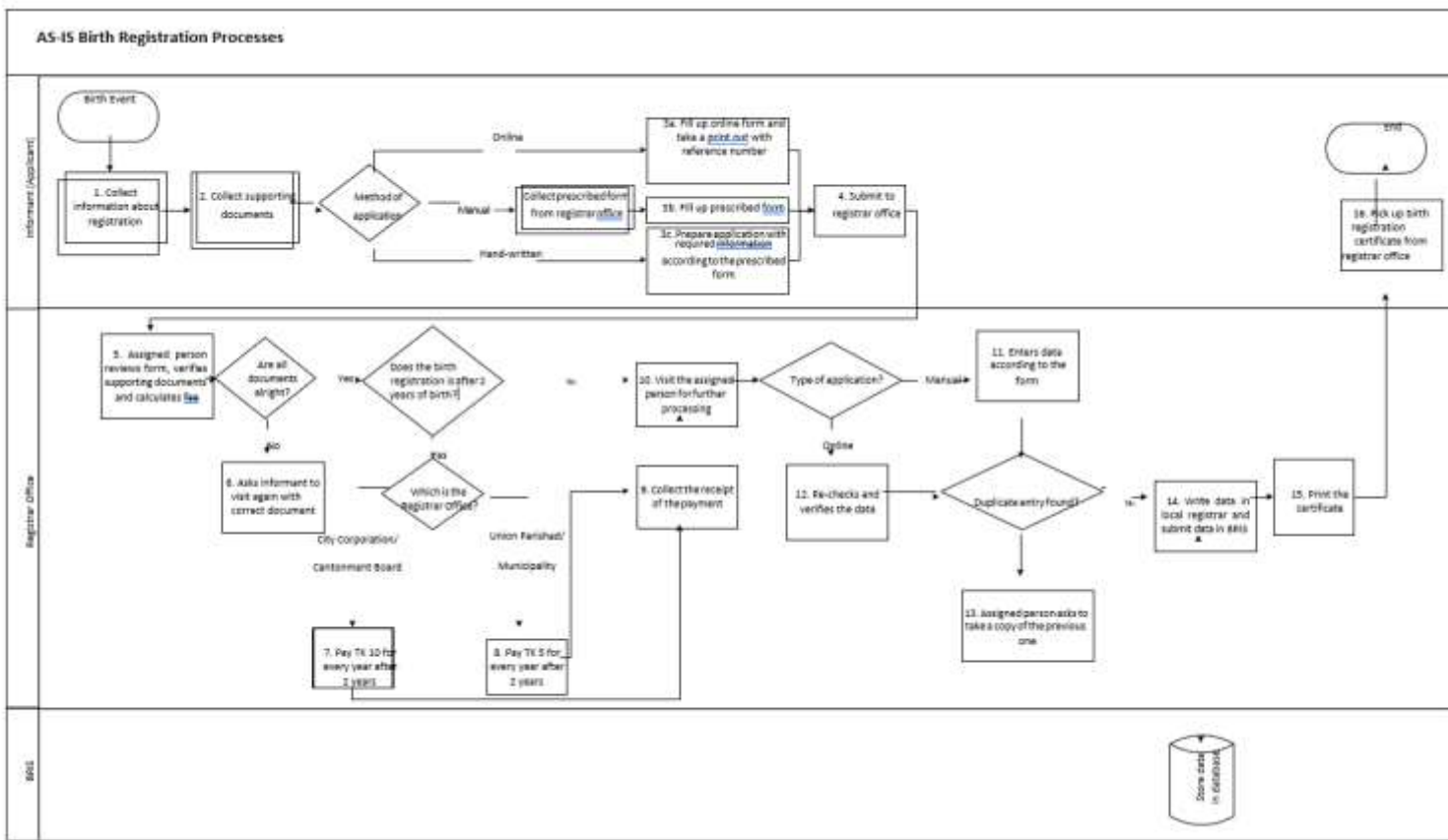


Figure 2: AS IS Birth registration process (Source: Plan-Digital Birth Registration in Bangladesh [62])

Step 1: Applicant has to submit the application form (manual/online/handwritten) with supporting documentation to the Office of the Register General-Local government nearest location. One thing that needs into consideration that the nearest register office has the authority to verify the applicant's present or permanent or birth location.

Step 2: After receiving the form, register the office's dedicated staff review and verify the supporting documents, and if all ok then comment on calculated fees related to the application. If any problems are identified in the application form or supporting documents, then the Register office asks the person to visit the office in person to make corrections.

Step 3: Once the application and pay documents declare right then the application goes to the respective IT officer. The document reviewers and IT person can be the same. If the applicant's birth date is less than 2 years. IT officer to start further processing without any fee. For the cases above 2 years register office charges from the fee schedule and receive a payment received to clear payment.

Step 4: Again, the IT officer reviews the manual and handwritten application form before making entry to the BRIS portal and asks the applicant to check if all information entries are fine. For the case of an online application, the IT officer takes a printout of the form and checks the entries to verify the information.

Step 5: After completing and validating the data entry then IT personnel search for duplication in the system, if no duplication is found then approve the new registration. This way a single online birth registration process completes. The data stored in the BRIS central database.

In case if someone lost the birth certificate or need to do a correction then this can be easily done online by vising the register office applying a specific form.

Table 1: Birth and Death registration fee applied from July 2013 (Source: Office of the Register General, Birth & Death)

Subject	Fee rate		
	Union Council & Municipality	City Corporation and Cantonment Board	Embassy
Within 2 years of occurrences	Nil	Nil	Nil
For every year, after 2 years of occurrences	Tk. 5.00	Tk. 10.00	\$5.00
For original Birth or Death Certificates (either in English or Bangla)	Nil	Nil	Nil
For duplicate copies of Birth or Death Certificates (either in English or Bangla)	Tk. 25.00	Tk. 25.00	\$10
For the correction of any clerical mistake	Tk. 10.00	Tk. 10.00	\$20

4.3 BRIS System Functionality

BIRS system functionality gives an overview of how the digital birth registration software system works in Bangladesh. The below Schematic diagram of BRIS gives an overview of the reader what is the eco system of BRIS software and who are the system users and the

stakeholders of this system. It also gives technical operations visibility of the BRIS system.

BRIS system consists of four functional activities. The load balancer provides direct device consumer and approved stakeholder access to the BRIS system. A load balancer splits network or device traffic between five servers. The web server application is the web interface of the BRIS system and people can access it anytime to apply. Using this birth registration number (BRN) can be verified anytime. BRIS database solely works with the MSSQL server database to store all data. For data backup, BRIS is connected with a storage area network (SAN), a high-speed storage network.

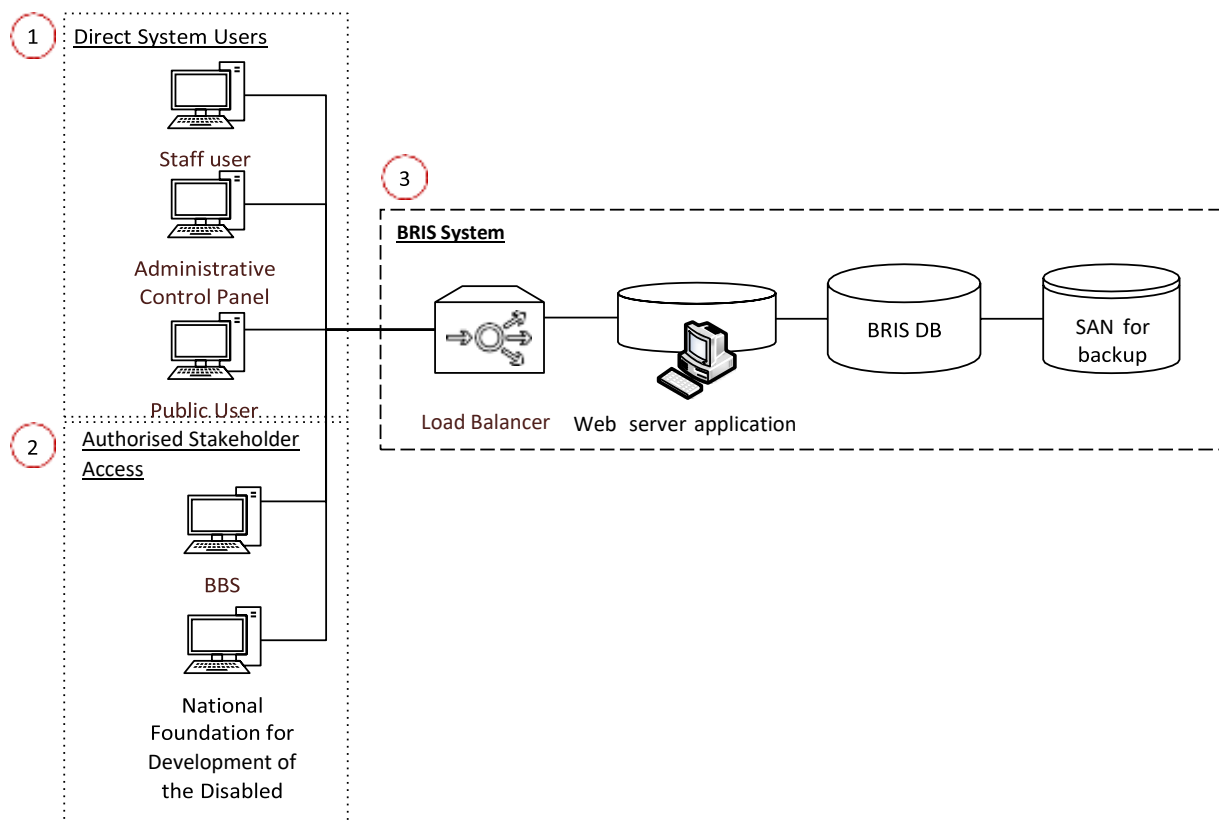


Figure 3: Schematic diagram of BRIS (Source: Plan-Digital Birth Registration in Bangladesh [62])

Direct System Users

From the above diagram, it is visible that there are three (staff, administrative and public) categorized system users related to this system. The staff users at the registration offices have access to the online BRIS scheme. They can generate new records as well as access online applications. Aside from that, the registrar's office will supervise various administrative tasks such as correction and de-duplication, which are carried out by officers from various jurisdictions. The Deputy Commissioner has the ability to monitor the entire region, the Divisional Commissioner can monitor the entire division, and the BRIS project director can monitor the entire region. The online database is used by 9132 users in the registration centers, who complete the registration process.

For system management, there is an administrative control panel. This administrative panel's primary responsibilities include assigning new accounts, updating passwords, and resetting passwords. They have ties to the BRIS as well. Both birth and death registry records are stored on the same server in BRIS.

Anyone can use the online BRIS system and use the web interface to enter information for an online application. Furthermore, anybody can search the birth information by entering a person's BRN and date of birth to validate an established birth registry record.

Authorized Stakeholder Access

The online BRIS framework is linked to BBS (The bureau of statistics) on a technological level. BBS does, in practice, have access to birth certificates and uses them for a variety of purposes. BBS can view and query birth records through a dedicated line that is directly integrated with BRIS. BBS, for example, requires birth register authentication and data collection for household surveys, which is similar to BRIS data. The National Disabled Development Foundation has similar access. They have access to BRIS birth certificates and use them for a variety of purposes.

BRIS currently employs a geocode-based numbering system that generates a 17-digit random number known as the BRN. It is distributed to each person as follows:

Table 2: Numbering scheme of birth registration (Source: Plan-Digital Birth Registration in Bangladesh [62])

BIRTH YEAR				GEO CODE						Sequence Number						
#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	
				District Code	RMO		B		C							

Bangladesh currently has an IT infrastructure for birth and death registration called the Birth Registration Information System (BRIS) which is a high-end server inside the Bangladesh Computer Council's datacenter. Below is the schematic diagram of the BRIS system.

4.4 Birth Registration Scenario in Bangladesh

In Bangladesh, a substantial portion of the population's common date of birth is January 1 according to passport /national Id card. Also, frequently we found different news nationally and internationally by the International organizations who are dealing with child trafficking mention that they face struggling to send those children to the home country as they do not belong any certificate that clarifies their nationality.

Bangladesh positions 10th among the other countries in South Asia and the country observe the highest rate of child marriage. UNICEF partnered with the Bangladesh government and calls initiatives for acceleration to end child marriage by 2030 [62].

Based on mentioned above all of these happening because of the absence of a birth certificate, a vital document. Article 7, of the United Nations Convention on the Rights of the Child (UNCRC), states that *"Every child has the right to a name, nationality and birth registration"* [63]. Thus, this article gives a clear insight into the significance of having a birth certificate where a person has a name, a parent's identity, and which country the person belongs to.

One of the biggest hurdles towards birth registration for the nation is a lack of awareness and understanding of the significance of this key identity document. Examining the situation in 2007, the Government of Bangladesh officially declared National Birth Registration Day on 23rd July, therefore the aim was to spread the message that every person needs a birth certificate. In 2001, Bangladesh Local government division commenced a strategy of universal birth registration strategy with UNICEF to get technical support from them. To execute the strategy Birth and Death Registration Act 2004 was replaces with the Old Act 1873 and the law came with effect from 2006, July 3 [64]. After that this identity document is a key proof to avail different essential services started from getting education facilities (school, university enrolment) to

become a voter, issuing a passport, apply for a driving license, and so on. According to the World Bank’s survey data on completion of birth, registration is indicated that data Bangladesh’s completion of birth registration until 2019 is 56% [9].

4.5 Globally Birth Registration Scenario

Child labor is another concern that different nations have been struggling with so long, children are subjected to do hazardous works in a wide range of segments, including maidservant, coal mining, construction works, leather industry. The International Labor Organization reports that per year around 22,000 children are killed around the world due to force child labor and 73 million children engage in unsafe work who are under 5-17 [65].

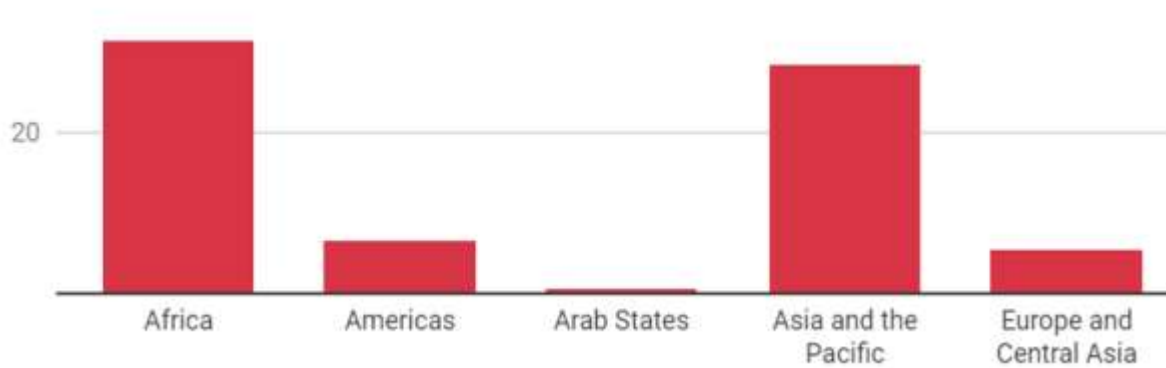


Figure 4: ILO, Global estimates of child labor Results and trends (2012-2016) (Source: Global estimates of child labor, 2017[67])



Figure 5: Regional Prevalence of child labor (Source: Global estimates of child labor, 2017[67])

In the above figure, it is visible that regional wise the topmost position hold by Africa concerning child labor enforcement with 19.6. Asia and the Pacific second highest with 7.4 percentage. Americas, Europe, and Central Asia, and Arab states rank respectively third, fourth, and fifth with 5.3, 4.1 and 2.9 percentage of child labor.

The birth registration process globally differs greatly [66]. In the developed countries birth

registration is treated as a first right and completed on time and in poor countries, birth registration is never given importance, even numerous births are never registered[5]. There are other countries where registered complete after several years when it is needed e.g., school admission [67]. Yet, within a country wealthy group of people have a better registration rate compared to the underprivileged group [68]. Recently universal birth registration has been expanding into small-income countries and lower-medium income countries(LMIC) because developed countries and the LMIC group members are prioritizing this as a key objective [69]. *“The birth registration rate is one of the indicators used to track progress towards the 16th and 17th Sustainable Development Goals, that is, the promotion of more inclusive societies and the strengthening of systems contributing to sustainable development thud, major global initiatives have been launched to strengthen civil registration and vital statistics (CRVS) systems”* [70].

Birth registration of a child requires registration soon after they are born and legally within 42 days the registration must take place in England, Wales, and Northern Ireland. In Scotland, the legal binding is a birth must register within 21 days and receive a birth certificate (How to register your baby’s birth, n.d). Without having a certificate, it is difficult to claim the country’s nationality or avail the citizen’s rights that are stipulated in the constitution. In Mongolia, there is a provision that childbirths must immediately (within 30 days) require to register through the online system and a unique registration number issued against per registration. Negligence to register childbirth cause the barrier to get essential public services and child benefits [71]. In China, data on births were obtained by three government agencies. In 1958, the Ministry of Public Security created the household registration system (Hukou), in which all members of a household are registered according to their date and place of birth, gender, ethnicity, marital status, educational level, and occupation. Within one month of birth, parents must report their newborn to the nearest police station [72]. Crucial birth events in Jamaica frequently disparage the pervasiveness of infant and perinatal deaths. Post neonatal deaths are bound to be enlisted than early neonatal death [73]. Furthermore, the birth isn't enrolled when the newborn child arrives. Birth enrollment rates are most noteworthy in networks with high paces of medical clinic conveyances where organizations notify the enlistment center of each birth. Deaths that take place in the hospitals were more averse to be enrolled than homegrown deaths as enlistment centers are not consequently informed. Missing information and the basic reason for death has brought about a lack of planning in the medical services framework as commonness on driving reason for death is frequently disparaged [74].

4.6 Benefits of Birth Registration

Every year, millions of children under the age of five die from diseases that could be avoided. Unregistered children are frequently unable to obtain health-care services or must pay a higher price for those services than registered children. A birth certificate, on the other hand, ensures that an infant has access to preventive care and the vaccines he or she requires to remain safe. Even a child's participation in school will be restricted if birth registration is not completed timely manner as it provides the required identification to enroll in private and public institutions. Government authorities have no proof of a child's existence without registration. If no such document accessible the legislation is unable to shield children from illegal violence and assault [75]. Successful birth registration safeguards children and ensures that they are aware of their civil rights, also the legitimacy of their relationship with parents and family. However, birth registration provides legal evidence of a person's family relations, guaranteeing that they earn what is rightfully theirs, facilitates the reduction of child marriage, and prevents statelessness [76].

5. Study Results and Analysis

This chapter represents the research results elaborately explaining what results comes out related to answering the research question and sub-research questions on citizens' adoption of digital birth registration scenario in Bangladesh. Based on interview question answers a thematic analysis has been performed, several codes were identified to applying in Nvivo 12 that are categorized as Themes (presented as Appendix 2). Finally, the author analyzed the analysis thoroughly and bring the results in the most interesting way to get a clear view of the finding also proposed some recommendations for future research scope.

5.1. Outcome of the Expert Interviews

5.1.1 Identified outcome of digital birth registration

Service Provision and Access to Information

In 2013, the government amended the main legislation of the birth registration act to enforce mandatory providing birth registration to avail 17 necessary public services. This includes issuing a passport, national ID card, driving license, educational institutions admission, land registration, opening a bank account, Tax Identification Number certificate, etc. Though the legislation put in place, however, the implementing organizations have a lack of wiliness to adopt this change and ask citizens to deliver while applying for services. According to one interviewee stated that “Government has formed various laws for citizens wellbeing but the organizations have lack of eagerness to implement them, in between citizens take the advantage of this gap” Another interviewee expressed that *“Only few implementation agencies are truly maintaining government legislation and act accordingly among them passport office, national ID card office, ministry of education, public and private financial organizations are doing tremendous job safeguarding themselves storing the birth certificate with other documents”*.

Human Rights

After examining five interviews carefully it is noted that from the above three themes, human rights received the maximum number of frequency of references. The highest impact after the implementation of digital birth registration was conceived by the human rights area. Human rights are a vast range of activities that started from establishing a legal identity. When an individual completes birth registration it automatically offers a person documentary evidence.

Human rights cover access to information in education, the healthcare sector, and a range of social protection initiatives which include ending child marriage, stop human trafficking, ending child labor.

During the interview, an interviewee mentioned “*A few years back I was a child protection officer at that time me along with district magistrate was successful to stop quite a few girl child marriages in a remote area with the help of birth registration certificates*”. Last few years there are a couple of international Non-Governmental Organizations like Plan, UNICEF, UNHCR that are closely associated with the government to ensuring citizens’ human rights especially working for children in general. Bangladesh government has declared birth registration as a mandatory identity document for enrolling in educational institutes which is one of the big motivators to enhance the birth registration process. Most of the educational institutions have substantial contributions to increase birth registration last couple of years. They make accept it as a regular practice that they first ask for birth registration before going for further processing.

Vital Statistics

Vital statistics correspond to data of live births, migration, fetal deaths, weddings, and divorces. On the other hand, civil registry, an institutional method used by states to register important incidents that exist in their communities is the most effective means of gathering records about these events. Nevertheless, recording birth is the essential metric for future planning or initiating rapid wellbeing initiatives for healthcare purposes. It also has an impact to understand the population dynamics factor such as reproduction rate, migration ratio, men-women-child ratio. Bangladesh has gained a positive contribution from DBR in respective to having decentralized databases in different divisions. Government can easily track the population size, gender info, infant mortality rate, population growth rate of a particular area obtaining DBR's database information for allocating resources, development initiatives for the country's wellbeing.

5.1.2 Identified facilitating factors of DBR adoption

Raise Awareness

Raising public awareness is critical to get more support from the public and it creates enthusiasm among them. In the expert interview, the maximum number of interviewees put focus on raising awareness. As most of the people in Bangladesh live in the village area whereas maximum people are illiterate to understand a straight message from the government.

If the government just spread a direct message that birth registration is important and a new simple registration process government has introduced for their betterment so they should use this service, this message will only listen but barely try to understand the inside meaning of this message. So, to create awareness for such a group of people it is necessary to put oneself into their place and think in their aspects to find out the effective ways. One interviewee said that *“village people mostly believe in what they visualize so the most effective way to create awareness among such group people is campaigning, making informative advertising and regular telecast to radio and television.”* Another interviewee addressed that *“nowadays social media plays a significant role when it comes to creating awareness, though in the village people are struggling to get internet facility, however, if any important news comes into social media the news spread like wildfire via word of mouth.”*. Besides social media and electronic media NGO workers are tremendously helping the government in all development initiatives. Bangladesh has dramatically witnessed the huge growth of NGOs last couple of decades. In total, almost 26000 registered national and international NGOs are currently working in Bangladesh[77] they are contributing to the grassroots levels intending to empower the most are the vulnerable group in society. NGO workers generally selected from the root level so they can easily communicate and exchange information with each other, besides female NGO workers are playing the most crucial role in rural society. To address women and children centric problem in rural for example family planning, campaign for cervical cancer, breastfeeding, vaccination.

Women NGO workers are contributing unexplainable as a result Bangladesh has impressively got success removing polio disease, diarrhea and now they are working hard towards achieving success in the mandatory vaccination program. One interviewee revealed that *“healthcare workers are also a critical part in the awareness-raising as rural are people believe trust them more than anyone so if they advise or suggest anything at least they give a generous thought of it.”*

Establishing More Registration Centers

The existing registration centers are not adequate according to one expert stated during the interview session. According to the Office of the Register General Office’s website at present, registration services are available in 12 city corporation’s premises, 124 region office areas, 328 municipality corporation’s office locations, and 4571 union Parishad locations. There are 15 cantonment board offices across eight divisions also providing online registration facilities.

55 foreign Bangladesh high commission also providing these services for the Bangladeshi community. One expert mentioned in the interview that *“if village people aim to do birth registration, they need to go to nearby union Parishad office which in general quite far from the village are which they are not willing. From unprivileged people’s perspective spending transportation costs, registration fees, and commuting time is all waste.”* Another important aspect revealed from the interview is government staff who are engaging registration process in prescribed areas do not maintain ethical commitment, most of the time they misbehave if a person comes to do online registration the center and does not understand the instruction. One expert interviewee articulates an “unfriendly environment.”

Engaging Hospitals

Hospital’s engagement in the birth registration process is listed as a critical function. There are a huge number of live birth happening in public and hospitals, so it is very easy to issue a birth certificate from the hospital while leaving. In developed countries whenever a live birth happens a certificate is issued to the newborn by the physician, before signing it the physician crosschecks their record along with the hospital information system. After validating the credentials then it is being signed by the physician. Later when the child’s parent officially applies for birth registration this certificate certifies the evidence. According to one interviewee *“In Bangladesh most of the hospital record system is manual, when live childbirth happens, they preserved all the details manually and upon release day they do not deliver any certified copy adhering the birth details. So, parents who are less educated forget the date of birth even sometimes a year. After contacting hospital no information can regain and this is typical hospital management system”*. Introducing a health information system is a better approach to engage healthcare workers in the registration process. Apart from in placement of hospital information systems, the willingness of hospital management is a concerning factor. For government hospitals, implementation is far less than private hospitals. Additionally, healthcare worker's willingness of engaging in the registration system should take into account as this is an additional responsibility besides their core job.

Innovative Solution

Using the mobile application in the birth registration process gained huge success. Some of the African countries implement this solution and obtained great success. However, the international NGO Plan international has already proposed Bangladesh government consider new ways to enhance the registration process but the government so far not responded to this

new proposition. One expert interviewed mentioned *“mobile birth registration option is a great evolution to complete birth registration for Africa and South Asia region people, this option allowing people to stay at home and register the birth with the help of SMS. A smartphone and internet connectivity all are needed to complete registration.”*

5.1.3 Identified Barriers of DBR

The identified challenges currently the whole system is facing are given below.

BRIS Portal:

The government portal for Birth registration (BRIS) is not functioning since January 2021 due to server and database problems. The concerning authority publishes a press release in January stating that due to server and database problems the portal is not in service until further notice, they are trying to resolve the issue soonest. However, it's been five months since the portal still not functional and no further update has come up from the authority concerning the issue. For this reason, for the time being, the online registration process is ongoing. One interviewee mentioned during the interview that *“if this portal continues to malfunction and IT experts do not manage to fix the issue then there is a high possibility to lose huge amount of data from the database”*. In this regard experts from the ICT, ministry needs to come up with a feasible solution and start the registration process again.

Another problem was identified in the interview is the long processing time. When an applicant starts the application process and moves one step to another it takes a long processing time, sometimes shows an error, in that case, the applicant has to fill up the application form again which is not desirable for anyone. For effective use of the system ICT ministry and Office of the Register, the General office needs close collaboration to improve the portal's functionality and regularly monitoring the system.

The Limited Ability to Remove Duplicate

One of the major challenges in the online birth registration process is the lack of ability to detect duplicate application and remove it from the server. For that reason, a huge number of duplicate record exists in the system as a result the record of registration shows in the record system much bigger than the original one. One interviewee expressed that *“yes, the system cannot identify the duplicate application, and this is a key problem. ICT experts need to go deeper into the problem and propose durable solutions”*.

Decentralized Database

At present country's birth registration process is decentralized, meaning there is no central storage in place to store cumulative data. The main challenge of the decentralized database is it permits the user to store and retrieve data nearby the database. Users face difficulties while storing and retrieving data in the network interface. One interviewee expressed that *"BRIS database is decentralized in nature, the birth registration information stored respective locations. An individual can apply for registration from different locations, and this is one major cause for a substantial amount of duplicate registration application identified."* Another interviewee identified decentralized database as an obstacle for data interoperability, he said, *"to create data interoperability between two or more organizations it needs centralized database system in place otherwise the information cannot share properly with another network interface."*

In a centralized database, it is very easy to store data and remove data compare to the decentralized database. Most significantly data is more secure in a centralized database. To understand the importance of the centralized database government has recently announced that they are planning to shift all current data into a centralized database once everything finalizes. This is news for the registration process because it will remove all these problems make the process smooth.

Remove Registration Fee

The government's recommended price list for acquiring birth certificates is manageable for people who are living urban, suburban areas but for rural area people it is quite hard as their per day income is very low *"as a social protection specialist I have visited a lot of remote areas and observe their miserable life, some of their per day earning below 100tk (1 euro) so for those people spending money on birth certificates visible as a luxury, he further added government should think about this specific group of people and take initiatives to remove registration fees for them"*. So, the government needs to be closely monitoring this fact and act accordingly to increase this group's participation in the registration process.

Expand Internet Connectivity

According to statistics until June 2019, Bangladesh's internet penetration rate was 57% only. The country has 4 large modern telecom companies in services, and they have been engaging to setup nationwide a modern infrastructure-based microwave radio replay system to cover

network coverage whole Bangladesh. Thus, the initiatives still shortfall due to huge population, remote location where commuting is a great problem, electricity problem. One interviewee said that *“I have visited some registration centers that are located in a very remote area and while ongoing registration process suddenly networks connectivity turned down due to bad internet coverage.”*. To smoothly continuing the online registration process, need good internet connectivity. Hence, the government can closely work with the management of telecom companies if needed partnering with them to facilitate the network infrastructure for high-speed internet facilities all over the country. Training is also an important aspect that is related to the ICT division's initiative and current existing training need more emphasis. As the system regularly taking updates so workforce associated with this whole process needs regular training as a system and individual development purpose.

5.2 Outcome of the Citizen Survey

To get familiar with the citizens' perception of DBR in Bangladesh a Google survey form was created with an online link for survey data collection purposes and then shared among various educational institutions, social media, private and public organizations in Bangladesh. Based on the participant's responses a few pie charts are developed (which are presented in Appendix 3) and the survey data analysis conducted a combination of google spreadsheet and google form. The survey was conducted in April and in total 313 responses were stored. The survey was done anonymously besides some demographic information no personal information was collected. There are 12 questions outlined in the form that the author segmented into demographic, citizens' perception, perceived user risks, perceived benefits, perceived expectations. The survey question also gives a clear understanding of the research question in Bangladesh's citizens' perception.

Understanding Citizens Experience, Expectation, and Perception

Demographics are part of a survey questionnaire and represent characteristics of population size. In this survey author used age, gender, area, and education level to identify which group to survey to get meaningful survey information. As stated by Allen (2017) Demographic questionnaire serve *“Demographic questions serve two major purposes. One is demographic questions allow the researcher to obtain a clear picture of who participated in the study and the second one is the research problem being addressed may require an understanding of certain demographic characteristics”* [78].

The goal of the first four survey questions was to collect demographic information of respondents which gives a clear understanding of the participant's age, gender, location, level of education information. These survey questions help to better understand the background characteristics of certain groups of people which helps to design a useful service for citizens. Based on respondent's answers from the first survey question it is visible that the maximum number of respondents belongs to the age group 20-35, 66%, then the second-highest respondents belong to the age group up to 20, 15.7%. The lowest respondents are above 50 age group, 3.5%. So, it is evident that mostly younger generation to mid-age group participants goes has the experiences of registration process compared to the older generation (Appendix 4, figure 8).

The second question represents the gender engagement in the survey process, which gender group mostly used this service it was taken into account. It gives a clear idea that male participants obtain birth registration more than the female group. Responses show that 59% of male and 39% of female participants had the experience of the birth registration process (Appendix 4, figure 9). In Bangladesh discrimination between gender equality is a concerning issue, society is male dominated as a result of a girl child born before being stepping into an adult force to get married at a very early age. 59% of girl child get married before reach to 18 in Bangladesh which the highest number in South Asia (US aid-Gender equality and women's empowerment, n.d.). If a girl obtains a birth registration certificate, then NGO workers or law enforcement institutions can stop the child marriage as they have the legal document that proves the girl's original age.

The feedback received from the third survey questionnaire indicates the location specification. People who are living in the urban and suburban areas are the large number who responses to this survey (48.1% and 31.7%), this also interpret that urban and suburban people of Bangladesh are more aware of this service and presuming that they have completed their birth registration. People who are living abroad are also aware of this service and compare to the percentage of people who live abroad the response is very good (10.9%). The lowest percentage of response comes from the rural area (Appendix 4, figure 10).

Since this, an online survey and most of the rural area people do not get enough internet facilities or availability of network coverage to answer this survey question that author presume, hence it could be the probable reason for receiving less response from this group.

The level of education of the participants was asked in the fourth survey questionnaire where

74% of respondents selected their level of education graduate and postgraduate and second-highest category respondent 20.2% completed their school. The less 4.2% respondents marked their level of education completed basic education which means below 10th grade (Appendix 4, figure 11).

Citizens' Perception

The fifth survey questionnaire comprised of respondent's responses to the question of how they processed their birth registration, and 66% of respondent's responses listed they used a paper-based system, and 33% done online (Appendix 4, figure 12). This survey response aligns with the research question and critical evidence that people still prefer to carry out birth registration manually despite having an alternative online service is already in place.

From the previous survey question, it is evident that people used the manual birth registration process while acquiring birth certificates. On the other hand, their response to this survey question of which model of the way they feel convenient if they give chance to do birth registration represents the high frequency of respondents feels digital birth registration process. 79.5% prefer digital process and only 20.5% of participants prefer manual process (Appendix 4, figure 13). The author finds a gap between these two survey questions as a bigger percentage of participants used the manual process during registering the birth, however, at the same time they also intend to use digital service. This may indicate they faced any difficulties while doing online registration, upon failing they go for paper-based service.

The seventh survey questionnaire represents input from the respondents which analyzes the current barriers outlined. 63% of respondents click yes to the question of did they face any difficulties while accessing the digital birth registration state portal and 36% mentioned they did not face difficulties (Appendix 4, figure 14). The author also finds a valid statement in favor of the DBR accessing problem. Since January 2020 the portal is not functioning as stated by the responsible authority person AKM Masudur Rahman, deputy registrar general (DRG) of the Office of the Registrar General Birth and Death under local Government confirmed that the server is down and hence not functioning [79].

Eights survey question indicated to choose any of the problems that relate to the DBR portal while accessing it, 35.6% of respondents think that they do not have adequate information of this portal, if any new information or changes come the concerned organization must acknowledge that. 32.4% of responses find it difficult to access the portal as it takes a very long processing time. 17 % of respondents feel that they did not face any problem when they

accessed before. 11.2% do not understand where to start as they are not acutely aware of this portal before, and 3.8% of respondents think they do not understand the instructions given in the portal (Appendix 4, figure 15). From the response, it is visible that there is a massive lack of awareness that exists which causes less acceptance of this service. The second-highest percentage of respondents indicates that accessing the government birth registration portal takes longer processing time which is also a factor that affects citizens' acceptance. Some respondents select the option that they did not understand the instruction how to process the registration and another group of respondents does not know how to start. Both problems are results of not implementing user-centric public service design. While designing the portal the web designer must consider the user understanding level and expectations.

Perceived User Risks

The ninth survey question was asked to participants to get a clear understanding of their perception of DBR related risks. 34.9% of respondents think that privacy and data protection is a major concern considering increasing awareness of privacy and data protection across the world. 29% feel that there is no risk associated with the service. 22% of respondents showed their concern about identity theft, for instance, if any other organization or hacker possession someone's identity credentials and commits fraud which creates great risk. Furthermore, 13.5% of respondents claim that the system does not meet their expectations. They were expecting far better service compared to the existing service (Appendix 4, figure 16).

Perceived Benefits

The tenth survey question was placed to get a clear understanding of how the respondents recognized the potential benefits of DBR from four options given by the author. 47% believe that DBR helps to remove duplication. There are a huge number of duplicate application exists in the database. 20% of respondents believe it will improve data quality as it is a computerized system and all data entry checked by IT officer which enhances the store data quality. However, 17% of respondents feel that DBR helps to reduce data loss and 14.7% believe the system creates a great deal of accountability (Appendix 4, figure 17).

Expectations

The eleventh survey question was formed to comprehend the respondent's perception towards embracing DBR. 48.4% of respondents agree that this system will enhance the birth registration process, 32.7% strongly agree with this statement. 15.1% of respondents click the Neutral that means they are not sure yet. In addition to that 3.8% disagree with the statement meaning they

sure that this system will not help to increase birth registration (Appendix 4, figure 18).

The last survey question was incorporated to validate if the respondents recommend using this online service or a manual process to their friends, family, colleagues whoever is not aware of this service yet. 77.5% of respondents' node as yes, they will recommend 16.4% clicked no. probably these respondents are still hesitant to accept this service and 6.1 % say no which means they prefer manual process rather using this online service (Appendix 4, figure 19). The upcoming sub-section of this chapter will elaborately focus on the outcome of the questionnaire.

5.3 Analysis and Discussion

From the survey questionnaire and expert interviews, below is presented the outcome of the study, which supports a better understanding of the current scenario of citizens' adoption of DBR in Bangladesh. The study showed that Bangladesh still struggles variety of barriers to the implementation of e-governance as the country is overpopulated and the literacy rate low which results in social, political, cultural impediments towards accepting e-governance initiatives. The theories which were discussed in the previous chapter are very much related to the current context. In the Bangladesh country context, the TRA and DOI act as barriers as during the interview one interviewee from Plan International revealed that citizens and public organizations servants are hesitant to accept technology-related services, the interviewee closely worked with both and party in the DBR implementation process back in 2014. In addition to this, from the survey questionnaire this it is visible that yet registration completion in the manual process is higher than DBR. Furthermore, they are afraid of failure and show less interest to learn new technology and accept that as well. Public servants who are linked with the online registration process need regular proper training as the technology changes over time, so they need to incline with the system to deliver accurate service. The technology acceptance model has been of great relevance in this research. In the survey questionnaire participants indicated that they want to use DBR, however, they also indicated that they believe DBR's possible risk is privacy and data protection, and identity theft. These two concerns make them confused to use this system. Older generation people and rural area people on the other hand prefer to use manual systems as they gain fear of accepting new technology. Nevertheless, raising awareness among the citizen can be used as a facilitator towards DBR adoption. The unified theory of acceptance and use of technology also has great relevance to this study.

From the survey questionnaire, it is evident that citizens are encouraged to use the DBR but when they access to BRIS government portal some of them find it difficult as it takes a long processing time and some of them do not understand the instruction hence, this results in less interest to use this service. To mitigate these problems government, need to focus on identifying problems related to the website and restricting a user-centric website, that motivates citizens to use this service.

To increase the efficiency of the online service it is needed to provide up-to-date information in the web portal without glitch-free as many respondents informed that the current DBR portal is not functioning for a long time and before that people also have issues with accessing the application form. Moreover, awareness increases an essential part to increase adoption of DBR so government should focus on massive advertising in electronic and social media which are the best platforms to reach mass people easily. Furthermore, the government has established a vision a few years back to transform Bangladesh into a completely digital state by 2021. However, the year 2021 is running but the country needs to focus more to achieve the dream of Digital Bangladesh. To do so the government needs to focus on IT infrastructure development especially expanding internet availability and coverage. Without the availability of the internet, it would not be possible to increase the usage of service. Good governance theory was proposed by the World Bank in 1989. Good governance concern with ensuring transparency, accountability, responsiveness, and effectiveness of a country's overall system. E-governance is also working towards increasing transparency, better service delivery, minimizing costs, etc. Therefore, good governance and e-governance both have an empirical relationship that goes hand in hand. Overall, to increase the adoption of DBR government identify the barriers and take preventive initiatives to enhance the service.

5.4 Research Limitations

Qualitative research data analysis is a time-consuming process, and it creates ambiguities while conducting human interactions and the findings cannot be expanded to the mass people with the same reliability that the quantitative analysis capable of [80]. Conducting this research is not completely out of shortcomings as the research is completely centered on the researcher's assessment and the interpretation of the subject matter and the methods, process, and context is opposite to quantitative research [81]. There is always a possibility that the study results can wrongly represent the results and create a conclusion from the results. Yin highlights that to

understand the phenomenon and to conduct tests for exploratory case study the most useful method is checking the reliability and validity of the contexts [82]. Validity gives a clear understanding of the findings of the case study would be comprehensive or not and reliability confirms the consistency of the data collection procedure for instance if the collection procedure repeats then the result should be remaining the same as previous.

The author of this research has a deep understanding of this subject matter as the author conducts a birth registration process before choosing the research topic. Also, the author had worked with an international developing organization which also helps to understand the scenario better. To reduce ambiguity and biasness the author has taken probably all kinds of preventive measures and construct the questionnaire according to the guidelines which help to get the exact information from the interviewees.

Covid-19 Pandemic has greatly affected this study. The initial plan was for the author to conduct face-to-face interviews, however, it was not possible at all so all the interviews were arranged via phone, skype, and messenger call. As some of the experts were from government organizations, the anonymity of the interviewees was required to be maintained, due to the sensitivity and confidentiality of the information provided.

6. Conclusion and Future Work

This research aims to evaluate the country's adoption of digital birth registration in the Bangladesh context. The government has adopted e-government initiatives under a2i an e-government program of the prime minister's office under the ICT division. This program office consistently creating efforts to offer public delivery service into eservice. The government's efforts to improve public service delivery are continuous and as part of this project introduced digital birth registration a few years back.

In response to the first research question findings, the author has analyzed how citizens of Bangladesh reacted to the implementation of DBR. Before starting analyzing the author chooses some ICT adoption theories to inline the research question and theoretical framework. Some successful examples of digital birth registration case studies were also analyzed. To conduct this exploratory case study, data collection was completed via an online survey and the author has interviewed five excerpts from different stakeholders who are associated with this system. Based on both findings it is visible that citizens are willing to accept and use this service and thus they think that improving registration will have positive effects on ensuring legal identity, protecting children from violence, and ensure smooth access to information to avail different public services. Another benefit identified from the research is as improving vital statistics. VS has an enormous impact on the national level budget and development-funded project commencements. This gives solid demographic information about a country's citizens. For example, sharing birth-related information with the healthcare sector makes public health care facilities more advanced particularly the government's vaccination program, cancer awareness program, etc.

To answer sub research question author has identified some barriers from the interview and survey questionnaire, these are the probable root cause of less adoption of this service. The state online application portal (<http://br.lgd.gov.bd/english.html>) has been malfunctioning for a long time for some server and database problems. For this reason, a lot of people who aim to do DBR now go back to the manual process which is time-consuming and involves hassle. Another barrier is the systems' lack of ability to detect duplicate applications. Sometimes people apply for an online birth registration then once the process successfully competes, they need to collect the birth certificate. Sometimes a person does not collect the certificate timely

then later again apply online with a new application and the system barely catches this duplication and removes it from the system. For this reason, an enormous application exists in the DBR database which gives wrong data about the completion of the online birth registration number. The DBR database is decentralized in nature which is another problem for storing duplicate registration. The citizen can apply online application anywhere from the country, as the database is decentralized so the record is being stored from wherever a person applies. The last barrier identified as a limited number of online birth registration centers for the sun urban and rural are people who do not have availability or know how to apply via the portal. A huge percentage population is illiterate, and they completely rely on registration centers. These centers are very far from the village are and to go union Parishad takes time and costs money. So, the government needs to take initiatives to expand registration centers to each village area to increase the adoption.

To answer the third sub-research question there are some factors such as awareness raise, removing registration fee, proposing innovative solutions, and expanding internet coverage identified as a facilitator to improve the DBR adoption. Awareness raise is an essential part to let people know information about the usage, process, and procedures, for Bangladesh county context electronic media such as TV, Radio is a most effective medium to reach grassroots level people. Government can rethink the costs of the DBR process for the rural area people. As this is people suffer extreme poverty, so their daily earning is very low. Whenever they advised doing birth registration they denied doing so because they value the money while they have to spend for registration. Even they do not understand the meaning of this document. New innovative solutions can also enhance the birth registration process such as the mobile birth registration process which is gaining popularity in South Africa and neighboring country Pakistan. Two provinces in Pakistan initiate this innovative solution and results in tremendous impacts in the completion of the birth registration process. Hence, Pakistan is expanding this project all over the country.

6.1 Future Work

So far, the author did not find any study that has been conducted on the technology adoption in Bangladesh which is a lacking current research field. This research could be a base for future research in the field of formulating an ant technology adoption model. Though more research is needed in this field to improve the country's e-governance implementation process.

Academicians are using different technology adoption theories to country-specific contexts which is an indication that there are no specific theories is needed to determine the outcome of research rather mixing some theories form a unified way to get through the aiming research outcome. For future studies, it would be beneficial to determine the research by conducting hypotheses in the contextual environment. In addition to that, mixing some theories and make a hybrid theoretical framework also can help specially TAM, UTUAT, DOI as these theories are focus on different aspects of human behavior, expectation, perceptions which could help to have a proper justification from different approaches of a research study.

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Appendix 2 – Interview Questions

Interview Questions

A representative from the Office of the Registrar General under LGED

1. What does the Office of the Registrar General do could you briefly describe?
2. What is the current process of birth registration?
3. What is the approximate population percentage completed birth registration so far?
4. What were the problems aligning with the manual birth registration process?
5. Would you briefly describe what are the reasons that the government decided to implement DBR?
6. Do citizens of Bangladesh adequately inform about the online birth registration service?
7. How would you describe the citizen's experience of the online birth registration process?
8. What are the benefits in your opinion the organization faced after implementing the system?
9. What are the challenges in your opinion the organization faced after executing the implementation of online birth registration?

A Representative from the Donor Organization (Plan International)

1. What was the plan's motivation to partner with the government to initiate digital birth registration in Bangladesh?
2. Does the location of registration facilities are enough according to your viewpoint?
3. Do you think childbirth registration can act as a prevention tool for ending child marriage?
4. What are the existing problems creating barriers to accessing online birth registration?
5. What kind of feedback did you receive from the citizens after the implementation of online birth registration?
6. In the context of Bangladesh are citizens show a willingness to use this service or they prefer manual service?
7. How rural people using this service and are they clear about the process?
8. Do you think the BRIS portal functioning properly at present?

9. Does Plan think of any other innovative solution to introduce in Bangladesh? i.e., mobile application?

A Representative from ICT Division

1. What kind of role-play the ICT division does in the online birth registration process?
2. How effectively is the BRIS portal functioning?
3. Do citizens of Bangladesh adequately inform about the online birth registration service?
4. How would you describe the citizen's experience of the online birth registration process?
5. What are the main challenges you observe in the process?
6. How often does the ICT division organize training for the employees who are conducting online registration at the field level?
7. What are the challenges in your opinion the organization faced after executing the system?
8. Do you propose any recommendations to improve service?

A Representative from Public Health Care Sector

1. What problems does a physician in particular face when a patient comes and does not provide an accurate birth date?
2. Do citizens of Bangladesh adequately inform about the online birth registration service?
3. Tell us how the health care sector could play a vital role in increasing registered birth?
 - a) If yes, how?
 - b) If no, why?
4. What are the benefits children get who are under 5 if their birth is registered?
5. Tell me your opinion are health care workers in the best position to create awareness among citizens?

A Representative from Civil Society

1. What is the importance of birth registration?
2. Do you and your family have birth registration?
3. How did you acquire them? manual or online process?
4. Did you hear about the BIRS state portal which is operating for online birth registration?
5. What is your opinion about the functionality of the BRIS portal?
6. Which process (manual or online) is more convenient in your opinion?
7. Do you think besides existing systems implementing an alternative solution like mobile technology can increase birth registration?
8. What would be your suggestion on DRR, if any?

Appendix 3 – NVIVO mind map (Interview’s outcome)

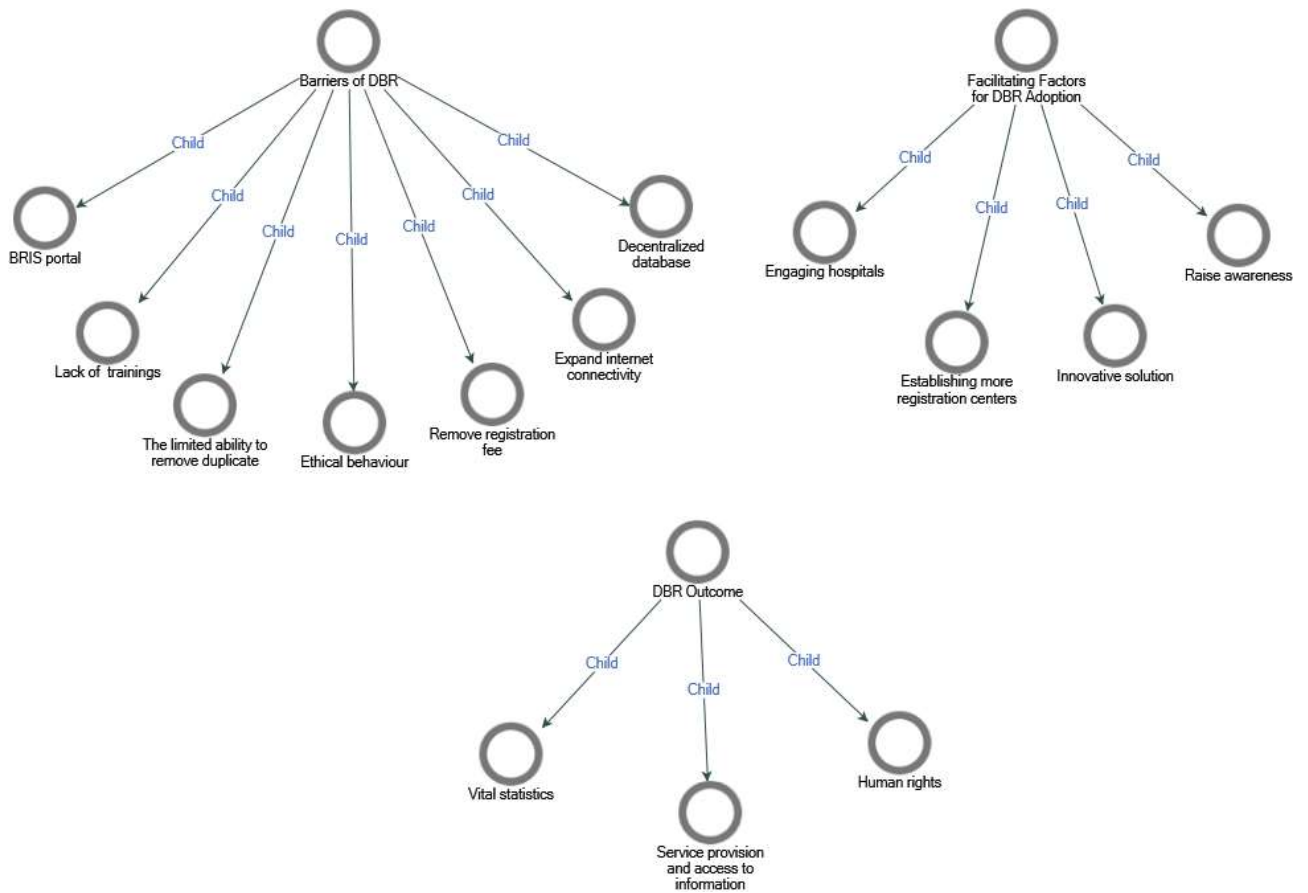


Figure 6:Thematic Analysis

Appendix 4 - Survey Results

Q.1 To which age group do you belong?

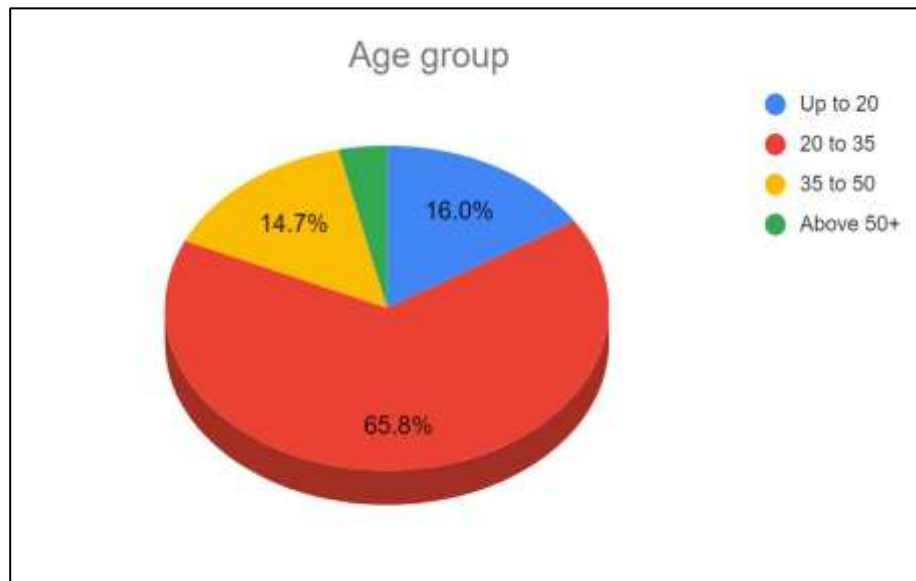


Figure 8: Respondent's representation into age group

Q.2 Please indicate your gender.

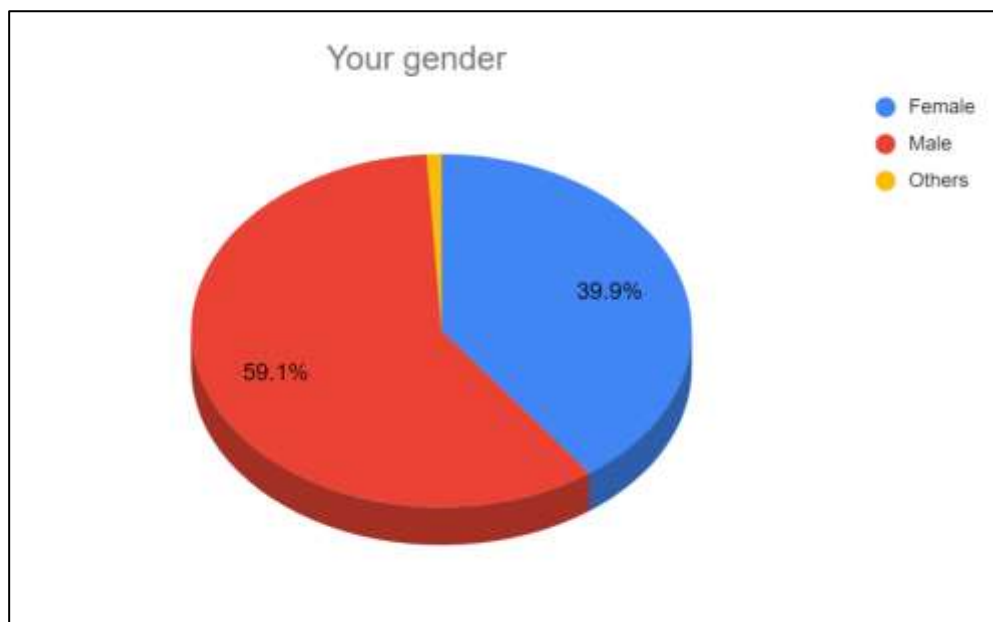


Figure 9: Respondent's representation into gender

Q.3 Which area do you live?

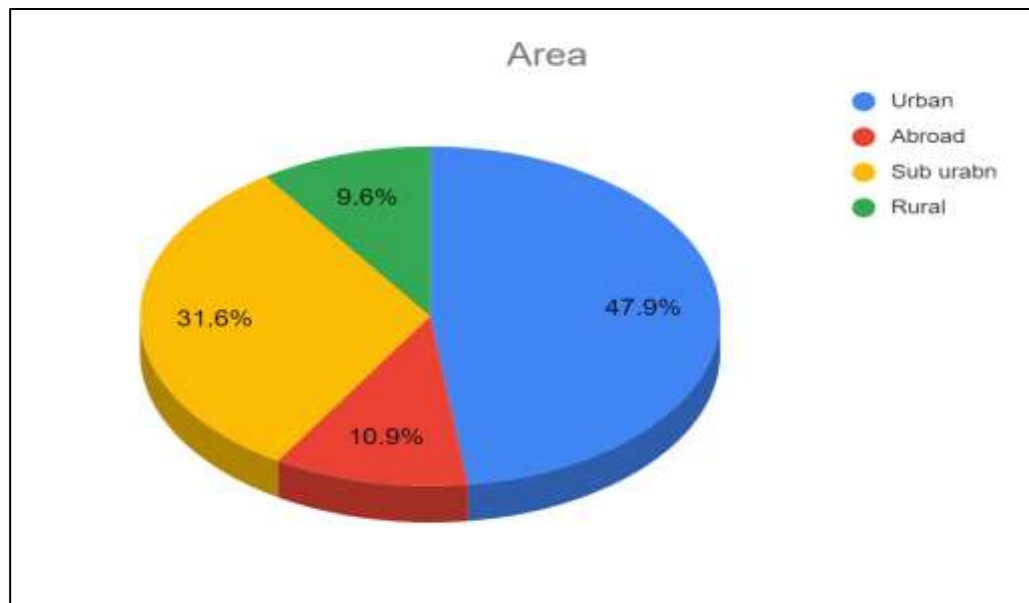


Figure 10: Respondent's representation into area

Q.4 Please indicate the level of your education.

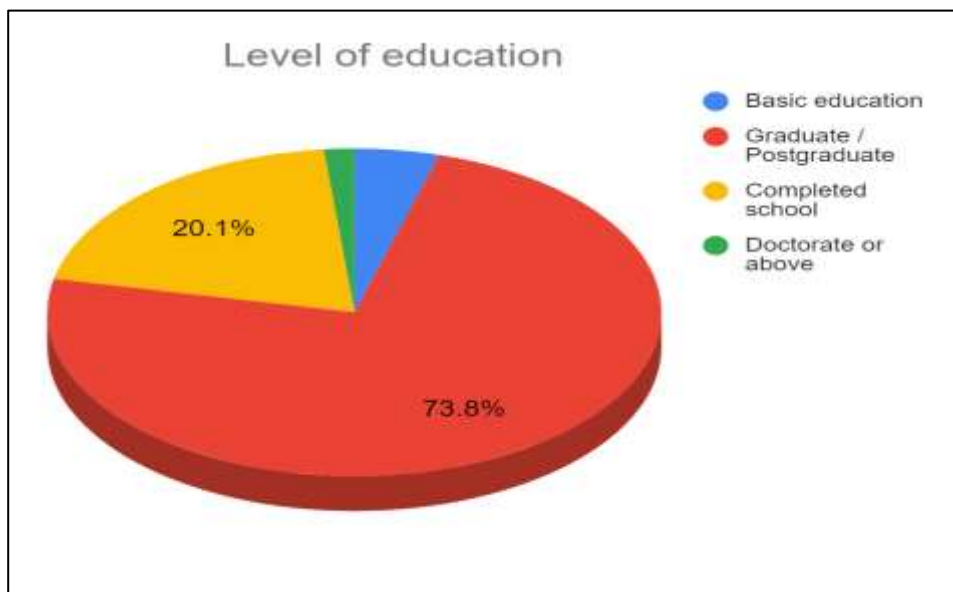


Figure 11: Respondent's representation of education

Q.5 If you have birth certificate then how did you register your birth to acquire it?

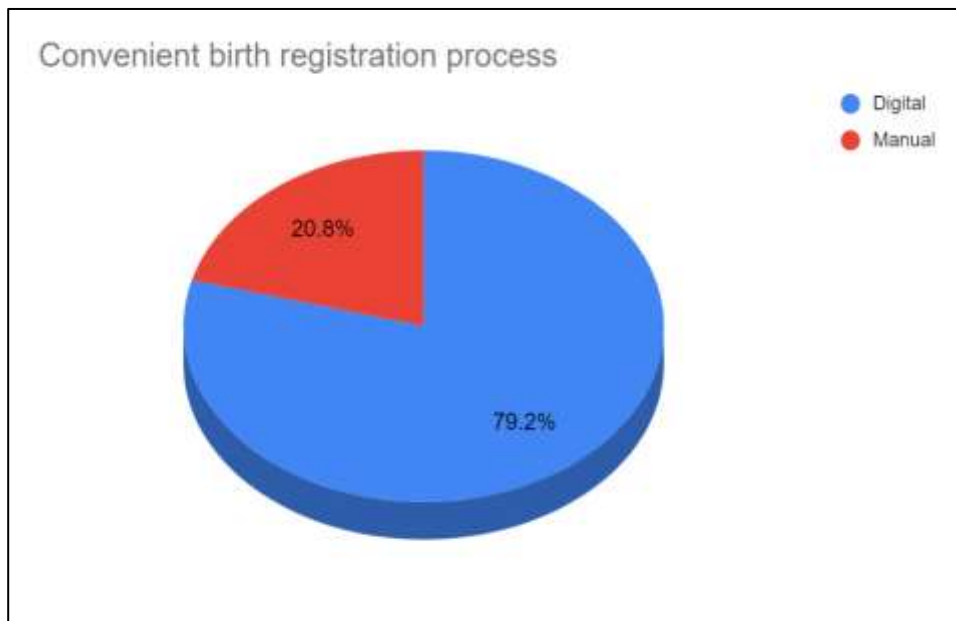


Figure 12: Respondent's representation of convenient registration process

Q.6 Did you face any difficulties accessing DBR system?

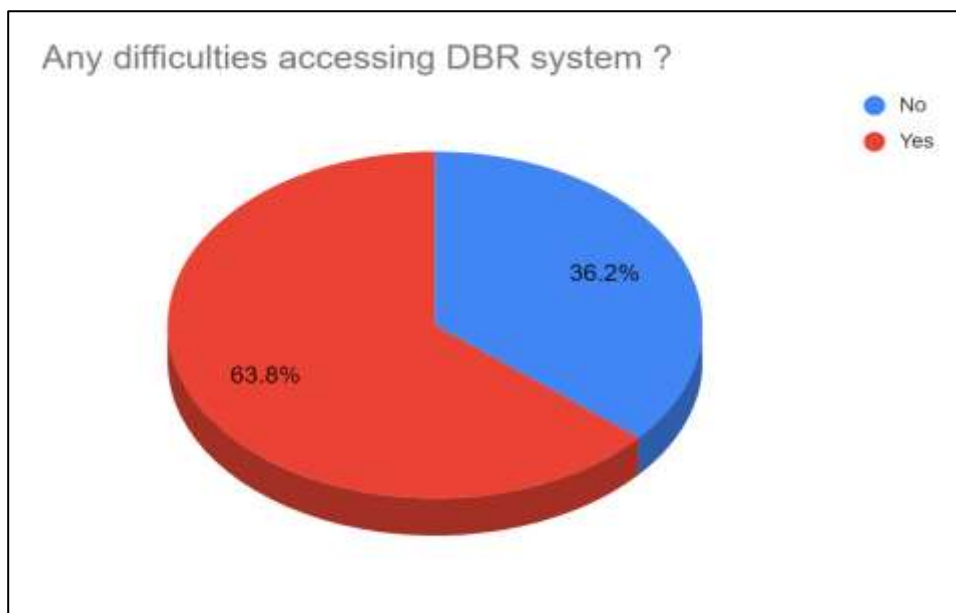


Figure 13: Respondent's representation of DBR access

Q.7 If you have birth certificate then how did you register your birth to acquire it?

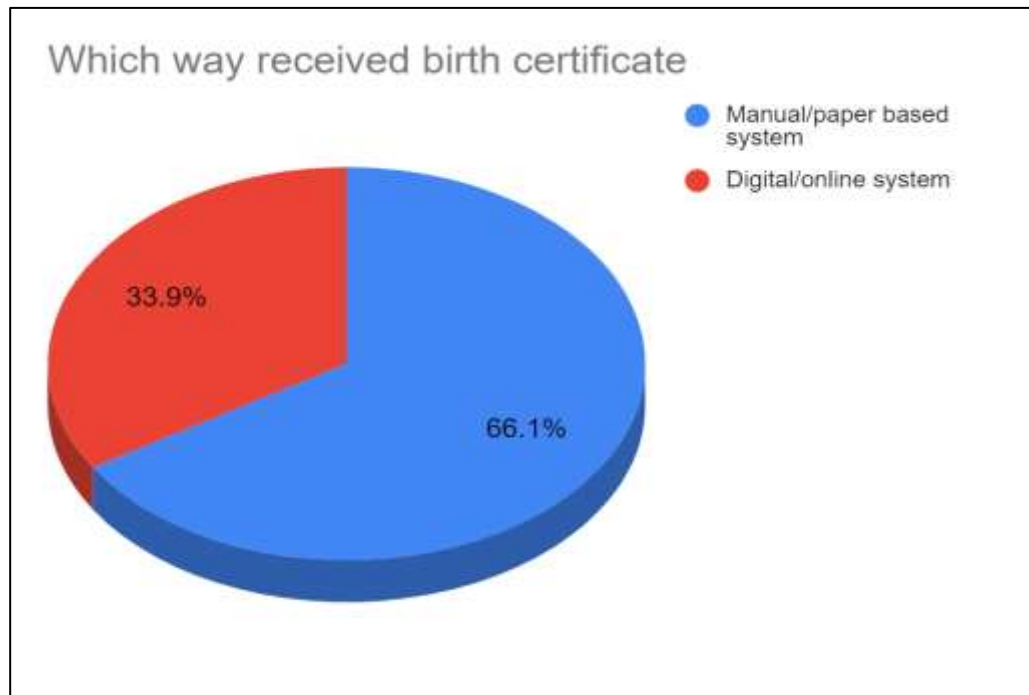


Figure 14: Respondent's representation of how they acquire birth certificate

Q. 8 Could you relate any problem from below?

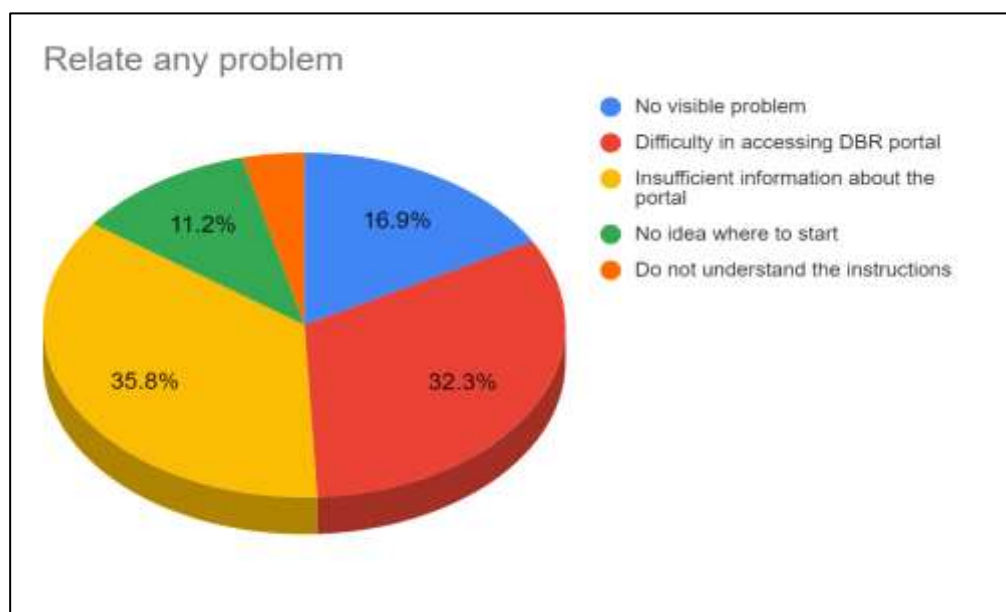


Figure 15: Respondent's representation of DBR access related problem

Q.9 What are the risks associated with DBR?

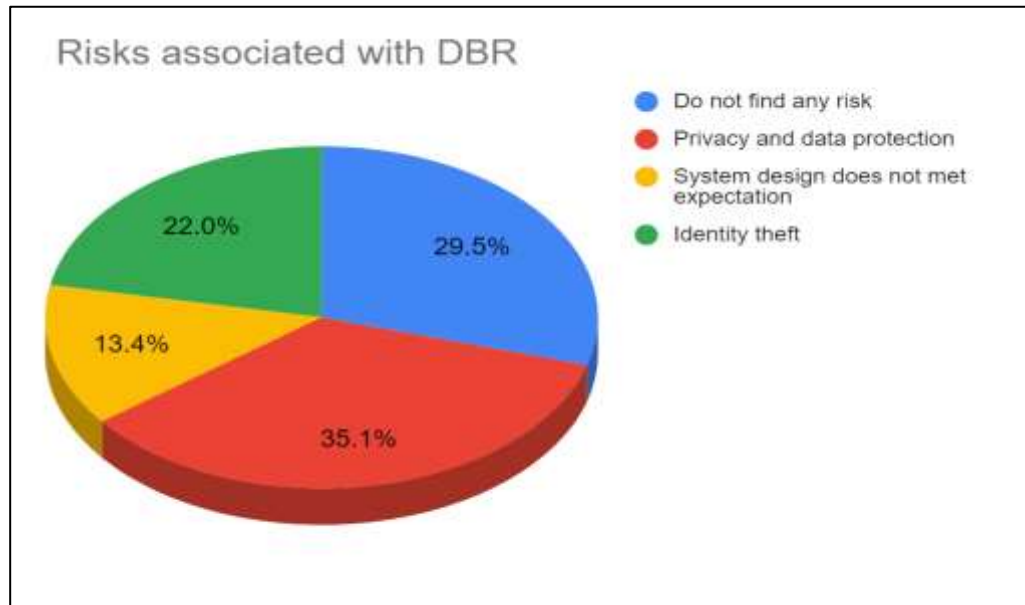


Figure 16: Respondent's representation of risks

Q.10 What are the advantages of DBR in your opinion?

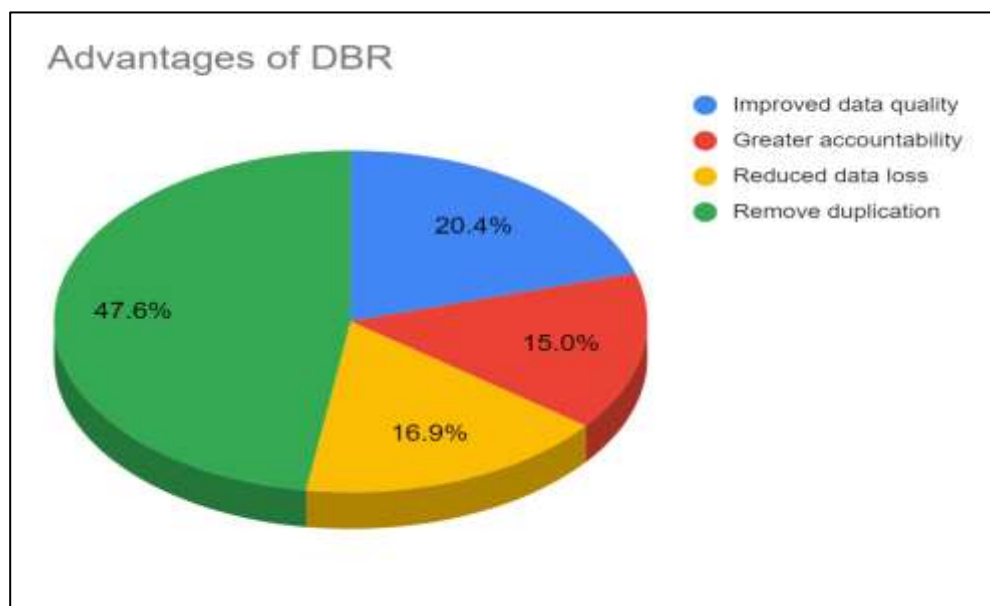


Figure 17: Respondent's representation of advantages of DBR

Q.11 Do you agree DBR enhances the birth registration process in Bangladesh?



Figure 18: Respondent's opinion on DBR enhances the registration process.

Q.12 Would you recommend using this e-service to your friends and family?

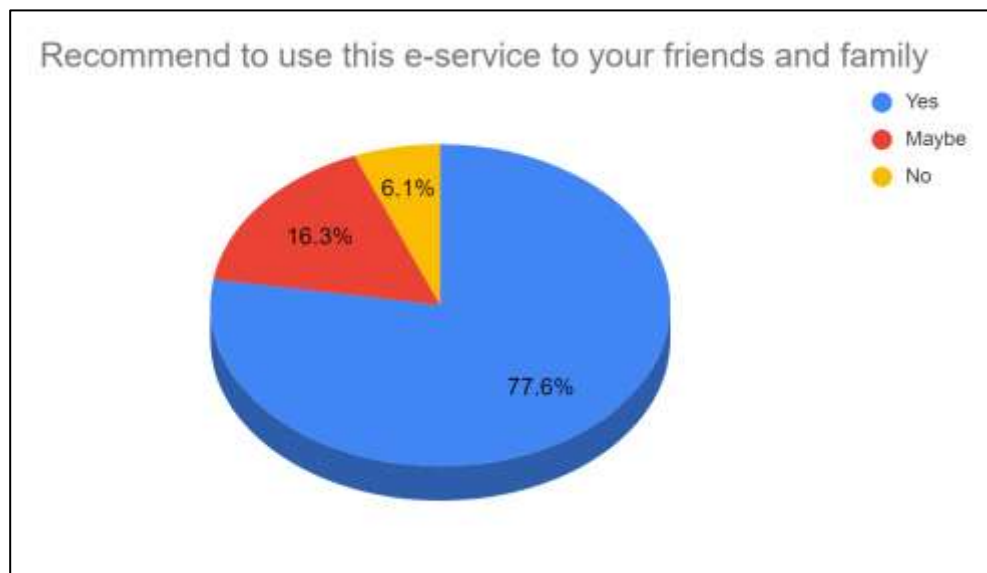


Figure 19: Respondent's opinion on recommends using this service