Final Draft

Technological Options for Bangladesh Pharmacy Model Initiative (BPMI)

HK Consulting Ltd

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# Acronyms/Abbreviations

|  |  |
| --- | --- |
| ADDO | Accredited Drug Dispensing Outlet |
| ADS | Accredited Drug Store |
| AMR | Anti Microbial Resistance |
| API | Application Programming Interface |
| BBS | Bangladesh Bureau of Statistics |
| BCC | Bangladesh Computer Council |
| BCDS | Bangladesh Chemists and Druggists Samity |
| BMDC | Bangladesh Medical and Dental Council |
| BPMI | Bangladesh Pharmacy Model Initiative |
| BPS | Bangladesh Pharmaceutical Society |
| BTEB | Bangladesh Technical Education Board |
| CCDS | Citizen Core Data Structure |
| DGDA | Directorate General of Drug Administration |
| GOB | Government of Bangladesh |
| ICT | information and communication technologies |
| ITIDO | Invention and Technological Ideas Development Organization |
| MDG | Millennium Development Goals |
| MFS | Mobile Financial Services |
| MNO | Mobile Network Operators |
| MOC | Ministry of Commerce |
| MOE | Ministry of Education |
| MOHFW | Ministry of Health and Family Welfare |
| MOPT&ICT | Ministry of Post, Telecommunication and Information Technology |
| MSH | Management Sciences for Health |
| PCB | Pharmacy Council of Bangladesh |
| PCT | Pharmacy Council of Tanzania |
| SDG | Sustainable Development Goals |
| SME | Small and Medium Enterprises |
| SMS | Short Messaging Service |
| TFDA | Tanzania Food and Drug Authority |
| USSD | Unstructured Supplementary Service Data |
| WAP | Wireless Application Protocol |
| WB | World Bank |
| WHO | World Health Organization |

# Executive Summary

This study aims is to recommend technological solutions for the Bangladesh Pharmacy Model Initiative (BPMI) being developed by Management Sciences for Health (MSH) on behalf of Directorate General of Drug Administration (DGDA) under the Ministry of Health and Family Welfare (MOHFW), Government of Bangladesh (GOB). The BPMI seeks to bring changes into the dispensing practices in the registered pharmacies based on Accredited Drug Dispensing Outlet (ADDO) model first introduced in Tanzania.

Bangladesh has made positive gains in health indicators consistently over the last few decades. Notable progress was made in meeting MDG targets. MOHFW promotes public health with emphasis on primary health care. Provision of public health care, however, is fraught with access issues and public sector facilities fail to provide desired level of services. For a large number of population seeking healthcare may start with an untrained provider or a pharmacist in a medicine shop. While questions could be raised about the prescription behavior of large number of physicians, prescription drugs are available on demand at the drugstore. Indiscriminate use of antibiotics among a large population is contributing to the rise of anti-microbial resistance. Improving dispensing practices can result in better health service delivery.

The Ministry of Health and Family Welfare (MOHFW) is responsible for formulating national policies on health and for ensuring their implementation through field offices. The DGDA is responsible for drugs. The supply of medicines lies at the core of health care delivery and is an important element in health system building blocks. Ensuring the availability of essential medicines is also a policy objective of the GOB.

The pharmaceutical industry is engaged in the development, production and marketing of medicines. Life expectancy has increased in Bangladesh. Lifestyle changes are contributing to increase of non-communicable diseases. Bangladesh is now faced with double burden of communicable and non-communicable diseases. NCDs are life-long diseases. Thus people's need for medicine continues to increase which translates into greater demand. The regulators need to assure that pharmaceutical products remain accessible and affordable to the large population.

One of the main functions of the DGDA is to provide license to the retail drug shops to carry on business at any place in the country and is also required to inspect those drug shops. There are 105,610 registered pharmacies in Bangladesh. About 50% of the pharmacies do not renew their registration on time or ever. In reality, the total number of drug shops could be double or more that number, which means many such establishments remain outside any regulatory oversight and deprive the government of a significant revenue. A pharmacy cannot be established without a registered pharmacist. The inspection, one of the core duties of the DGDA are not properly carried out, lack of manpower could be a reason. There are infrastructural differences in the pharmacies. Some do not have any refrigerator, though they are selling drugs that should be stored in refrigerator. Counterfeit drugs are also sold in the market. Reforms should be carried out in pharmacies by enlisting the support of the traders.

There is no Management Information System (MIS) unit in DGDA. However, DGDA generates daily and monthly data on some key performance areas. Digital transformations are occurring in DGDA. DGDA website is rich in contents. Databases could be accessed from the site to know about registered drugs, registered pharmacies, pharmaceutical companies etc. If the database on registered pharmacies is updated and additional data is collected, its functionality would increase and allow managing the license processes or other management functions. These resources could be utilized to move ahead. Providing registration and other services online could increase e‑government footprint of DGDA.

There is awareness in the DGDA about managing information and a collaborative effort with DGHS is resulting in availability of data through DHIS2 platform. DGDA is also working to improve services through developing software program that include registration. DGDA is going to participate in the NSW (National Single Window). It would allow the DGDA to monitor raw materials import under block list.

The Pharmacy council of Bangladesh (PCB) is the professional body set up to maintain standards of education and practice in pharmacy. The PCB maintains registers of A, B and C grade pharmacists. Graduate pharmacists are accorded A, while the diploma holders B and certificate holders C grades. C grade pharmacists are trained jointly by BCDS and BPS. The examination is taken by PCB. Question papers are set by university teachers.

The number of registered pharmacies is greater than the number of pharmacists registered with the PCB. There is problem in the supply side. If DGDA were to enforce the pharmacist requirement in the pharmacies, PCB won't be able to ensure the supply of C grade pharmacist in the short term. So alternative should be explored to increase the number of C grade pharmacists.

BPMI found its inspiration from the accredited drug dispensing outlets (ADDO) program of Tanzania. The Pharmacy Council of Tanzania (PCT) is responsible for regulating ADDOs. The PCT wanted to develop a comprehensive database to organize information on ADDO and pharmacy facilities and personnel. Invention and Technological Ideas Development Organization (ITIDO) was commissioned to develop an ADDO and pharmacy database and mobile technology applications to suit PCT’s needs. The key feature of the pilots were: A web-based databaseof private sector drug outlets’ facilities and personnel, including information on facility registration, personnel qualifications and certifications, inspections, and personnel and premises fees payment. Information was made available to ADDO owners through mobile platforms. Priority was given on mobile payment for collection of revenues by the PCT. They designed a solution based on SMS as most of the dispenser had little access to feature or smart phones. The solutions were used effectively for payment by small firms and also to provide key information to the stakeholders. Tanzanian pilot suggests mobile platform could be a viable option.

Under BPMI, two standards have been proposed: Standard I and Standard II. Technologies based on information and communication technologies (ICT) are rapidly changing the world. The adoption rate of new ICT technologies especially mobile technologies have been great. Therefore a combination of mobile and web based solutions with backend database functions would be preferred. BPMI registration would be an existing or new application for establishment of a pharmacy. BPMI applicants would have to meet specific requirements or conditions.

This study comes with a host of recommendations that address the BPMI as well as overall digitization of DGDA. Some strategic objective have guided the formulation of the recommendations which are: build upon existing resources (enhance existing databases); focus on online services and automating business processes; emphasize mobile solutions based on technology adoption, trends and country situation; build capacities and strengthen MIS functions; minimize investment requirement by collaborate with other government agencies. The recommendations are enumerated below.

**Registration and website management**

The following recommendations address suggested online services and improvement of the current website of DGDA:

1. Allow registration/renewal of pharmacies online through mobile and web applications starting with BPMI
2. Make the registered pharmacy database interactive for the visitors and transactional for the clients with access control based on users and perform functions like alerts for renewal through email or SMS following expiry of the license or notifications at different stages of approval of registration
3. Increase the functionality of registered pharmacies database and devise a strategy to collect additional data from the pharmacy owners and create elaborate search functions for use in decision making by the DGDA staff with tools for visualization
4. Develop Android App for inspection of pharmacies using tablet PCs in both online and offline mode with the ability to integrate GPS data or other meta data
5. Examine the design issues of the database e.g. change the numbering scheme of the pharmacies, implement national standards like CCDS, BBS geo code
6. Make the existing website mobile-friendly or implement responsive design
7. Make the website bilingual - create content in Bangla
8. Ensure that capability of mobile app for finding registered pharmacies (on-going activity) and counterfeit drugs are enhanced through use of manufacturing data
9. Distinguish which data should be provided on html pages, rather than in pdf files

**Social media**

The social media can play an important role in disseminating the activities of the DGDA regarding the BPMI model as well as routine activities. Therefore it is suggested that

1. Utilize the social media platform for informing its stakeholders about the BPMI Initiatives on a regular basis
2. Create web content on rational use of drugs and address anti-microbial resistance issues

**Mobile payment**

Mobile money is gaining ground in Bangladesh and its role would increase. Mobile payment option is currently seems difficult for DGDA. However, PCB would be in a position to utilize the mobile payment options for examinations or registration of students. Therefore it is suggested that the PCB might

1. Consider opening a merchant account with a suitable mobile financial service provider for collection of examination fees of C grade pharmacist and also for registration

**Pharmacy Education**

PCB needs to make the database of pharmacists functional and also increase the educational opportunities for the C grade pharmacists. It is suggested that

1. Populate the pharmacist database from written records or registers and allow the verification of any specific pharmacist through website, also collect additional data such as workplace information etc
2. Create mobile apps for using the pharmacist database of PCB by pharmacists, owner of drug shops or anyone
3. Negotiate with educational portals for introducing online courses for C grade pharmacists
4. Launch an information campaign for updating the pharmacist databases

**Capacity Building**

Skill and knowledge of the users need to be increased for using the ICT tools developed for BPMI. It is recommended that DGDA

1. Organize short training for managing registration and carrying out inspections through digital tools by the DGDA officials
2. Prepare manual on inspection and training
3. Recruit personnel to handle IT related jobs and content management

**Collaboration across Ministry/Departments**

DGDA can be benefited through collaboration with other departments within MOHFW on digitizing the processes and also providing services online. The following are recommended:

1. Strengthen collaboration with DGHS for using the DHIS2 platform: generate MIS data using DHIS2 platform in collaboration with DGHS
2. Engage into a service level agreement with the NID wing of Election Commission Secretariat to use NID database to verify the owner of the pharmacy as well as any pharmacist when providing new licenses or renewing the old ones
3. Check birth registration numbers of pharmacists or owner of pharmacies online by having an MOU with the Office of the Birth and Death Registration
4. Verify the pharmacists through PCB Pharmacist database while processing any application for registration or renewal of pharmacies
5. Notify the availability of services through a communication campaign and also include the services in the Services Portal of the Government called Shebakunja
6. Initiate discussion with DGHS or BCC for using their server for hosting the registration database

**Investment in Hardware/Software**

The following recommendations address acquiring hardware/software for the BPMI by DGDA:

1. Take steps to increase budget allocation for purchasing tablets for field officials
2. Negotiate with development partners for developing software through technical assistance

**Policy Implications**

Digitizing any activity performed by government organizations means changing those from manual to digital forms. Therefore it would be necessary to for the MOHFW

1. Amend laws to include the BPMI model and have the powers to lay down the process for online registration and/or other services through appropriate subordinate regulations

The above recommendations are presented as an Action Plan in a matrix that identifies the roles and responsibilities of different actors, time-frame of completion, cost implications and next steps required to be taken for implementing those.

# Introduction

The purpose of this study is to examine the technological solutions that could be introduced under the Bangladesh Pharmacy Model Initiative (BPMI) being developed by Management Sciences for Health (MSH) on behalf of Directorate General of Drug Administration (DGDA) under the Ministry of Health and Family Welfare (MOHFW), Government of Bangladesh (GOB). BPMI seeks to bring discipline into the dispensing practices of the retail pharmacies using Accredited Drug Dispensing Outlet (ADDO) model that has been implemented in Tanzania. Later the model was introduced in Uganda and Liberia. In Tanzania the initiative is led by Pharmacy Council of Tanzania (PCT). In Bangladesh, the retail pharmacies are regulated by DGDA and it was decided by MOHFW that BPMI would be led by DGDA. The PCT introduced technological solutions in Tanzania. This study evaluates the applicability of those solutions in the context of Bangladesh and come up with recommendations for comprehensive digitization in the DGDA and PCB.

## Scope of Work

The ADS project is addressing a host of issues relevant for implementing the BPMI in Bangladesh. This study is limited to technology or use of ICT tools. Detailed Scope of Work (SOW) is at Annex A. The SOW includes reviewing documents relating to technology strategy as adopted by PCT to maintain its ADDO and Pharmacy Database and mobile technology suite. The study needs to look at the MOHFW’s eHealth strategy or initiatives and agree upon a collaborative approach for developing the BPMI technology strategy by identifying opportunities to integrate the private sector pharmacies into the national strategy. The consultant is required to review DGHS/DGDA interactive web portal and identify whether private sector pharmacies could be integrated into the portal and/or how the BPMI technology strategy could be designed to complement or interact with the existing portal. The strategy need to identify what tools will be most useful for facilitating, enhancing, and sustaining the BPMI program from within a suite of applications like a) Web-based database, b) Mobile money payments, c) SMS information exchange and helpline, d) SMS reporting. It has to identify the components or tools to adapt from the Pharmacy Council of Tanzania as well as potential components or tools that should be newly developed to fill any gap. The recommendations need to include a) Strategy for building the tools and rolling-out the technology during the implementation phase, b) plan for integrating the technology with existing eHealth tools, portals, and strategies. It has to describe the plan for technology oversight, implementation, and maintenance and recommend a lead entity (e.g. DGDA, MOHFW, PCB, etc.) that would house the technology and the staffing needed at the lead entity to operate those. A high level summary should also be developed indicating the resources needed and timeline for introducing, scaling-up, and maintaining the technology.

## Methodology

This study was conducted using desk literature survey, Key Informant Interviews (KII) and participation in meetings with stakeholders. The list of people met is at Annex B. The websites of MOHFW, DGDA, DGHS, PCB, BMDC and BTEB[[1]](#footnote-1) along with Bangladesh government portal were reviewed.

Meetings with BCDS, BAPI and BPMI dissemination seminar organized by ADS project provided the opportunity to interact with the stakeholders and understand their position.

The Tanzanian experience of using technology and opportunities of introducing those in Bangladesh were assessed. However, no country is similar and there are variations in terms of infrastructure, skills, organizational structure and functions. There are lots of strengths in the current digital technologies used by the MOHFW in Bangladesh under a supportive policy environment. Organizations under the MOHFW have experiences of implementing complex ICT projects. On the basis of country situation, strategic objectives for BPMI technology were developed that provided the rationale for recommendations of this study.

The recommendations were disseminated at the draft stage in a workshop and finalized on the basis of feedback received.

# Health Sector in Bangladesh

The Ministry of Health and Family Welfare is responsible for formulating national policies on health and for ensuring their implementation through field offices. MOHFW follows a 5-year long strategic plan through a sector wide program. Two departments under the MOHFW are responsible for health service delivery, namely the DGHS and DGFP. Both have presence in the rural grassroots level through rural health workers. The DGDA is responsible for drugs. The Drug Policy of MOHFW directly relate to medicines.

Bangladesh has made positive gains in health indicators consistently over the last few decades. Life expectancy at birth has increased and stood at 71 in 2015 (BBS, 2015) compared to 58.1 in 1990[[2]](#footnote-2). Notable progress was made in meeting MDG targets (GED, 2015). Under 5 child mortality was 151 per 1000 live births in 1990. At the end of 2013, it came down to 41 per 1000 live births. Maternal mortality in 1990 was 574 per 100,000 which came down to 194 in 2010. Dramatic reduction in total fertility rates (TFR) has helped to arrest population growth, though population would continue to increase for many years to come. Bangladesh is poised to reap demographic dividend because of a young and active population (Planning Commission, 2015).

GOB emphasizes primary health care and promotes public health. Bangladesh health system has elaborate structures from grassroots levels to urban areas. At different levels, these facilities provide daycare, limited curative and proper curative services. Public sector facilities however, manifest remarkable differences in provision of healthcare in rural and urban areas primarily due to absenteeism or vacancies. Retaining physicians in rural areas remains a challenge for the MOHFW. As a result, usage of public facilities is low or and many of these facilities lack readiness for providing desired services (NIPORT, ACPR, & ICF International, 2016). There is mismatch in health workforce starting from physicians to nurses and medical technologists including pharmacists (HRM Unit, 2013) which arise from educational system that patronize graduate physicians over other workforce. Commercialization of medical education could be a contributory factor (Kabir, Sabur, & Hossain, 2014).

Bangladesh health sector shows pluralistic characteristics and different types of facilities or providers are keys to provision of healthcare to those in need. Such characteristics effect health systems governance and regulation and result in endemic problems such as overuse and misuse of drugs (Ahmed, Evans, Standing, & Mahmud, 2013). Concentration of doctors is high in urban areas leaving healthcare in rural areas largely to paramedics and informal providers (NIPORT et al., 2016). High out of pocket expenses (63%) suggests that people rely on providers in the private sector to a greater extent and spend a large portion on medicine (MOHFW, 2015). Of the total health expenditures, 43% is spent on medical goods and services. Commercialization of healthcare is also a cause of concern. Cost of health care is high and not affordable to bottom quintiles. Informal providers including pharmacies play an important role in health service delivery (Ahmed, Hossain, & Chowdhury, 2009). Indiscriminate use of antibiotics, among others, is attributed to the rise of anti-microbial resistance. Therefore, improving dispensing practices can be an effective tool for improving health service delivery.

The supply of medicines lies at the core of health care delivery. One of the objectives of the Health Policy of the country is to ensure the availability of essential medicines (MOHFW, 2012). It also calls for updating the list of essential medicines approved by DGDA. There is a list of 117 essential medicines. The Drug policy of 2005 stated that the government would update the list of essential drugs in line with the list of WHO (MOHFW, 2005). However, the list could not be changed. The draft drug policy[[3]](#footnote-3) published for public consultation in 2015 includes a list which is close to WHO list. Price control affects essential medicines and a lot of consumers benefit could come from strong government regulations in this regard.

## Pharmaceutical Manufacturing Sector

The pharmaceutical industry is engaged in the development, production and marketing of medicines. Worldwide pharmaceutical industry is one of the most profitable industries. Worldwide pharmaceutical sales are growing having seen three fold increases between 2001 and 2014[[4]](#footnote-4) and exceeded more than 1 trillion US$ in value. Bangladesh's home-grown pharmaceutical market is also growing. Lifestyle changes are contributing to increase of non-communicable diseases (NCD) which are life-long. Bangladesh is now faced with double burden of communicable and non-communicable diseases. This translates into greater demand and potential for further growth for pharmaceutical companies. The regulators need to assure that pharmaceutical products remain accessible and affordable to large population.

Among the least developed countries, Bangladesh was the only country to have a local pharmaceutical industry. This was facilitated by the National Drug Policy of 1982 and the Drug (Control) Ordinance, 1982. Legal instruments targeted control over production banning harmful and unnecessary drugs, ensuring good manufacturing practices (Chowdhury, 2012). The sector which was the size of Taka 1000 mn has grown to more than BDT 113 bn ($1.5 bn) in 2014. Even in 1995, 75% of the drugs had to be imported. The situation has reversed completely. Annual pharmaceutical sales in the local market are likely to reach Taka 160 bn by 2018. Local productions are now meeting 98% of the local requirement (EBL Securities, 2015). Now, only 2% of the drugs are imported which are mostly high tech specialized items. Meanwhile, some companies have started to produce vaccine, insulin, anticancer drugs, etc. Pharmaceuticals produced in Bangladesh are exported to as many as 117 countries. A number of companies have also got approval developed country regulators like FDA. This creates opportunities for export to developed countries' markets. This sector has substituted imports and has the potential to become 2nd largest sector for earning foreign currency. This sector’s contribution to the GDP is growing rapidly (Choudhury & Zarrin, 2016). Country educational systems are producing graduates in abundant number to meet the demand of the industries. However, the sector suffers from structural weaknesses as it is heavily dependent on import of raw materials from abroad. Changes required by international trade policies could also impact the sector[[5]](#footnote-5).

DGDA categorizes the pharmaceutical industries into five types: allopathic, ayurvedic, unani herbal and homeopathic & biochemic and issues licenses accordingly. DGDA have issued 269 licenses to allopathic pharmaceutical industries[[6]](#footnote-6). Of those, 209 are functional, 24 are non-functional, productions have been held in 5 and licenses of 32 have been suspended. Ensuring quality in the manufacturing processes is a challenge for the regulator. A much publicized case about using toxic materials in a child syrup that led to death of many children took more than 20 years to complete the judicial process but resulted in punishment of perpetrators (Yusuf & Salam, 2014). Parliamentary Committee on Health in the recent past became concerned about the manufacturing standards and quality of as many as 62 industries (Shahriar, 2014). Very recently, the High Court ordered closure of 20 industries (Shaon, 2016).

Table : Number of Pharmaceutical Industries in Bangladesh

|  |  |  |
| --- | --- | --- |
|  | Type of Industries | Number |
|  | Allopathic | 269 |
|  | Ayurvedic | 201 |
|  | Unani | 271 |
|  | Herbal | 32 |
|  | Homeopathic and Biochemic | 42 |

Source: DGDA website (accessed 30 May 2016)

GOB accords high priority to this industrial sector. Bangladesh Industrial Policy 2016 recognized pharmaceutical industry as a high priority industry (MOI, 2016). High priority industries are those having potentials for massive employment through accelerated growth and export. This priority bestows privileges and incentives from government.

Pharmaceutical industries work aggressively to increase the market share often crossing ethical boundaries. The marketing of pharmaceutical products raises ethical question and in many countries those have been investigated by government and evidence of malpractice resulted in fines in the order of billions of dollars against so-called big pharmas or multinational pharmaceutical companies (Anderson, 2014). The pharmaceutical companies use a multiple of strategies to induce sales like prescription monitoring and maintaining databases of physicians. They employ a large pool of Medical Representatives for disseminating information. Assistance in continuous medical education for the physicians becomes a marketing tool. PhRMA, a body of pharmaceutical industries, has published an ethical guidelines that prohibit gifts and many other activities like offering meals and specify when continuing medical education or professional meetings could be supported (PhRMA, 2008). However, it is also true that codes of practice are mere window dressing unless they are explicit and vigorously observed (Abbasi, 2003). The physicians also need to adhere to the standards of ethics as evidence suggests that though the pharmaceutical companies initiate the unethical marketing practice, physicians are responsible for its continuation (Mohiuddin et el, 2015). Because of aggressive marketing policies and continuous drive for accelerating profit, as a stakeholder the pharmaceutical industries could be considered to have high power and low interest in any initiative that may dent their profit. A recent report on AMR also expressed such skepticism for reducing the unnecessary use of end line antibiotics (Review on Antimicrobial Resistance, 2016). It is, therefore, essential that appropriate stakeholder management is in place for the new initiative.

## Retail Pharmacies in Bangladesh

According to DGDA website, there are 105,610 registered pharmacies in Bangladesh[[7]](#footnote-7). About 50% of the pharmacies do not renew their registration on time or ever. Many shops are carrying out businesses without going through any registration process. Many suggest that total number of drug shops could be at least double or more which means many such establishments remain outside any regulatory oversight and results in significant loss of revenue for the government[[8]](#footnote-8). A mapping exercise[[9]](#footnote-9) by BPMI showed that 52.4% of the pharmacies had no license. Licenses are not displayed in the premise. In the survey population, only 30% had any formal pharmacy-related qualified personnel, majority were holding C grade certificates, a few of them were pharmacy graduates. As regards inspection, only 42% were inspected within last year. There are infrastructural differences in the way the pharmacies are set up. There are differences in the standards of pharmacies located in different areas even within the same city. Some do not have any refrigerator, though they are selling drugs that should be stored in refrigerator. The majority of shops surveyed showed mean sales of 3,000/- taka per day only which would imply that the earning potential of these establishments are quite limited.

Table : Number of registered pharmacies in Bangladesh

|  |  |  |  |
| --- | --- | --- | --- |
|  | Type of Pharmacies | No of pharmacies | Variables |
|  | Allopathic | 105,610 | Name and addresses (district, upazila and postal address) of the unit, license number, date of renewal and date of validity, name of the pharmacist and proprietor, registration number, phone number and national ID (some fields lack data) |
|  | Ayurvedic | 334 |
|  | Unani | 564 |
|  | Herbal | 10 |
|  | Homeopathic and Biochemic | 1,734 |
|  | Wholesale[[10]](#footnote-10) | 927 |

Source: DGDA website (accessed 30 May 2016)

A pharmacy cannot be established without a registered pharmacist. However, studies have pointed out questionable practices in approval of licenses (Rahman & Mina, 2015).There is no doubt that pharmacist are in short supply. It is believed that same certificate is used for registration of different pharmacies (sometimes using photocopies). It is not clear how staff turnovers are handled during renewal. Increasing number of pharmacists might improve the situation. Some reforms are necessary to improve the situation.

Counterfeit (misbranded) and spurious drugs are sold in some pharmacies. DGDA's drive to control such drugs results in confiscation or destruction of substantial amount of drugs. For example, in 2014, 892 cases were lodged yielding Taka 10.5 million as fine. Consequently, 64 persons were given prison sentences of different tenures (DGDA, 2015).

The DGDA requires the following documents when while applying for a drug license:

1. Properly filled in Form 7 of Drug Act, 1940.
2. Original registration certificate of Pharmacist along with an attested photocopy
3. Certificate of commitment from Pharmacist
4. Main copy of treasury challan[[11]](#footnote-11) in respect of fees deposited for registration (Tk 1500/- for municipalities and metropolitan areas and 750/- for areas under a union parishad[[12]](#footnote-12))
5. Attested photocopy of trade license
6. Attested photocopy of citizenship certificate[[13]](#footnote-13)
7. Attested copy of agreement/rent receipt
8. Bank solvency certificate

As we shall see later, registration could be processed through website or android apps accommodating all such information. The fees for drug licenses are nominal and not adjusted to yearly inflation and remain unchanged for long time. The DGDA might consider increasing fees on annual/biennial basis.

# The role of DGDA

DGDA is a government department. In performance of its duties it is guided by Drugs Act, 1940 (GOB, 1940) and Drugs (Control) Ordinance, 1982 (GOB, 1982). DGDA regulates drugs or medicines including medical equipment. DGDA provides registration for manufacturing or marketing of pharmaceutical products. The DGDA is responsible for carrying out inspection of the manufacturing plants in accordance with GMP guidelines to ensure that local manufacturers comply with global quality standards of medicine. One of the main functions of the DGDA is to provide license to the retail drug shops to carry on business at any place in the country and is also required to inspect those drug shops. However, studies suggest that whether in registration or in inspection DGDA find it difficult to properly discharge its duties. The shortage of inspectors is often cited as one of its shortcomings in undertaking such tasks. The DGDA’s pricing policy and regulation ensures that price of essential medicines are within reasonable limit. However, there is no systematic price-monitoring system (Jude Nwokike & H. L. Choi, 2012). It is not uncommon to see that medicines are not available at prices fixed by DGDA.

DGDA is a lean organization. DGDA operates through 57 field offices at the district level. DGDA was operating with very limited manpower till 2011 when its manpower strength was increased from to 370. In terms of its mandated activities, it is recognized that it requires additional manpower. Skill shortage is critical in some areas. The DGDA has only one position of Assistant Programmer. This position has not yet been filled up.

## Information Management

There is no Management Information System (MIS) unit in DGDA. However, DGDA generates daily and monthly data on some key performance areas. DGDA headquarters collect reports of daily activities of field offices (districts). District offices send data by SMS or email. Those are used to produce a daily report which is done manually and can be very time consuming. One officer of DGDA is responsible for this. It is a mixture of electronic and manual system. Monthly reports are also prepared on status of retail licenses; inspection of pharmacies and factories etc. DGDA publishes annual report on its activities (DGDA, 2015) where these statistics are published. Following activities could be managed electronically:

1. Report on retail licenses: aggregated on monthly basis and contain number of retail licenses, pharmacies without license[[14]](#footnote-14), new licenses issued and licenses renewed.
2. Statistics relating to testing samples: DGDA staff collects samples of medicines and monthly reports are prepared that contain numbers of samples sent for testing, number of test reports received and number of substandard (unqualified) medicines.
3. Statistics relating to cases: data relating to number of cases in the drug court[[15]](#footnote-15), number of cases lodged in the Mobile court[[16]](#footnote-16), fines realized by mobile court, approximate value of confiscated drugs, sentences imposed in the mobile court.
4. Statistics in respect of inspection of pharmacies and factories - number of inspections of pharmacies and number of factories.
5. Collection of revenue: fees against registration and renewal as well as fines are categorized as non-tax revenue. The amount goes into national treasury and DGDA has no control over the money. DGDA gets regular budget from the Ministry of Finance to meet all its recurring expenditure. Tracking non-tax revenues is required for reporting.

## Website of DGDA

Digital transformations are occurring in DGDA. DGDA website (<www.dgda.gov.bd>) is rich in contents. Lots of information are made available to the public through its website. The homepage provides a map showing divisional and district offices with location and telephone numbers. DGDA website provides the following information (search performed on online database):

1. Information on all type of manufacturers (allopathic, ayurvedic, unani, herbal homeopathic and biochemic)
2. Registered imported drugs
3. Valid source of raw materials
4. Information on all types of registered drugs: allopathic (in generic or brand names), ayurvedic, unani, herbal homeopathic and biochemic
5. Information on, registered pharmacies, pharmaceutical companies etc.

Table : Availability of registered Drug information in DGDA website

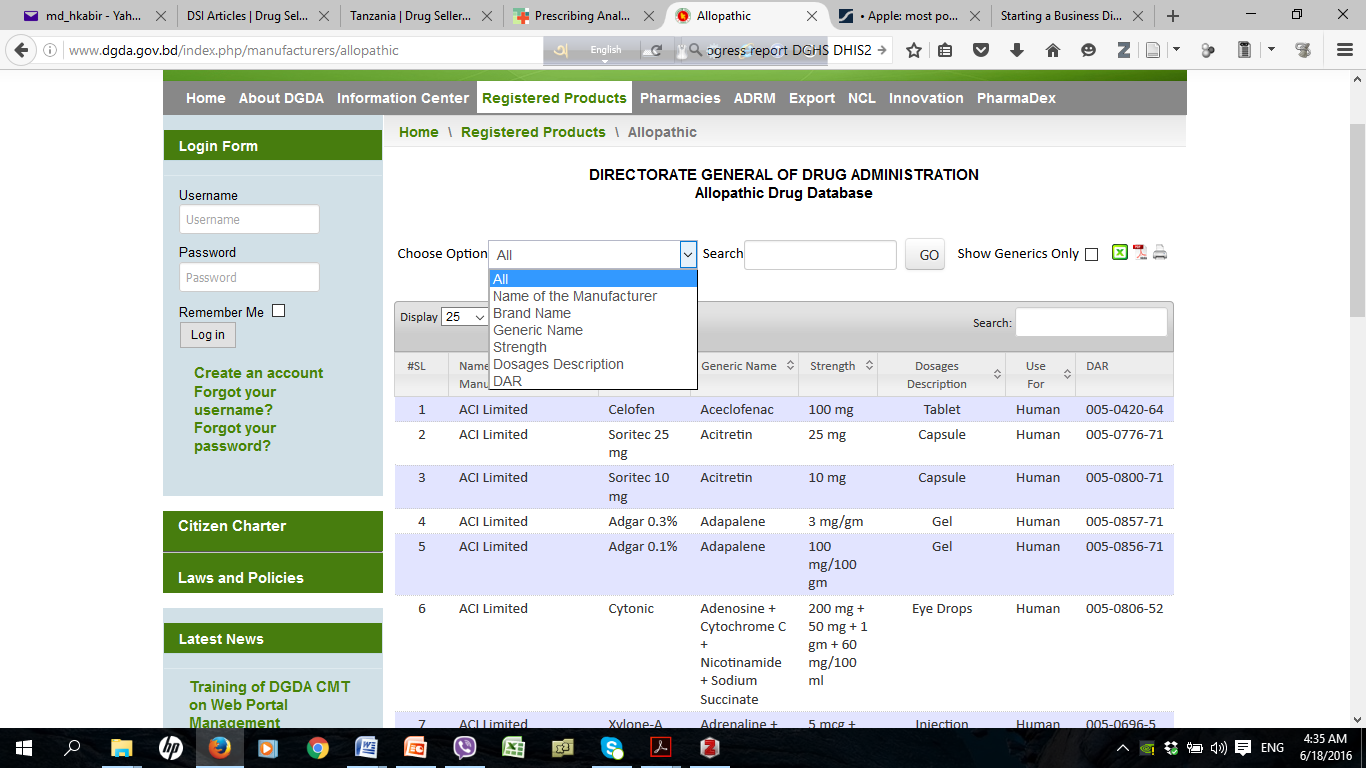
|  |  |  |
| --- | --- | --- |
|  | Type | Products |
|  | Allopathic Drugs | 26,458 |
|  | Ayurvedic Drugs | 3,653 |
|  | Unani Drugs | 5,106 |
|  | Herbal Drugs | 353 |
|  | Homeopathic and Biochemic Drugs | 2,294 |

Source: dgda.gov.bd - accessed 30 May 2016

Table 3 gives an idea about the options available to any visitor to view and learn about any registered product which is updated regularly (searches for registered allopathic products are performed on more than 26,000 records). Specific product data available online are: name of the manufacturer, brand name or generic name depending upon filter used, strength, dosage description and Drug Administration Registration number (DAR).

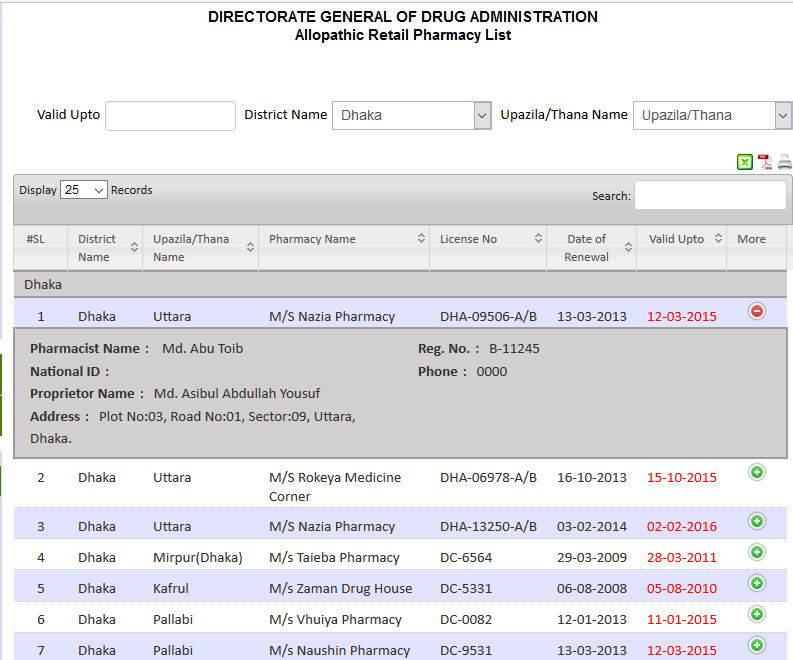
Figure 1 below shows how registered products can be searched in the DGDA website:

Figure : Search functions in the DGDA website for allopathic products



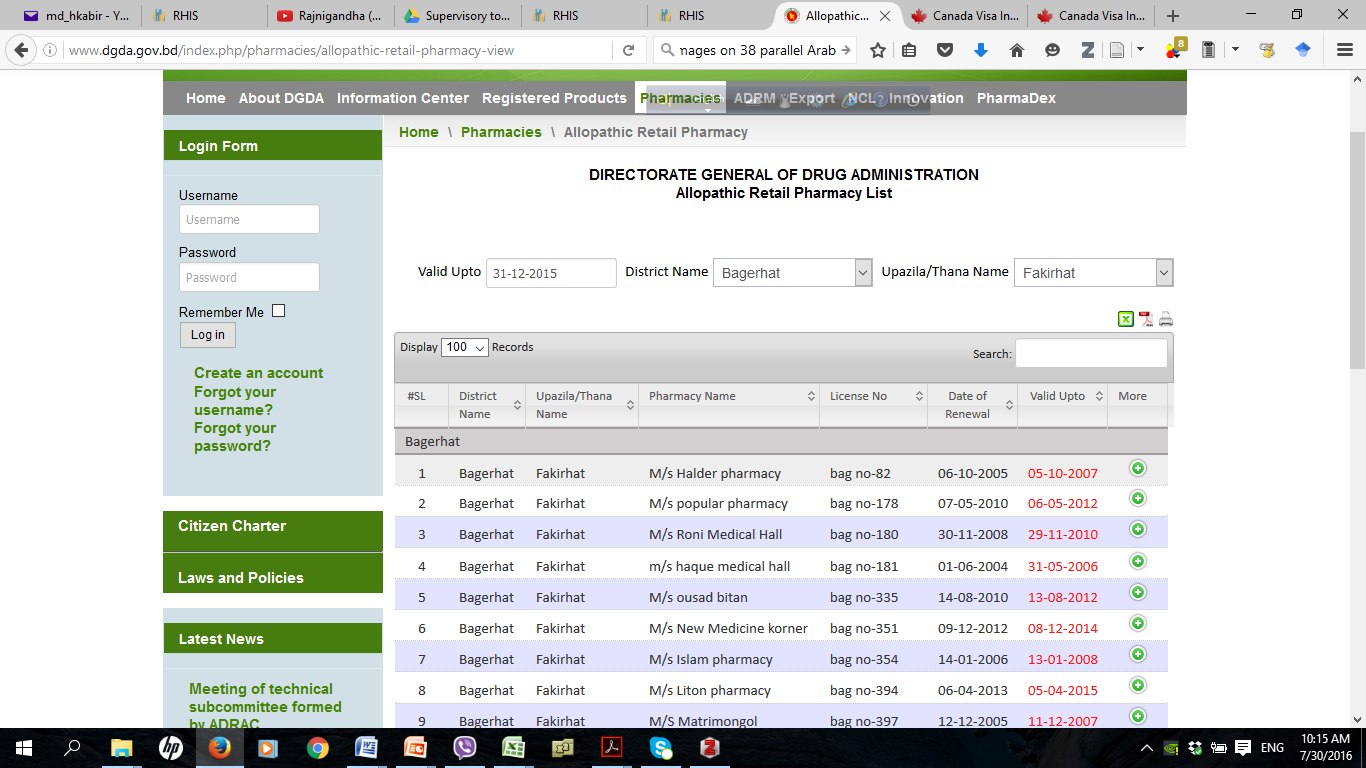
As mentioned earlier, the DGDA website provides list of all allopathic, ayurvedic, unani, herbal pharmacies and wholesale pharmacies. This is a searchable database allowing users input.

Figure : Finding a registered pharmacy in DGDA website



The pharmacy database contains name of the pharmacist with NID (this field should not be in public view as it is related to privacy issues), name of proprietor, address, registration number and phone number (many fields contain null values - see Figure 2). The DGDA site also provides access to officials to an intranet. If the database is updated and additional data are collected, its functionality would increase and allow managing the license processes as well many other management functions. The district officials can find the details of expired licenses, issue notifications for renewal. Some procedural simplification should be in order perhaps. Searched data can be downloaded in excel or pdf format or printed online with details. It is possible to filter records on parameters like district, upazila (sub-district), status of registration (date of expiry). Therefore, it is possible to get a picture of any or all pharmacies by district or upazila. For example, a search of Bagerhat district produced 431 pharmacies with flashing text showing expiry of validity. Filtered further, a search of Fakirhat upazila of that district showed that on 31 December 2015 all licenses became invalid (see Figure 3). It is assumed that a visit or inspection by DGDA inspectors could improve the situation.

Figure : Filtering Pharmacies Without Valid Registration



However, there could be some database design and management issues. There are necessities for following national standards like CCDS[[17]](#footnote-17), BBS geo code to maintain interoperability and provide cross-functionality.

According to DGDA staff, the website receives over 2000 hits per day. All its traffic is generated in-country[[18]](#footnote-18). People visit DGDA website for different purposes. One is certainly related to registration of pharmacies. More than 20% of the searches relate to drug licenses (see Figure 4) meaning that there is considerable interest among the stakeholders to learn about the process and many among them could potentially be identified as users of online registration system.

Figure : Top Keywords from Search Engines

|  |  |  |
| --- | --- | --- |
| Which search keywords send traffic to this site? | | |
|  | Keyword | Percent of Search Traffic |
| 1 | dga | 36.05% |
| 2 | dgda | 31.72% |
| 3 | drug license | 18.35% |
| 4 | drug license application form | 4.08% |
| 5 | drugs development | 3.17% |

Source: http://www.alexa.com/siteinfo/www.dgda.gov.bd (accessed 28 May 2016)

One of the criticism of this website could be there is very little content in Bangla. Bangla is the medium of education in the country and almost all the visitors to this government site are presumably from Bangladesh. Therefore, it would be appropriate that greater emphasis is given in creating content in Bangla especially for its public face. FAQs should be written in Bangla. Further use of the DGDA website could lie in creating awareness about rational use of drugs in order to tackle the issue of anti microbial resistance. Strong social media presence is necessary for this purpose.

The site is also not mobile friendly. In order to keep pace with the technology and importance of mobile platform the site should adopt responsive[[19]](#footnote-19) or mobile-friendly design. If registration process is automated, it should be managed both through web and Android app.

## E-government Initiatives of DGDA

There is awareness in the DGDA about managing information and a collaborative effort with DGHS is resulting in availability of data through DHIS2 platform. The DGHS is assisting the DGDA to use DHIS2 platform for generating daily and monthly MIS data. Taking it further, making DGHS hardware resources available to the DGDA would reduce the need for investing in infrastructure (server, data center etc).

DGDA has been awarded an amount of Taka 15 lakhs (about US$20,000/-) for a project of innovative nature by the Access to Information (a2i) project of Prime Minister's Office. The award money would be utilized to develop a computerized solution that would allow anyone to report about counterfeit drugs and also if drugs are sold above the approved retail market price. There is concern from citizens about counterfeit drugs and an initiative from a startup recently appeared in the press[[20]](#footnote-20) which is supported by a pharmaceutical company.

DGDA is also working to improve services. They are working on SPS which means Service Process Simplification - an initiative of a2I of Prime Minister's Office. The process of registration would be brought under this system. It will result in savings in time, cost and visit (TCV seeks improvement in terms of these three parameters). The clients would be able to apply for registration or renewal online and also submit particulars of payment. Treasury challans which are used for depositing money are now possible to verify online[[21]](#footnote-21). This could bring significant improvement in the processing of registration of pharmacies.

DGDA is going to participate in the NSW (National Single Window). The NSW is an initiative of National Board of Revenue (NBR) and is being implemented under a project supported by the World Bank. It would allow the DGDA to monitor raw materials import under block lists. The DGDA approves import proposal of industries in bulk through a single letter. The importers may import those in separate installments making it difficult for the DGDA to monitor total volume imported. Some seepage might occur. NSW would allow the DGDA to monitor separate installments of imports against a specific approval letter. Such monitoring is useful for ensuring that raw materials are used by the authorized users only and not leak into the wholesale market.

DGDA would need support for managing Common Technical Documents (CTD) and Pharmadex which rely on online submission.

The above analysis shows that DGDA website is dynamically providing lots of information and these resources could be utilized to move ahead. Diffusion of e-government happens at several stages beginning with provision of information through a static site. Next stages are described as two-way communication, transaction, integration and participation (United Nations, 2008). The DGDA website facilitates two-way communication. With provision of registration and other services, it could move into next or transactional stage.

Figure : Stages of e-government

# The Role of PCB

Health workers include all providing health services - such as doctors, nurses, pharmacists, laboratory technicians and management and support workers. After doctors and nurses, pharmacists represent the third largest healthcare professional group in the world. To some, it is a neglected workforce (Wiedenmayer, 2007). A WHO report maintained that in many developing nations they are underestimated and underutilized. Pharmacists are the most accessible of all healthcare workers. Therefore, they play a key role in the delivery of healthcare services at all levels. Pharmacist role has evolved over time from that of a compounder and supplier of pharmaceutical products towards that of a provider of services and information and ultimately that of a provider of patient care. In some countries, pharmacists have been trained to provide patient care like in HIV (K. Wiedenmayer, Summers, Mackie, Gous, & Everard, 2006).

The MOHFW has created a number of autonomous organizations which bear the responsibility of regulating education and practice for physicians, nurses, pharmacist etc. The Pharmacy council of Bangladesh (PCB) is the professional body set up to maintain standards of education and practice in pharmacy. It is guided by the Pharmacy Ordinance of 1976 (GOB, 1976). Its principal policy making body is the Council which is headed by the Secretary, MOHFW. In contrast to PCT, the Bangladesh regulatory body has no role for registration or regulation of pharmacies[[22]](#footnote-22). The Main objective of the PCB is to maintain quality of education and regulate the practice of pharmacy throughout Bangladesh. The PCB approves examinations in pharmacy for the purpose of qualifying persons for registration as pharmacists; recognizes degree or diploma in pharmacy for the purpose of registration as pharmacist, undertake inspections of institutions; prepares and maintains registers of pharmacists and apprentices in pharmacy. MOHFW recognizes that the number allied health professionals including pharmacists is not increasing significantly (HRM Unit, 2013)

As regards education

* The PCB maintains registers of A, B and C grade pharmacists. Graduate pharmacists are accorded A, while the diploma holders B and certificate holders C grades.
* There are 12 government and 22 private universities (altogether 34) that are providing degree education to about 3,000 pharmacy graduates. For B category pharmacist, the maximum could be 500. Prospects of jobs for the B category pharmacist are limited.
* PCB website ([www.pcb.gov.bd](http://www.pcb.gov.bd)) shows a searchable database of pharmacy professionals based of A, B and C categories, which however is not functional yet.
* A total of 62,473 C grade pharmacists are working in the pharmacies. 10,239 B-grade pharmacists are employed in public and private hospitals. A grade pharmacists are serving in the pharmaceutical companies.
* C grade pharmacists are trained jointly by BCDS and BPS. The examination is taken by PCB. Question papers are set by university teachers.

Bangladesh Chemist and Druggists Samity[[23]](#footnote-23) (BCDS) is a registered trade body representing drug shop owners. BCDS is involved in training of C grade pharmacists. The Committee of BCDS is elected from its members. The tenure of the last elected body of the BCDS expired long 2 years ago. As the elections could not be held, the Ministry of Commerce (MOC) intervened. MOC looks after the trade bodies. The MOC appointed an Administrator, whose main task was to conduct election of this trade body. Two successive Administrators were appointed who could not complete the election. So there is no central body of BCDS currently. The PCB is losing significant amount of revenue because of organizational crisis in the BCDS that led to stagnation in training including examinations of C grade pharmacists.

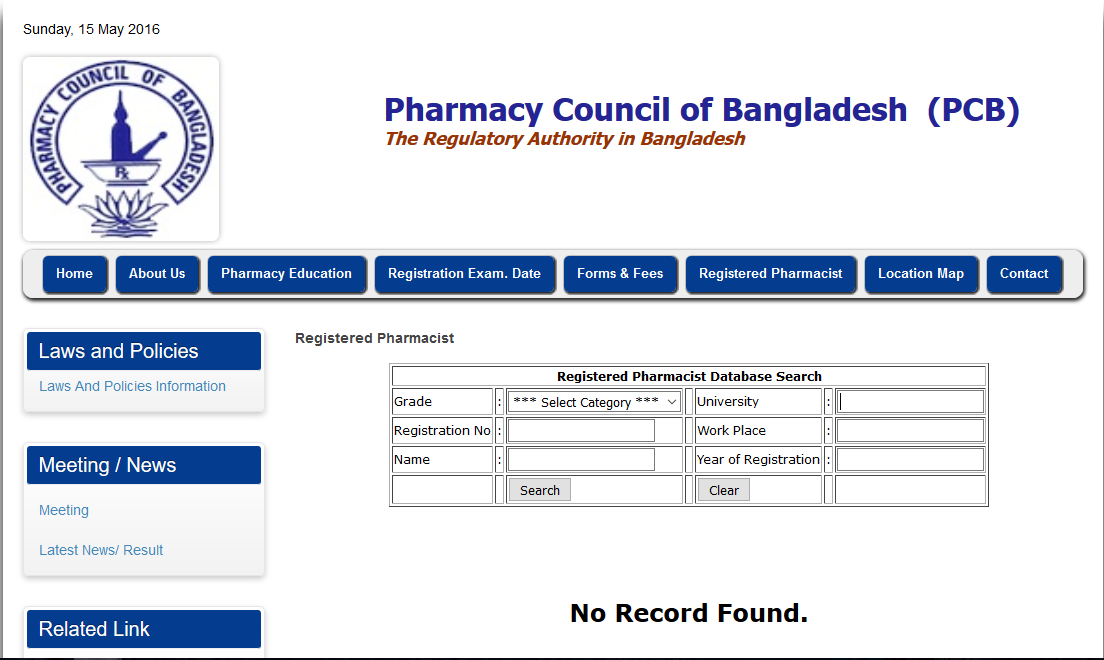
## Parallel Stream of Pharmacy education

In parallel to institutions affiliated with PCB, pharmacy education is also offered by educational institutions affiliated with Bangladesh Technical Education Board (BTEB) under the Ministry of Education (MOE). Those institutions offer 3-year diploma in pharmacy and one-year certificate in pharmacy courses. BTEB diplomas or certificates are not recognized by the PCB. Apparently, these courses are also tuned to the job market and their alumni are working in the private health care facilities. It is, therefore, appropriate that this issue be resolved which might require some measure of compromise between the organizations. The MOHFW was working on a proposal of creating a Paramedical Board. However, it is unlikely that a board under the MOHFW would resolve the issues. The main opposition of the PCB against the courses approved by BTEB is that students without any science background at the secondary or higher secondary level could get admission into their courses. PCB wants that only students with science background should be enrolled in such courses. On examination of BTEB website (<www.bteb.gov.bd>), it was found that secondary school science background is not required for any vocational courses approved by it.

## PCB website

PCB website (<www.pcb.gov.bd>) is slim and provides information relating to pharmacy education. It also has some downloadable documents. The website has a provision for finding the pharmacist, though no data is available there. This database needs to be populated with the records of all pharmacists from the Register. Making it available would mean any pharmacist or a prospective employer or the regulator could search the database. Additional functionalities could also be created such as online sharing of data with DGDA pharmacy registration database.

Figure : Registered Pharmacist Database Search



Similar provisions exist for finding doctors in the BMDC website (see Figure 7 below). The BMDC site also requests for a scanned copy with any application for correcting mistakes from its registered graduates, which is a good way of correcting any data entry error.

Figure : Find a Registered Doctor at BMDC website

## 

## Introducing Online Courses

The number of registered pharmacies is greater than the number of pharmacists registered with the PCB. It means about one-third of pharmacies would never be able to appoint any registered pharmacist. The problem is acute from the supply side. If DGDA were to enforce the pharmacist requirement in the pharmacies, PCB won't be able to ensure the supply of C grade pharmacist in the short term. So alternative should be explored to increase the number of C grade pharmacists. Special program would be required to increase the number of pharmacist.

One option could be to introduce online courses using local websites dealing with education. Now full-fledged courses are available online from foreign universities or some websites. While issues remain with recognition of these courses, the universities are under pressure to accept online credits (The Economist, 2013). Initial activities for putting up a course in the website include putting together a curriculum, producing written and recorded material to explain it, and creating an interactive site that facilitates discussion and feedback (The Economist, 2014). Developing such a course entails some costs, maintenance is not. According to a World Bank report, digital tools make it easier to tailor learning to each student and rapidly assess student's progress. Digital technologies can reinforce learning. Successful applications of technology help introduce an appropriate curriculum or enable students to move through material at their own pace. These types of tools can be particularly helpful in developing countries, where students often need to develop skills that their teachers lack or do not teach (World Bank, 2016). The assessment options for online courses vary on the basis of payment modalities. The courses which are free to take offer computerized assessment, an example of which is Khan Academy. Some educational sites offer free courses but charge for assessment as it requires human interface (like udx or udacity). Online courses fit neatly into the PCB requirements. PCB approved a text book for the C grade pharmacist[[24]](#footnote-24). The book is organized as follows:

1. General description of medicine
2. Ethical principles of pharmacist
3. Laws relating to medicines in Bangladesh
4. Physiology
5. Microbiology
6. Pharmaceuticals
7. Drug stability and preservation
8. Route of administering drug and methods
9. Surgical dressing
10. Medicines used in Bangladesh
11. Community Pharmacy
12. Family Planning and Birth Control
13. Nutrition and Health
14. Health and Environment
15. Healthcare and Role of Government
16. Primary care
17. Alternate Medicine: Indigenous medicine
18. Community Clinic

It would not be difficult to convert this book into electronic format using rich multimedia (combining video and audio). There are sites that specialize in providing online courses in Bangla. The benefit of online courses is that anyone with an internet connection is able to study at their own pace from anywhere. If there is a prospect for job, which would depend upon DGDA enforcing the requirement, there should be students. For assessment purpose, it is possible to enlist pharmacy graduates. In the Tanzanian model, capacity building had a strong focus and shop owners were offered training in effective business practices – e.g. monitoring sales, stock expiry, profit management, and training dispensers in treatment guidelines and stock management. Such courses can also be developed and offered online to students. As with the ADDO experience, much would depend upon the public information campaign (Bigdeli, Peters, & Wagner, 2014). Once the PCB gathers experience of offering course and assessment for C grade courses, it might consider expanding better-tailored courses like one year certificate courses for BPMI II. Both online and physical courses can be offered in parallel. Even if the PCB is not agreeable to offer online courses, such course materials could be put up in the internet to facilitate learning of the prospective pharmacists.

Currently, the PCB requires the students to deposit Tk 1,500/- in favor of BCDS as course fee and 250/- taka for the book[[25]](#footnote-25). In addition PCB charges 1,000 taka for conducting the exam. The online course would not hamper the revenues of any as the BCDS could still offer physical courses and charges for exams would be applicable whether online or not.

# information systems management in the Health sector

Government of Bangladesh has a Digital Bangladesh vision with emphasis on digitization of activities of government organizations. MOHFW has been promoting digitization in its third sector program - HPNSDP (2011-2016). Under the HPNSDP, digital transformation has been sought by increasing the use of software programs or ICT-based tools. Investments have been made in hardware. An enabling ICT infrastructure has been created. There are data centers in DGHS and DGFP. About 13,000 Community Clinics at the village level are equipped with laptops. DGHS have made tablets available to all rural government health workers (known as health assistants) working at the community level for the DGHS. Local area network are planned for facilities. DGFP is also providing tablets and laptops at community level. Internet connections mainly through mobile operators are being utilized to connect to the central databases. Problems in stable connection or continuous power supply are being addressed by creating the ability to run offline (see MEASURE Evaluation, 2016).

Successful implementation of DHIS by the DGHS has earned appreciation (Birdsall, 2014). DHIS2 is capable of collecting data from many vertical and fragmented programs. The system collects data from all facilities spread all over the country and use visualizations that could be used by decision makers, line directors to support interventions and by general public to understand the health status of the country. DHIS2 is widely used across many health systems in many countries. Health system delivery in Bangladesh is managed by two departments. DGHS has fully implemented DHIS2. DGFP is going to move its legacy MIS data to DHIS2 platform. DGDA can implement DHIS2 in its own server or can integrate with the DGHS systems.

Computer based systems are proliferating in the MOHFW. Perhaps it is typical of public sector organizations in the developing countries that they remain ill-prepared to manage a rapidly changing environment through evolving technologies by appropriate legal instruments. MOHFW's legal environment has not been shaped to suit digital systems. Legal instruments that could enforce confidentiality of data and privacy of citizens are absent. There is no eHealth Strategy[[26]](#footnote-26) or a Health Information Policy.

# Application of Technology in ADDO

MSH, with a grant from Bill and Melinda Gates Foundation, started Accredited Drug Dispensing Outlet (ADDO) in Tanzania in 2003 as a pilot. The success of this pilot resulted in rolling out of the model across the country. The initiative later was replicated in Uganda and Liberia. It is considered that the Tanzania ADDO model is scalable, sustainable, and transferable to other county contexts (Rutta, 2014).

In Tanzania pharmacies and drugstores represent two separate categories. The pharmacies are allowed to sell all medicines, the drugstores could only sell over the counter medicines. Pharmacies are located mainly in urban areas, whereas drug stores in rural and peri-urban areas. Another important place for medicines are public health hospitals, which had limited drugs and required long waiting time. So, many would seek health care and medicines from retail drug shops, which historically had unqualified, untrained and unsupervised sellers (Levine et al., 2015). The program’s goal was to improve access to affordable, quality medicines and pharmaceutical services in retail drug outlets in rural or peri-urban areas with few or no registered pharmacies (Rutta, 2014). The program combined extensive training, business incentives, authorization to dispense a limited list of antimicrobials and other medicines to treat common conditions, regulatory enforcement of practice standards, and efforts to affect customer demand. Overall, people in rural Tanzania considered ADDOs as part of their health system confirming that the accreditation program in Tanzania succeeded in the intent described in its development (Chalker et al., 2015). ADDOs have contributed to some improvements in the use of antimicrobials but factors that influence dispensers’ behavior need to be addressed to achieve greater measure of success (Dillip et al., 2015).

With nationwide scale-up, the PCT wanted to develop a comprehensive database to organize information on ADDO and pharmacy facilities and personnel. PCT also sought to improve its communication, reporting, and fees collection systems from these premises and personnel. Invention and Technological Ideas Development Organization (ITIDO) was commissioned to develop an ADDO and pharmacy database and mobile technology applications to suit PCT’s needs (“MSH Technology Brief,” 2014). Before starting the pilot, ITIDO undertook exploratory studies. They looked at mobile penetration of the country especially in the ADDOs. They also did willingness studies to understand the likelihood of participation by the drug shop owners in mobile money platform (ITIDO, 2012).

ITIDO found that though the penetration of mobile phones was low or only 30%, there was overwhelmingly positive perception about mobiles among the ADDO providers and their suppliers regarded mobile technology as a business tool. There were using it for sharing information including adverse drug reactions. There was willingness to pay for such services or to invest more for expanding their business operations. The identified the intervention areas that included: procurement of supplies plus payment systems; communication with regulatory authorities; coordination and reporting; information sharing on different aspects of the program including product information; continuing education and technical support; payment of regulatory fees; reimbursements of sales by health insurance companies; referral and counter referral for ADDO clients etc. The study proposed establishment of a mobile information system backed by a database in order to receive and process information from different stakeholders and disseminate it using relevant applications (e.g. web, SMS, USSD) (ITIDO, 2012). In another study about Uganda, it was suggested to use system based on SMS or USSD (Avytel Global Systems, 2013). It was decided that no new purchase of hardware would be imposed on the owners. Accordingly, solutions were developed for basic or feature phones. Smart phones were not considered because owners had limited access to them.

## Tools implemented by ITIDO in Tanzania

ITIDO developed mobile technology applicationscompatible with basic mobile phones. The applications interact with the database and include a mobile paymentcomponent for facility and personnel fees. There is a SMS-based ADDO and pharmacy indicator reporting module**,** and a SMS-based information exchange module**,** which allow ADDO and pharmacy personnel to send and receive information, for example, on premises requirements or drug recalls.

The key features of the systems and results are stated below:

* A web-based databaseof private sector drug outlets’ facilities and personnel, including information on facility registration, personnel qualifications and certifications, inspections, and personnel and premises fees payment. Registration database was created from an excel file. They also used geo code to identify the locations of the ADDOs. The shops are also given unique registration numbers. Information was made available to ADDO owners through mobile platforms.
* The system allows sending report about services. As those could be submitted through mobile it saved the time and money of ADDO personnel.
* Helpline was viewed positively as they could send a question asking about the process of opening a drug shop and you get all the information .
* Mobile money was safe and they found that paying through M-Pesa was very easy and acceptable to users.
* The sustainability of the system has been ensured. Relevant personnel have been trained for using the system. ITIDO only provide support, if needed. The database is now managed by the PCT.
* Rolling out the technology to other areas require resources for training, travel etc. The training can now be carried out by local officials.

ITIDO implemented technological solutions in one region in Tanzania on pilot basis. After pilot it is now being rolled out to other regions. Tanzanian pilot suggests mobile platform could be a viable option.

# technolgy options for BPMI

Drug retail shops are often the first and only source of health care outside the home for a majority of poor patients in developing countries and Bangladesh is no exception (Ahmed et al., 2009). People access these shops to bypass expensive consultations where they also buy drugs without any supervision. Pharmacies and drug shops often miss out from countries’ health strategies, policies, and monitoring and are not generally integrated with larger health system (Rutta, 2014). Reforms brought by BPMI have the potential to change this scenario. Under the BPMI, dispensing practices could be improved.

Under BPMI, two standards have been proposed: Standard I and Standard II. There are some variations in the requirements for setting up of pharmacies of Level I or II. BPMI applicants would have to meet certain requirements. BPMI registration would be based upon an existing or a new pharmacy that would meet those requirements. The BPMI registration and management processes should be facilitated by technological solutions. In this section, the technological options available to DGDA and PCB are enumerated. Based on the previous analysis, some strategic objectives have been identified as below:

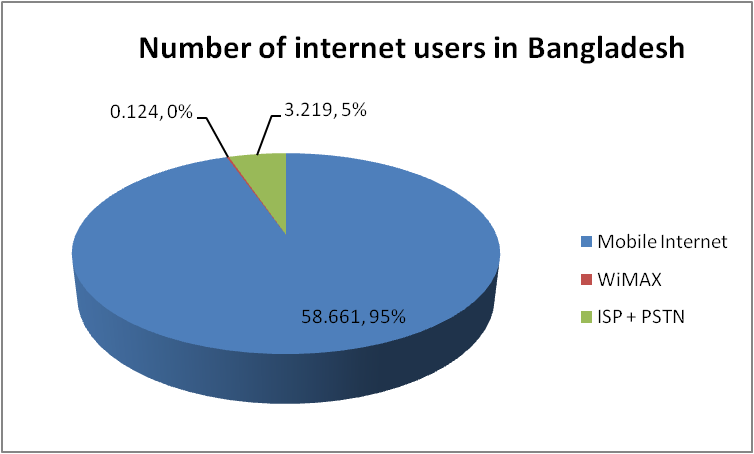
* Build systems upon existing resources of DGDA (enhance existing databases)
* Focus on online services and automating business processes of DGDA
* Emphasize mobile solutions based on technology adoption, trends and country situation
* Build capacities and strengthen MIS functions of DGDA
* Minimize investment requirement
* Collaborate with other government agencies for maximizing benefit.

Technologies based on information and communication technologies (ICT) are rapidly changing the world. The adoption rate of new ICT technologies especially mobile technologies have been great. Therefore a combination of mobile and web based solutions with backend database functions would be preferred for BPMI.

The value of currents websites has been discussed in previous sections. In the following sections we enumerate the other technological options and related issues.

## Role of Mobile Technologies and Internet

Global PC sales have been dropping due to their high penetration in the developed countries. In the USA, PC has penetrated to 80% of the population. In developing countries the penetration of PC has been low for reasons attributable to cost, literacy etc. factors. The penetration of mobile phones however has been promising. In Bangladesh, after a biometric registration was enforced for mobile connections, the total number of mobile phone subscriptions dipped by about 22% from 131 million to 108.1 million[[27]](#footnote-27) in May 2016. Population-wise, that still reflected more than 60% coverage. Mobile phone has penetrated all global population faster than any other technologies throughout the history of mankind. Its appeal is universal and is affordable even in the poorer countries. Citizens of higher income countries possess mobiles with higher functionalities or smart phones more. The citizens of developing countries' are most likely to possess basic and feature phones in greater number. The price of smart phones have seen steady decline. A smart phone is now available for less than 50 US dollars making them affordable to lower income groups. Smart phone is fuelling the growth of mobile market. In 2012, about 25% of the people were using smart phones. This number is expected to double by 2018[[28]](#footnote-28). In Bangladesh smart phones now occupy about 20% of the subscribers, that is projected to double by 2020, reckons industry experts (Islam, 2015). Globally, the number of population accessing internet from mobile phone stood at 52.7% in 2015[[29]](#footnote-29). In Bangladesh, 58.661 million were using internet at the end of April using mobile phone which represent 95% of total users[[30]](#footnote-30). Therefore, possession or use of mobile devices with internet access must be considered as a key element of any technological solutions based on information and communication technologies.

The utility of a mobile phone extends beyond the basic voice and text functions. A mobile phone is connected with network all the time. The functionalities of the basic or feature phones have been expanded to provide certain services using mobile network. Use of apps in smart phones makes them versatile. Connectivity to internet has opened up opportunities for small and medium enterprises. While in Tanzania, SMS/USSD based technology was used, given the situation in Bangladesh and lead time required for greater adoption of BPMI, smart phone based technology would be a viable option that allows access to internet and can run app.

There are tremendous opportunities for the SMEs in using the mobile technologies for different business functions (BCG, 2015). More and more web users are accessing the web from mobile devices. As a result, a growing number of businesses and organizations are now beginning to develop a mobile strategy and make their web presence accessible on tablets and smart phones.

ADDOs send service information to PCT through mobile phones and have access to information through mobile phones. BPMI contents can be made available though web pages or mobile apps. Any reporting requirements, if necessary, could also be accomplished.

## Mobile Payment

Banking using mobile phones came into existence in 2000 with introduction of M-pesa in Kenya. In Bangladesh the door for mobile financial services was opened in 2011. A central bank guideline recognized the role of agents of mobile network operators (MNOs) (Bangladesh Bank, 2011). Mobile financial services follow two models, one led by MNOs, the other banks. Bangladesh Bank opted for bank-led model.

Mobile payments can use a number of different technologies to perform a transaction. Remote payments will usually make use of short message service SMS (Short Messaging Service), USSD (Unstructured Supplementary Service Data) Wireless Application Protocol (WAP), a browser, or a mobile application (Mauree, 2013). USSD based solutions had been preferred in a low-resource environment where the poorer and unbankable section of society is targeted.

Mobile money promotes financial inclusion and specially suited for the disadvantaged groups. In Tanzania, mobile payment option was included in the technology suite. As DGDA would be in charge of implementation in Bangladesh, the applicants or owner of pharmacies would have no option but to deposit money in the treasury[[31]](#footnote-31).

In Bangladesh 577,000 agents were providing mobile services in February 2016 ((Daily Prothom Alo, 2016). These agents facilitated 116,208,000 transactions. Average monthly transactions stood at 16,600 crore or Tk 166 billion. Average daily transactions amounted to Taka 550 crore or 5.5 billon. The facility is mainly used for Cash transaction (cash in and cash out), utility payments (Gas, electricity, water). There are as many as 10 mobile financial service providers (MFS) in the market. bKash is the market leader with 70% market share. Other important MFSs are Dutch Bangla Mobile Money and mCash etc. The market of Bangladesh is not matured and 95% transactions are termed as OTC cash in cash-out with a limited share going to utility bill payments. In countries where it is successful, mobile banking is used for salary payments, savings, remittance, loans, micro insurance and payment at POS as well as b2b payment. In addition to individuals, it could be a viable option for the small businesses or SMEs. Businesses operate though merchant accounts and can send or receive money from customers or other business entities. There is also a need for interoperability, otherwise the late comers could not effectively compete in the market.

Mobile financial services are gaining good ground in Bangladesh. Though currently it is mostly used in cash-in and cash-out transaction purposes, there is potential for increasing their coverage. In the BPMI, mobile payment options seem limited at the moment due to public financial management system of the country.

# Key Findings

BPMI would be implemented by DGDA, the regulatory body for drugs and pharmacies in Bangladesh. The PCB would also be a partner supporting the implementation through arrangements for increasing training facilities of C grade pharmacists. This study looked at the digital tools used in Tanzania, and also evaluated the infrastructural situation and readiness of the DGDA to implement digital tools. Key findings of the study are discussed below.

## Scope for Automation

By automation, in this study, we are referring to transforming business processes using digital technologies, not using high-tech digital equipment like robots that replaces humans. Work that is repetitive, requires number crunching and structured could be automated easily. Tasks performed by, say, bank tellers, bookkeepers, or clerks – and services such as registration and licensing – can to a large extent be done with digital technologies (World Bank, 2016). That is why sectors like banks went for automation earlier than others. Making public services available online offers government the opportunity to improve quality of services, lessen hassle and reduce time to deliver.

Mobile phones have become ubiquitous in the modern world. Capabilities of mobile phones have increased gradually from basic phone to feature phone and finally to current smart phone. These are also changing the way people act and behave in the society. Mobile technology is also great tool for business and especially useful to SMEs. As planned by DGDA, the mobile app for finding registered pharmacies and also to check counterfeit drugs should be developed the soonest possible.

DGDA should consider providing pharmacies' registration service online using website or Android apps. This could be facilitated in collaboration with different actors of the government. An applicant can submit application through web or a mobile app. Verification is one important element of registration. Currently, attested paper documents are used for this purpose. Documents like NID, BRN could be verified through the depository for authenticity. Payment is another element in such services which could be verified online or through APIs. DGDA could ensure that the requirements of BPMI are met through any app/solution developed.

The application can be made available in both paper form and through internet at the initial stages. Registration or re-registration online (through mobile app/internet) would allow collection of all necessary particulars. The benefit would be availability of up to data and storages of those in the DGDA server as permanent records open for inspection by headquarters. The existing registered pharmacy database could be redesigned and used for this purpose. For monitoring purposes, many reports could be generated from the registration database include (BPMI/non-BPMI), some of which could be:

1. List of BPMI applications with status of processing/approval
2. District wise list of pharmacies the license of which are no longer valid (for using reminders through email, mobile number or paper) - for use by district offices
3. Upazila wise list of pharmacies for use by district offices
4. Division wise summary table especially for the use by DGDA headquarters
5. Monthly report on revenue earned (aggregated or disaggregated by districts)

Inspection of pharmacies or pharmaceutical companies is a key function of DGDA officials. An Android app should be developed for use by the DGDA field officers during inspection. Android apps would allow inspection to be captured online or offline with some meta data including on site GPS data and system generated time-stamps. Images could also be captured of the facility. Additionally, apps could be developed cater to the need of data on cases relating to mobile court or drug court.

This could be part of a suite of applications that would run on tablet. The App would ensure security of data through user profiles and access control. Additional apps in the suite could be inspection, daily reporting, monthly reporting, collection of samples from market, particulars of cases lodged in the mobile court along with penalties and jail sentences. All data would be uploaded into a central server through internet, though it must be ensured that apps have capacity to run offline. Database would continue to build up records of such activities allowing their use for decision making, monitoring etc. Customized or structured reports could be made available through browser or app. A simplified data management structure based on above is presented in Figure 8.

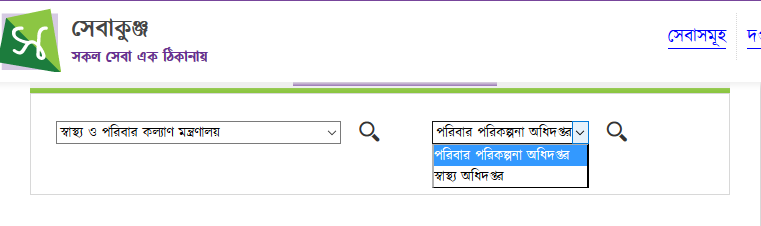
Figure : Simplified Data Management Structure



PCB should create mobile apps for searching pharmacists through smart phones, so that both the pharmacist and owners of drug shops can verify any one through their cell phones.

A GOB portal called *Shebakunja* maintains a catalogue of all services provided online by different government entities (see Figure 9). DGDA should enroll this service in *Shebakunja*.

Figure : Shebakunja (www.portal.services.gov.bd)



## Website enrichment

Websites are public windows for the government. Content creation and management or regular updating are essential to make a website useful and attractive. It has been seen that almost all visits to DGDA website are generated from in-country and about 25% land in the page by using search criteria as license or pharmacies. Most of the users are not literate and they need content in native language. It is most likely many of the visitors would be accessing the dgda site from mobile, not PC. Therefore, mobile technology should be supported in the website. Services provided online would increase the importance of the website. Accordingly, following suggestions are made:

* Currently DGDA website is only available in English. It would be appropriate to make the website bilingual where initially some contents could be included with translations. Eventually, most of the contents should be made available in Bangla. It is possible to make default in English for the overseas visitors and Bangla for visitors from Bangladesh by identifying the source of IPs.
* The website should be revamped for provision of services like registration or renewal.
* There are other design issues as well like using responsive design to make the site mobile friendly (considering the BPMI clients accessing the website through mobile).
* No document in Bangla should be created in non-standard ANSI fonts or only Unicode fonts should be used. Many documents in the site are in pdf format. It may be useful to distinguish which data should be provided on html pages, rather than in pdf files (without a viewer, the pdf files could not be read from web and need downloading, which could be a hassle).
* A special page on BPMI level I and II should also be prepared for disseminating the BPMI initiatives together with the list of level I and Level II pharmacies (sorted and searchable with location data to find them).
* It is necessary to use national standards like CCDS, Geo code etc in the database.

The PCB website also needs some enhancements. There is a page for finding the registered pharmacists in the webpage. That would mean data relating to all pharmacists should be entered into the database (like BMDC website mentioned before). There is no data in the pharmacist database. The database should be populated using data available in the register in order to make it functional. The PCB also needs to consider that DGDA would need to verify the pharmacist before registration or renewal using the pharmacist database.

As a regulatory authority the DGDA can establish a system to collect some product information from the manufacturers (batch no, lot no, date of manufacturing, date of expiry and maximum retail price) and make them available to the public which could go a long way and ensure that there is a method to check the counterfeit drugs. Such data could be collected electronically (APIs) or in a form possible to integrate in the database (such as csv[[32]](#footnote-32) files). This would allow the consumers to check whether they are buying genuine drugs.

## Social Media

Social media provides interactive tools for reaching a large number of stakeholders. It increases the visibility of any organization and make it possible to interact with citizens. It is also possible to increase awareness about the BPMI through social media. Social media is also useful for disseminating information (like educational materials in facebook, youtube, blog etc). It can also be used for creating awareness about rational use of drugs and addressing anti-microbial resistance issues. A recent report by a government constituted committee in UK prioritized the need for massive awareness campaign (Review on Antimicrobial Resistance, 2016).

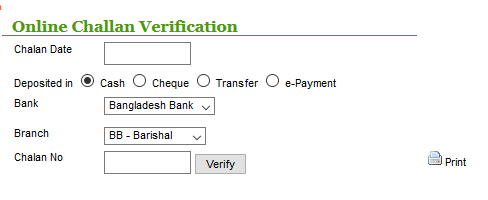
## Mobile Payment

Mobile payment systems have made good inroads in Bangladesh. Currently a number of service providers are facilitating the payment. However, the market is far from mature. On the other hand, the suitability of using such services for BPMI by DGDA seems limited. As a government department, DGDA receives budget from the consolidated fund of the government for making any expenditure. The DGDA receives allocation in the development budget for capital expenditure. So there is no additional benefit for DGDA to receive payment directly from its licensees.

Currently the registered pharmacies are required to deposit fees in the treasury either in a Bangladesh Bank branch or designated branch of Sonali Bank. Any money charged by it goes into government treasury. It is possible to verify such payment online by the DGDA officials (see ). This could also be automated through use of APIs[[33]](#footnote-33) and on successful negotiation with the Ministry of Finance.

In Tanzania, PCT received the fees for ADDO through mobile money. It's counterpart in Bangladesh PCB can be benefited from such payment. PCB's clients or any grade of pharmacists can use the mobile money platform to deposit money. PCB might open a merchant account for accepting payments of examination fees.

Figure : Verification of deposit made through Challan



Source: http://www.cga.gov.bd/index.php?option=com\_wrapper&Itemid=497

## Pharmacy Education

There is problem in the supply side for C grade pharmacist. PCB would have an uphill task if it were to facilitate the education of projected C grade pharmacists. It would be appropriate to go for online courses. Online courses appear right for C grade pharmacists. MOHFW/DGDA might negotiate with public/private educational institutes including leading websites for introducing online courses (e.g. www.shikhk.com).

## Capacity Building

Success in technology is ensured through users. New technologies can be beneficial if users understand their impact and commit themselves to use them. Training would be essential for better use or increasing proficiency. Training would be required for all inspectors as well as staff using the system. Manuals and related materials need to be developed as well. Web based tools like forum pages in the website could be useful as users would be able to share their experience and discuss about problems and solutions.

DGDA should consider setting up an unit with ICT personnel.

## Collaboration across Ministry/Departments

A number of actors could be identified for collaboration within MOHFW and outside. DGDA can be benefited through collaboration with other departments within MOHFW on digitizing the processes and for providing services online, e.g.:

* Ongoing collaboration between the DGDA and DGHS would help DGDA to generate MIS data using DHIS2 platform. DGDA would be able to utilize the resources available with DGHS (its data center and DHIS2 platform)
* Online registration would require verification of digital identities of the applicants as well as pharmacists. Digital identities of the citizens are managed by Bangladesh Election Commission through NID Wing of Election Commission Secretariat. DGDA could use the services provided by the NID database to verify the owner as well as pharmacist of the registered pharmacies when providing new licenses or renewing the old ones. The NID wing also charges fees for Service Level Agreements. DGDA should update the registered pharmacy database by including data elements like NID, BRN or mobile number.
* Similarly it can verify the pharmacist through PCB database (which has to be made functional by populating with relevant data in the meantime).

These activities would require signing of MOU with relevant agencies of the government. On technical side the APIs for connecting with databases.

The infrastructure for managing those services is not available to DGDA at the moment. In addition to having a server in DGDA, several options are available. DGDA could utilize the DGHS server. Bangladesh Computer Council (BCC) data center is open to government organizations for hosting government databases. Disaster recovery is essential for such resources, which is available with both DGHS and BCC.

## Investment in Hardware and Software

Some investment in hardware, especially tablets for field officials or at least up to 100 would be required. Investment in server for database management could be skipped initially as without skilled manpower the DGDA would find it difficult to run the system. And it would be possible to perform such tasks in collaboration with other agencies of the government. For long term sustainability, DGDA should appoint people with ICT skills or background.

Software for Android platform and web would be required to be developed. DGDA should seek technical assistance for developing software and for organizing training programs associated with use of the software.

## Policy Implications

Proposed BPMI Standards I and II would require legal backing, if not immediately then later. The Drug Act, 1940 and the Drug (control) Ordinance, 1982 are possibly considered for amendment. In the proposed law, BPMI models should be incorporated including procedures required for online registration and inspections. Later those should be followed up with procedural laws. Digital processes need to be codified in the law and especially in the rules.

The fees for licenses were determined last in 2012. The fees are nominal (Tk. 1,500/- for new and Tk. 3,000/- with late fee for renewal). It should be ensured that the fees are increased per year by an amount not exceeding the rate of inflation or at a maximum of five percent.

# Key Recommendations

On the basis of analysis made in the foregoing sections the following recommendations are made.

## Automating the Business Processes and website management

The following recommendations address suggested online services and improvement of the current website of DGDA:

1. Allow registration/renewal of pharmacies online through mobile and web applications starting with BPMI
2. Make the registered pharmacy database interactive for the visitors and transactional for the clients with access control based on users and perform functions like alerts for renewal through email or SMS following expiry of the license or notifications at different stages of approval of registration
3. Increase the functionality of registered pharmacies database and devise a strategy to collect additional data from the pharmacy owners and create elaborate search functions for use in decision making by the DGDA staff with tools for visualization
4. Develop Android App for inspection of pharmacies using tablet PCs in both online and offline mode with the ability to integrate GPS data or other meta data
5. Examine the design issues of the database e.g. change the numbering scheme of the pharmacies, implement national standards like CCDS, BBS geo code
6. Make the existing website mobile-friendly or implement responsive design
7. Make the website bilingual - create content in Bangla
8. Ensure that capability of mobile app for finding registered pharmacies (on-going activity) and counterfeit drugs are enhanced through use of manufacturing data
9. Distinguish which data should be provided on html pages, rather than in pdf files

## Social media

The social media can play an important role in disseminating the activities of the DGDA regarding the BPMI model as well as routine activities. Therefore it is suggested that

1. Utilize the social media platform for informing its stakeholders about the BPMI Initiatives on a regular basis
2. Create web content on rational use of drugs and address anti-microbial resistance issues highlighting the role of physicians, pharmacists and patients

## Mobile payment

Mobile money is gaining ground in Bangladesh and its role would increase. Mobile payment option is currently seems difficult for DGDA. However, PCB would be in a position to utilize the mobile payment options for examinations or registration of students. Therefore it is suggested that the PCB might

1. Consider opening a merchant account with a suitable mobile financial service provider for collection of examination fees of C grade pharmacist and also for registration

## Pharmacy Education

PCB needs to make the database of pharmacists functional and also increase the educational opportunities for the C grade pharmacists. It is suggested that

1. Populate the pharmacist database from written records or registers and allow the verification of any specific pharmacist through website, also collect additional data such as workplace information etc
2. Create mobile apps for using the pharmacist database of PCB by pharmacists, owner of drug shops or anyone
3. Negotiate with educational portals for introducing online courses for C grade pharmacists
4. Launch an information campaign for updating the pharmacist databases

## Capacity Building

Skill and knowledge of the users need to be increased for using the ICT tools developed for BPMI. It is recommended that DGDA

1. Organize short training for managing registration and carrying out inspections through digital tools by the DGDA officials
2. Prepare manual on inspection and training
3. Recruit personnel to handle IT related jobs and content management

## Collaboration across Ministry/Departments

DGDA can be benefited through collaboration with other departments within MOHFW on digitizing the processes and also providing services online. The following are recommended:

1. Strengthen collaboration with DGHS for using the DHIS2 platform: generate MIS data using DHIS2 platform in collaboration with DGHS
2. Engage into a service level agreement with the NID wing of Election Commission Secretariat to use NID database to verify the owner of the pharmacy as well as any pharmacist when providing new licenses or renewing the old ones
3. Check birth registration numbers of pharmacists or owner of pharmacies online by having an MOU with the Office of the Birth and Death Registration
4. Verify the pharmacists through PCB Pharmacist database while processing any application for registration or renewal of pharmacies
5. Notify the availability of services through a communication campaign and also include the services in the Services Portal of the Government called Shebakunja
6. Initiate discussion with DGHS or BCC for using their server for hosting the registration database

## Investment in Hardware/Software

The following recommendations address acquiring hardware/software for the BPMI by DGDA:

1. Take steps to increase budget allocation for purchasing tablets for field officials
2. Negotiate with development partners for developing software through technical assistance

## Policy Implications

Digitizing any activity performed by government organizations means changing those from manual to digital forms. Therefore it would be necessary to

1. Amend laws to include the BPMI model and have the powers to lay down the process for online registration and/or other services through appropriate subordinate regulations

The above recommendations are presented in a matrix with identification of responsibilities, time-frame for completion, implications for cost and next steps forward, which appear next page at . These actions would enhance the competencies of the DGDA officials and help them to manage pharmacies that have adopted BPMI standards and usher in changes in the management practices based on information and communication technologies.

Table : Action Plan

| **#** | **Key Action** | **Next Steps** | **Action by** | **Time required\*** | **Funding** |
| --- | --- | --- | --- | --- | --- |
| **Automating the Business Processes and Revamping the website** | | | | | |
|  | Allow registration/renewal of pharmacies online through mobile and web applications starting with BPMI | Develop app and web application | DGDA | Medium term | BPMI Phase II |
|  | Make the registered pharmacy database interactive for the visitors and transactional for the clients with access control based on users and perform functions like alerts for renewal through email or SMS following expiry of the license or notifications at different stages of approval of registration | Develop using appropriate software and devise training strategy | DGDA | Medium term | BPMI Phase II |
|  | Increase the functionality of registered pharmacies database and devise a strategy to collect additional data from the pharmacy owners and create elaborate search functions for use in decision making by the DGDA staff with tools for visualization | Design and development. Strategy for collection of additional data. Training program for DGDA staff | DGDA | Medium term | BPMI Phase II |
|  | Develop Android App for inspection of pharmacies using tablet PCs in both online and offline mode with the ability to integrate GPS data or other meta data | App, web services, database | DGDA | Medium term | BPMI Phase II |
|  | Gradually develop a suite of apps for managing other activities of DGDA (industry inspection, mobile court etc.) | App, web services, database | DGDA | Long term | BPMI Phase II and beyond |
|  | Examine the design issues of the database e.g. change the numbering scheme of the pharmacies, implement national standards like CCDS, BBS geo code | Review and modify by using existing resources | DGDA | Short term | BPMI Phase II |
|  | Make the existing website mobile-friendly or implement responsive design | Review and modify | DGDA | Short term | BPMI Phase II |
|  | Make the website bilingual - create content in Bangla on issues relevant to drugs and BPMI | Review and modify | DGDA | Medium term | BPMI Phase II |
|  | Ensure that capability of mobile app for finding registered pharmacies (on-going activity) and counterfeit drugs are enhanced through use of manufacturing data | Activity on-going, evaluate the options | DGDA | Short term | GOB |
|  | Distinguish which data should be provided on html pages, rather than in pdf files | Review and modify | DGDA | Short term | No cost |
| **Social Media** | | | | | |
|  | Utilize the social media platform for informing its stakeholders about the BPMI Initiatives on a regular basis | Content development in Bangla and creating a FaceBook page for BPMI and a YouTube channel | DGDA | Short term | BPMI Phase II |
|  | Create web content on rational use of drugs and address anti-microbial resistance issues highlighting the role of physicians, pharmacists and patients | Content development in Bangla (text, video) for FaceBook, YouTube | DGDA, DGHS | Short term | BPMI Phase II |
| **Mobile payment** | | | | | |
|  | Consider opening a merchant account with a suitable mobile financial services provider for collection of examination fees of C grade and also for registration | Administrative decision | PCB | Short term | No cost |
| **Capacity Building** | | | | | |
|  | Provide short training to all Drug Superintendents for managing registration and carrying out inspections with tablets | Seek TA | DGDA | Medium term | BPMI Phase II |
|  | Prepare manual on inspection and training | Seek TA | DGDA | Medium term | BPMI Phase II |
|  | Recruit personnel to handle IT related jobs and content management | Government process | MOHFW and others | Medium to long term | Cost to be borne by GOB |
| **PCB** | | | | | |
|  | Populate the pharmacist database from written records/registers and allow the verification of any specific pharmacist through website, also collect additional data such as workplace information | Outsource, may seek TA | PCB | Short term | BPMI Phase II |
|  | Create mobile apps for using the pharmacist database of PCB by pharmacists, owner of pharmacies or anyone | Seek TA | PCB | Short term | BPMI Phase II |
|  | Negotiate with educational portals for introducing online courses for C grade pharmacists | Seek TA | PCB | Short term | BPMI Phase II |
|  | Launch an information campaign for updating the pharmacist database | Notification on website | PCB | Short term | Own or BPMI Phase II |
| **Collaboration across Ministry/Departments** | | | | | |
|  | Strengthen collaboration with DGHS for using the DHIS2 platform: Generate MIS data using DHIS2 platform in collaboration with DGHS | Activity on-going | DGDA, DGHS | Short term | cost absorbed by DGHS |
|  | Utilize the Services Portal of the Government called Shebakunja for notification of services | Notification to site owner | DGDA, MOHFW | Short term | No cost |
|  | Engage into a service level agreement with the NID wing of Election Commission Secretariat to use NID database to verify the owner of the pharmacy as well as pharmacist when providing new licenses or renewing the old ones | MOU, API, Database (PCB)  Seek TA | DGDA, PCB, BEC | Short term | Initial fees & transaction fees from revenue budget |
|  | Check birth registration number online by having an MOU with the Office of the Birth and Death Registration | MOU, API | DGDA, PCB | Medium term | BPMI Phase II |
|  | Verify the pharmacists through PCB Pharmacist database | MOU with PCB | DGDA | Medium term | TA required |
|  | Notify the availability of services through the Services Portal of the Government called Shebakunja other communication channels | Letter to Shebakunja | DGDA, PCB | Short term | No cost |
|  | Initiate discussion with DGHS or BCC for using their server for hosting the registration database | Administrative decision | DGDA, DGHS, BCC | Short term | Recurring costs (revenue budget) |
|  | Initiate discussion with Finance Division/Controller General of Accounts for verification of Challan online through APIs | Communication with relevant authorities | MOF, CGA | Medium term | No cost/BPMI cost |
| **Investment in Hardware/Software** | | | | | |
|  | Take steps to increase budget allocation for purchasing tablets for field officials | Budget proposal to Finance Division | DGDA, MOHFW | Medium term | Initially TA, later GOB |
|  | Negotiate with development partners for developing software through technical assistance | Through BPMI | DGDA, MOHFW | Short term | BPMI Phase II |
| **Policy Implications** | | | | | |
|  | Amend laws to include the BPMI model and have the powers to lay down the process for online registration and/or other services through appropriate subordinate regulations | Government process | MOHFW and others | Medium to long term | No cost |

Note: Short term means achievable within 1 year, medium term means 2 to 3 and long term 4 to 5 years. It is assumed that there would be BPMI Phase II project that would carry on recommended activities.

# Conclusions

Implementing BPMI Standards (Level I and II) requires adequate preparation on the part of MOHFW/DGDA. This study assessed technological options available to the MOHFW, DGDA and PCB – the organizations that would be responsible for implementing the strategy. Given the political commitment now present for digital transformation under a digital vision for the country, there is ample scope to realize the technical solutions suggested in this report. The piloting of Standard levels should provide the DGDA an opportunity to introduce system-wide automation as well for improving its MIS functions thorough use of digital tools. BPMI establishment process would need strong and continuous monitoring and digital tools would contribute positively to those efforts. Digital tools would also contribute to the improvement of management functions leading to effective dispensing practices in the registered pharmacies and consequently to health systems improvement.

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ANNEX : Scope of Work

1. Review documents from Tanzania describing the Pharmacy Council of Tanzania’s technology strategy. With ITIDO, review the Pharmacy Council of Tanzania’s ADDO and Pharmacy Database and mobile technology suite.
2. In collaboration with ITIDO, DGDA, and MSH, meet with the Director, MIS, DGHS to introduce the BPMI program and learn about the MOHFW’s IT strategy and existing eHealth initiatives. Agree upon a collaborative approach for developing the BPMI technology strategy.
3. With assistance from ITIDO and MSH, closely work with technology strategy technical working group to introduce assignment and plans for developing the BPMI technology strategy.
4. Review existing Bangladesh eHealth strategy and identify opportunities to integrate the private sector pharmacies into the national strategy.
5. In collaboration with ITIDO and MSH, review DGHS/DGDA interactive web portal and identify whether private sector pharmacies could be integrated into the portal and/or how the BPMI technology strategy could be designed to complement or interact with the existing portal.
6. Conduct key informant interviews with key BPMI stakeholders and individuals knowledgeable about eHealth initiatives and technology in Bangladesh, particularly relating to health facility or pharmacy databases and/or mobile technology. Central level interviewees should include MOHFW, DGDA, PCB, BCDS, MSH SIAPS staff, mobile providers and mobile communication regulatory entity in Bangladesh. At the district level, interviewees should include pharmacy owners and dispensers, district health officials, and BCDS representatives.
7. Based on the Tanzania’s technology strategy and tools, the existing eHealth tools and strategy in Bangladesh, and the information gathered from stakeholders, develop a concept note describing a proposed technology strategy for the BPMI program, which details the following:
   1. Recommended technology for the BPMI program—what tools will be most useful for facilitating, enhancing, and sustaining the BPMI program?
      1. Components or tools to adapt from the Pharmacy Council of Tanzania. Potential components include:
         1. Web-based database
         2. Mobile money payments
         3. SMS information exchange and helpline
         4. SMS reporting
      2. Components or tools to adapt from existing eHealth initiatives in Bangladesh
      3. Components or tools that should be newly developed to fill a gap
   2. Plan for integrating the technology with existing eHealth tools, portals, and strategies
   3. Describe the plan for technology oversight, implementation, and maintenance. Recommend a lead entity (e.g. DGDA, MOHFW, PCB, etc.) that would house the technology and the staffing needed at the lead entity to run the technology.
   4. Strategy for building the tools and rolling-out the technology during the implementation phase.
   5. High level summary of the resources needed and timeline for introducing, scaling-up, and maintaining the technology.
8. Hold technology strategy technical working group meeting(s) to solicit stakeholder feedback on the concept note.
9. Based on stakeholder feedback, revise the concept note to propose a final BPMI technology strategy.
10. Propose final technology strategy to a broader group of key stakeholders at a technology strategy finalization workshop for final approval.

ANNEX : List of People Met

1. Major General Mustafizur Rahman, Director General, DGDA
2. Professor Abul Kalam Azad, Additional Director General (Administration) and Director (MIS), DGHS
3. Mr. Golam Kibria Director, DGDA (functioning as Acting DG as DG is abroad)
4. Mr. Ruhul Amin, Director, DGDA
5. Mr. Sukorno Ahmed, Assistant Director, DGDA
6. Mr. K K Saha, Secretary, Pharmacy Council of Bangladesh (PCB)
7. Mohammed Abdul Hai, Bangladesh Chemists and Druggists Samity
8. Mr. Golam Sarwar, Proprietor, Ramna Pharmacy, Moghbazar, Dhaka
9. Mr. Shafiuddin Ahmed, Pharmacy owner.
10. Anwar Hossain Mridha, Managing Pharmacy, Tamanna Pharmacy
11. Golam Mostafa Farajee, Managing Partner, Lavendar Pharmacy
12. Mr. S M Shafiuzzaman, Secretary General, BAPI
13. Mr. Md. Harunur Rashid , Chairman, Globe Pharmaceuticals Ltd.
14. Mr. Mojibul Islam Panna, Managing Director, Amico Laboratories Ltd.
15. Mr. Zakir Hossain, Managing Director, Delta Pharma Ltd.
16. Mr. Mohibuzzaman, Managing Director, ACI Pharmaceuticals Ltd.
17. Dr. Anwarul Islma, Biopharma Ltd.
18. Mr. Munir Hasan, Country Coordinator, www.shikhok.com.
19. Mr. Masud Parvez, icddr,b (working in DHIS2)
20. Mr. Jafary Liana, MSH, Tanzania
21. Mr. Jacob Mtalitinya, ITIDO (through a Skype call)

1. mohfw.gov.bd, dgda.gov.bd, dghs.gov.bd, pcb.gov.bd, bmdc.gov.bd, bteb.gov.bd and portal.services.gov.bd. [↑](#footnote-ref-1)
2. http://databank.worldbank.org/data/reports.aspx?source=2&country=&series=SP.DYN.LE00.IN&period= [↑](#footnote-ref-2)
3. This policy has not yet been approved by the government. [↑](#footnote-ref-3)
4. http://www.statista.com/topics/1764/global-pharmaceutical-industry accessed 12 May 2016 [↑](#footnote-ref-4)
5. TRIPs agreement allows exemption from patents up to 2032 to ldcs. It has to be seen whether that benefit would continue as Bangladesh has become a lower middle income country in the meantime. [↑](#footnote-ref-5)
6. DGDA website lists 270 as the total number, but it was found that one record contains dummy data. [↑](#footnote-ref-6)
7. As appeared on DGDA website. This figure changes rapidly due to updating. [↑](#footnote-ref-7)
8. Lost income from unregistered pharmacies plus biennial renewal fees could amount to at least double the amount earned annually. [↑](#footnote-ref-8)
9. Summary findings gathered from preliminary report done under BPMI (courtesy ADS project). [↑](#footnote-ref-9)
10. Wholesale pharmacies registration is not a separate category and it is only given to the manufacturers and discontinued currently. [↑](#footnote-ref-10)
11. A receipt in support of payment made to the government treasury. Such payments are only accepted in Bangladesh Bank branches and designated branches of Sonali Bank. [↑](#footnote-ref-11)
12. A local government institution at the lowest tier of administration responsible for issuance of trade licenses. [↑](#footnote-ref-12)
13. As all citizens of the country are now provided with an NID, there is no point in obtaining the citizen certificate. Collection of NID number opens up the avenue for verification online. [↑](#footnote-ref-13)
14. This is done by the district offices. However, the figures may not represent actual situations. [↑](#footnote-ref-14)
15. Drug Courts are established by the Drug Act of 1940. An Assistant Judge in the district performs as Judge for the Drug Court. [↑](#footnote-ref-15)
16. Mobile courts are conducted by Executive Magistrates through roving teams and accompanying DGDA officials. [↑](#footnote-ref-16)
17. CCDS stands for Citizen Core Data Structure approved by Cabinet Division and prescribed for national databases. [↑](#footnote-ref-17)
18. http://www.alexa.com/siteinfo/dgda.gov.bd [↑](#footnote-ref-18)
19. Responsive design means device independent website suitable for mobile phones. [↑](#footnote-ref-19)
20. In June 2015, a number of ads about a pharmaceutical product was published in different dailies announcing a service available through mobile phones and internet from a startup. The startup has tied up with a pharmaceutical company which is printing special codes in the strip of the tablets. Sending that number through SMS to a designated number would generate a reply stating whether the drug is genuine or fake. See www.panacea.live. [↑](#footnote-ref-20)
21. http://www.cga.gov.bd/index.php?option=com\_wrapper&Itemid=497# [↑](#footnote-ref-21)
22. In Tanzania the responsibility was vested with the TFDA initially. On evaluating the success of ADS model, the Tanzanian authorities entrusted the regulation to PCT by an amendment of the law. [↑](#footnote-ref-22)
23. Samity is a Bengali word meaning Association. [↑](#footnote-ref-23)
24. সহজ ওষুধবিজ্ঞান, সম্পাদনায়: প্রফেসর এ বিএম ফারুক, প্রফেসর ইসমাইল খান, প্রকাশনায় বাংলাদেশ ফার্মেসী কাউন্সিল [↑](#footnote-ref-24)
25. http://pcb.gov.bd/images/pdf/InformationCourse.pdf [↑](#footnote-ref-25)
26. An expatriate consultant prepared a strategy document which was supposed to be finalized after stakeholder consultation. The Stakeholder consultation could not be done due to situation beyond the control of the consultant. It is possible to finalize the document by giving some extra input, especially by holding stakeholders consultation. [↑](#footnote-ref-26)
27. http://www.theindependentbd.com/post/45818 [↑](#footnote-ref-27)
28. http://www.statista.com/statistics/274774/forecast-of-mobile-phone-users-worldwide/ [↑](#footnote-ref-28)
29. http://www.statista.com/statistics/284202/mobile-phone-internet-user-penetration-worldwide/ [↑](#footnote-ref-29)
30. http://www.btrc.gov.bd/content/internet-subscribers-bangladesh-april-2016 [↑](#footnote-ref-30)
31. Actually, we know of at least one government department using mobile money, which is Traffic Department of Bangladesh Police. Fines are collected through UCash, a mobile financial service provider. [↑](#footnote-ref-31)
32. Comma separated values, a file format that is recognized by database or spreadsheet programs. [↑](#footnote-ref-32)
33. Application Programming Interface or special purpose computer programs. [↑](#footnote-ref-33)