# Rajshahi University of Engineering & Technology


## Department of Computer Science & Engineering (CSE)

**Course No.: CSE 4108**

**Course Name: Information System Analysis & Design**

# *"Analysis of Management System of Bangladesh Livestock Research Institute"*


## Submitted By:

AMINUL HOSSAIN SAZZAD

**Roll:** 1603105

MST. NUSHRAT JAHAN JUTHI

**Roll:** 1603106

Abdullah Al Zaied

**Roll:** 1603107

MD. SHABIR KHAN AKASH

**Roll:** 1603108

## Submitted To:

Dr. Md. Rabiul Islam

Professor

Department of CSE

**&**

Emrana Kabir Hashi

Assistant Professor

Department of CSE

# Table of Contents

## Chapter 1: Introduction



## Chapter 2: Problem Statements



## Chapter 3: Information Gathering & Analysis

## Chapter 4: Feasibility Analysis



## Chapter 5: System Design

## Chapter 6: Database Design



## Chapter 7: Project Scheduling

# Chapter 1: Introduction

Bangladesh Livestock Research Institute (BLRI) is a state-run national research organization under the Ministry of Fisheries and Livestock conducts research on livestock development of the country. BLRI was established in 1984 according to the 28th Presidential Ordinance and started functioning in 1986. It is situated in Savar, Dhaka on a land area of 487 acres.

## 1.1 Vision

Development of livestock and poultry by research.

## 1.2 Mandates

- Identification of the problems affecting poultry and livestock production.
- Development of technologies to solve those problems.
- Development of existing breeds and inventing new breeds.
- Food and nutrition management.
- Development of technologies for animal health and disease control management.
- Socio-economic evaluation and first-hand extension.
- Publication of research knowledge and findings.
- Food safety, diversification of inputs and products and their value addition.
- Counseling of farmers and entrepreneurs.

## 1.3 Organizational Structure

BLRI has total 8 (eight) research divisions, 1 (one) support division and 5 (five) regional stations.

### 1.3.1 Research Divisions

**Animal Production Research Division**

This division currently running projects like - System modeling for food waste to feed production, Comparative feed intake and growth performances of buffalo and cattle of different ages, Study on nutrient utilization and biometrical ranking of

available roughages in Bangladesh, Study of livestock manure management and clean air production, Strategic development of beef cattle and their qualities etc.

**Poultry Production Research Division**

This division currently running projects like - Conservation and improvement of native chicken: Performance of fifth generation, Conservation and improvement of Quail: performance of fifth generation, Productive and Reproductive performance of selected native duck genotype (gen 2) etc.

**Animal Health Research Division**

This division currently running projects like - Development of Peste des Petits Ruminants (PPR) free zone in selected areas of Bangladesh to meet global control strategy, Development of polyclonal antibody based PPRV detection technique, Prevalence and multi-drug resistant pattern of emerging and re-emerging foodborne pathogens in livestock and poultry value chain, Immune escape and genetic evolution of highly pathogenic avian influenza virus H5N1 with the advent of vaccination in poultry in Bangladesh and many others.

**Bio-technology Research Division**

This division currently running projects like - Propagation, improvement and conservation of Munshiganj Cattle through planned breeding and their performance study ex-situ, Screening and development of different coat color variants' goat stock at BLRI, Production of calves through transfer of in vitro produced cattle embryos at farmers level and BLRI Research Farm.

**Sheep & Goat Research Division**

This division currently running projects like - Evaluation of performances of Boer and Jamunapari goat at BLRI, Improvement of Black Bengal Goat through community breeding, Conservation of farm animal genetic resources (FAnGR) at Naikhoncari Performances of Hilly Brown Bengal goat development at farm level, Community based sheep production in hilly area at Naikhonchari.

**Socio-economic Research Division**

This division currently running projects like - Value Chain Analysis of Milk and Comparative Advantage of Milk Production in Bangladesh, Economic Evaluation of Buffalo Production in Selected Regions of Bangladesh.

**Systems Research Division**

This division works with a view to identify field-based problems and prospects of livestock and poultry in Bangladesh. To conduct need-based research works and to solve the identified problems. This division carried out field trials of different technologies developed by various discipline of BLRI. In addition, arranged farmers filed day for demonstrating different types of technologies and to organized farmers training to transfer the matured technologies for the ultimate users are the key mandates.

**Training, Planning and Technology Testing Research Division**

Different technology-based farmers training courses; scientist training, seminar, workshop, internship and study visit program are arranged by this division. The main vision of planning is to support all kinds of administrative and logistic supports or works to accomplished proper planning of Bangladesh livestock Research Institute (BLRI). Other than scheduled ones BLRI receives request from ministries and other organizations to incorporate new issues under this divisional activity and also to maintain the national and international linkage of Research-Extension-NGO for collaborative research, transfer of technology and capacity building development program.

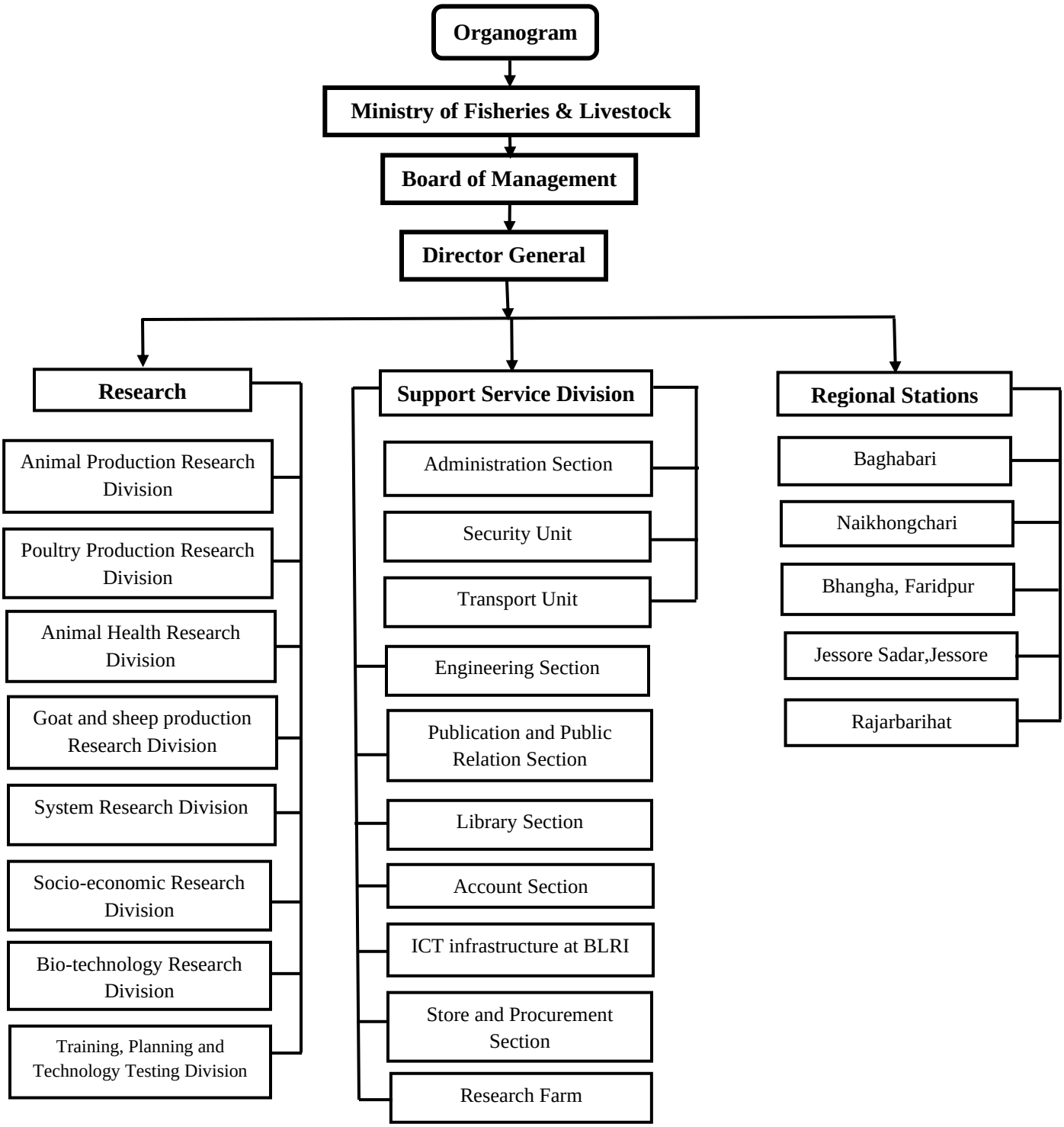
**Support Service Division**

This division consists of administration unit, security unit, transport unit, engineering section, publication and research section, library section, accounts section, ICT infrastructure at BLRI, store and procurement section and research farm.

### 1.3.2 Regional Stations

- Baghabari, Sirajganj
- Nikhongchari, Bandarban
- Godagari, Rajshahi
- Bhanga, Faridpur
- Jessore Sadar

## 1.4 Organogram



## 1.5 Board of Management

The institute is administrated by a Board of Management. The Board is the highest policy making body in the Institute's organizational structure and holds full responsibility to determine and execute policies and undertakings of the Institute within the framework of policy directives issued by the Ministry of Fisheries and Livestock of Bangladesh Government. The Director General, is the chief executive and works on behalf of the Board of Management. The Board consists of:

**Chairman**

Honorable Minister, Ministry of Fisheries and Livestock.

**Co-Chairman**

State Minister, Ministry of Fisheries and Livestock, ex-officio.

**Vice-Chairman**

Secretary, Ministry of Fisheries and Livestock, ex-officio.

**Members**

- Two members of Parliament to be nominated by the Honorable Speaker.
- Secretary, Ministry of Finance, ex-officio.
- Member (Agriculture), Planning Commission, ex-officio.
- Vice-Chancellor, Bangladesh Agricultural University, Mymensing, ex-officio.
- Executive Chairman, Bangladesh Agricultural Research Council, Mymensing, ex-officio.
- One-member higher rank than additional secretary, nominated by Department of Finance
- Director General, Department of Livestock Services, ex-officio.
- Two persons to be nominated by the Government from among persons engaged in research activities in the institute.
- Two persons to be nominated by the Government from among persons having interest in livestock and poultry.

**Member Secretary**

- Director General, Bangladesh Livestock Research Institute.

## 1.6 Workforce

There are in total 80 (eighty) scientists, 17 (seventeen) officers and 104 clerks in the institute. Recently 139 new is introduced to enhance the workflow of the institute and to increase the research area.

## 1.7 International linkage:

The institute has established linkages with a number of international organizations/institutes such as International Livestock Research Institute (ILRI), Chonbuk National University (CNU), Chinese Academy of Agricultural Sciences (CAAS) etc. for mutual cooperation in the fields of research and capacity building of human resources. The institute also maintains liaison with the other international donors and development partners like, FAO, UNDP, USAID etc. for their support in research and development activities.

## 1.8 National and International Reputation

- Bangladesh Livestock Research Institute (BLRI) provides importance on planning and execution of livestock research within the framework of the livestock & poultry policy of the Government.
- BLRI, so far, developed 75 technologies & packages and has been playing pioneering role in conservation of 24 different types of farm animals and poultry species, 43 different varieties of fodder crops of native and exotic origins.
- BLRI, responding to field demand of training on technologies, is training annually about 2000 farmers, entrepreneurs and training of trainers (TOT) and also jointly implementing MS and PhD research works of different universities and supporting university internship program.
- Bangladesh livestock Research Institute is implementing a project entitled Improving Animal Genetic Resource value and Production program in Asia (AnGR)" financed by the Rural Development Administration (RDA), Govt. of South Korea in collaboration with the Asia Food and Agriculture

Cooperation Initiative (AFACI). AFACI awarded a county award among thirteen countries to Bangladesh as "Outstanding Country Award".

## 1.9 Conclusion

In this chapter, we have looked through the vision and mandates of BLRI (Bangladesh Livestock Research Institute). Also, we have made a general visualization on the organizational structure, research divisions, regional stations in different districts all around Bangladesh. Then we discussed about their Board of Management which basically administrates the institute. The board of management is the highest policy making body in the institute's organizational structure. We also discussed about their workforce, international linkage all around the world as well as their reputation on both national and international level.

# Chapter 2: Problem Statements

## 2.1 Introduction

Bangladesh Livestock Research Institute has been serving the country's livestock resources for as long as 44 years now. It's one of the biggest research institute in this field. We investigated this institute's management system and found some problems as well as give some recommendations. We believe if the institute considers our recommendations and take necessary steps to eradicate these problems it will make them an even better institute that can serve our people.

## 2.2 Statement of Problems

The initial step of analyzing a candidate system is to find out the existing problems in that system. Here are our initial findings found in our initial investigation.

### 2.2.1 Problems Regarding Employee Needs

- Salary structure problem.
- Expectation of in situ promotion.
- Increment of age of retirement

### 2.2.2 Problems Regarding Work Load

- Have to share works out of one's duty.
- Work force is not sufficient to run administration.
- Travel allowance policy is not good enough.

### 2.2.3. Problems Regarding Regional Stations

- Regional stations are not self-sufficient.
- Don't have proper finance.
- Lack of senior officers.

## 2.3 Feasibility Study

**1. Statement of the Problem:** BLRI provides salary according to the national pay scale. But employees demand to have a separate salary structure for researchers.

**Summary of Findings:** Researchers are not happy with their salary which can be a big demotivating factor in their research activities.

**Details of findings:** The current pay scale is set according to the national pay scale of Bangladesh. It's relevant as they are government employees but the problem is, they are actually researchers. Researchers around the world get extra facilities which is not present here. Also, they should be also reward system for their achievement which is not present here now.

**Recommendations and conclusion:** The administration should prepare a different and research friendly pay scale for researchers.

**2. Statement of the Problem:** Researchers want promotion after a fixed period of time with a profile evaluation.

**Summary of Findings:** Promotion policy is not good for the employees.

**Details of findings:** Researchers have to wait long for promotions as promotion is given when there's an empty position. But researchers want promotion after a fixed period of time with a profile evaluation like the promotion system in academia.

**Recommendations and conclusion:** The administration should change its promotion policy for the researchers and avail in-situ promotion.

**3. Statement of the Problem:** At BLRI, age of retirement of researchers is 59 years. That's too early for a researches career.

**Summary of Findings:** Age of retirement is bad for both the career of the researcher as well as the productivity of the institute.

**Details of findings:** The current age of retirement for government employees is 62 years. But here the age of retirement is even lower. Also, we know at this age the scientists and researchers can research even better. Thus, retiring at this age is a waste of their brain capacity. It also ends their career early which must not happen at this age.

**Recommendations and conclusion:** The institute must increment the age of retirement according to the researchers' demand.

**4. Statement of the Problem:** Work force is not sufficient to run the administration of the institute and the employees have to overwork aside from their role.

**Summary of Findings:** The institute needs new recruits to decrease the work pressure and to increase productivity.

**Details of findings:** The institute has 80 scientists and 139 new are in the process of recruitment. So, it has sufficient number of researchers. But the problem is there's only 17 officers which is very low to run the administration properly. Thus, the scientists have to go through much administrative pressure with decrease their productivity. And also, they don't get separate payment for these extra works.

**Recommendations and conclusion:** The institute should add more officer positions and recruit new officers.

**5. Statement of the Problem:** No travel allowance for ministry works.

**Summary of Findings:** Scientists get travel allowance when they attend conferences or other official programs. But no allowance is provided for ministry works.

**Details of findings:** BLRI works under the Ministry of Fisheries and Livestock. It runs many joint projects with the ministry. The scientists related to those projects have to travel to the ministry a lot during the project. It costs

both his/her money and time. But he/she don't get any extra allowance for this extra effort.

**Recommendations and conclusion:** There should be a fund in joint projects with ministry for travel allowance and researchers should be given that travel allowance for ministry works.

**6. Statement of the Problem:** The regional stations don't have senior officers.

**Summary of Findings:** The regional stations are not self-sufficient as there are no senior officers.

**Details of findings:** A similar research institute is Bangladesh Rice Research Institute. Its regional stations are self-financed. Unlike that organization BLRI's regional stations are not self-sufficient.

**Recommendations and conclusion:** The institute should contract with the corresponding ministry to make the regional stations more active.

## 2.4 Conclusion

In the previous chapter, we discussed about the general introduction of the organization and the basic organizational structure of the institute along with their board of management. Problem identification is an important section in system analysis where the basis of candidate system is designed to improve the system of an institute or organization. In this chapter, we had presented and briefly discussed the problem statements on the basis of our initial approach and some of the problems of current system of BLRI. The findings of problems and the study of feasibility assisted us. Thus, we have found some problems regarding employee, work load and regional stations at the initial investigation which will certainly help to uncover more details about the institute's system and lead us towards the more detailed analysis of the system.

# Chapter 3: Information Gathering & Analysis

## 3.1 Introduction

The prerequisite of designing a proper candidate system is to have the clear understanding of the current system of the organization, identifying the true problems of the system. That's why it's necessary to gather information of that system first. There are many structured ways to gather information such as – review of literatures, procedures and forms; on-site observation; interviews; questionnaires etc.

We get the organization basic understanding of the organization through the literatures provided by the organization and also from the website.

For the Corona situation visiting the organization on-site was not possible.

We arranged a mobile interview with one of the senior scientific officers to understand the current system as well as problems of the system.

## 3.2 Interview

We had an interview with a senior scientific officer of the organization. Here are the key conversations written below:

**Question:** Do you have to take extra responsibilities along with your designated jobs?

**Answer:** Yes. We do.

**Question:** Then do you think your organization needs to recruit more employees to reduce the work pressure? If yes, how much?

**Answer:** Obviously. BLRI recently created 127 new scientist positions. So, there are sufficient scientists. But the administration size is very small. I think we need to recruit around 50% of our current administration size.

**Question:** Do you think the employees are skilled enough or need training?

**Answer:** We have our training division. And train our employees occasionally. But we need to train more certainly.

**Question:** Do you use manual attendance system or biometric?

**Answer:** We use biometric attendance.

**Question:** In case of intercommunication among employees, do you thing level skipping occurs here?

**Answer:** Yes. It's a big management problem for an organization but it occurs here.

**Question:** Do you use any project management software?

**Answer:** No. We do the process manually.

**Question:** Do you think your research facilities are sophisticated?

**Answer:** No organization can provide enough research facility they need. But with respect to our country our research facilities are very sophisticated.

**Question:** Do you have free access to any digital library with access to journals?

**Answer:** Yes, we have our own digital library and also, we use FAO digital library with more than 3500+ journal article access.

**Question:** Do you have reward system for scientist research performance?

**Answer:** No.

**Question:** Do you offer PhD degree at your organization?

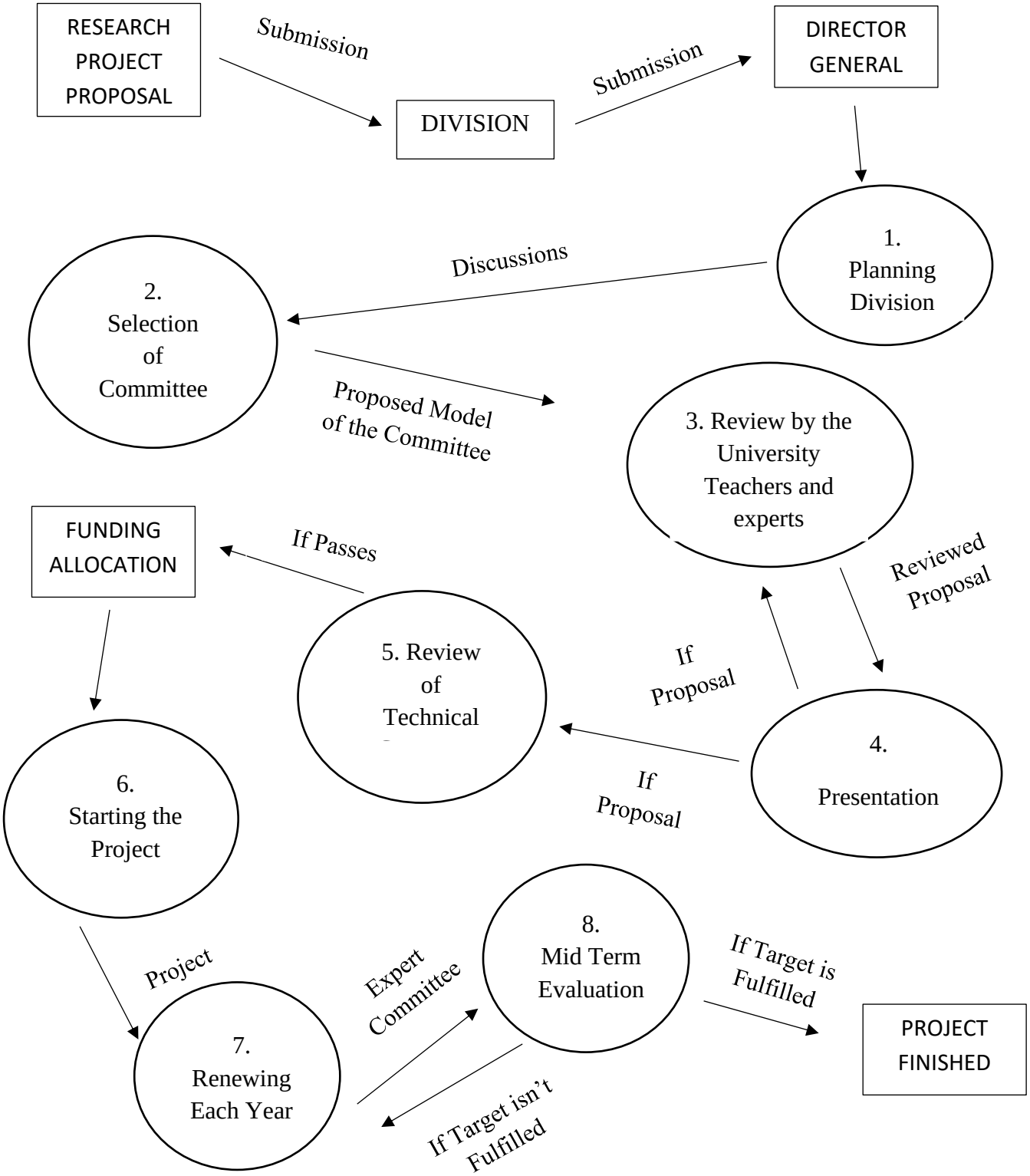
**Answer:** No. It's a big problem. Even in our neighbor country India these types of research institutes can offer degree. Also, not everything can be done with our regular employees but possible with students. We need this facility as soon as possible.

**Question:** Is your regional stations self-sufficient?

**Answer:** No, it's not. These are not self-financed. Thus, we can't allocate senior officers there. As a result, these stations can't perform at their best.

## 3.3 Overview of The Existing System

### 3.3.1.1 Project Workflow



#### 3.3.1.2 Description of Project Workflow

First a researcher creates a research proposal in a certain format and submit it to the Director General of BLRI.

The DG, BLRI forwards the proposal to the planning division of BLRI. (1) The planning division analysis the primary criteria and forward it to the selection committee. (2) The selection committee is consisted of the DG, BLRI and all the divisional heads. The selection committee forwards the proposal to expert reviewers (3) – a team of university professors and some other field experts. They evaluate the proposal, give recommendations and make changes. Then the scientist has to present (4) his revised idea in front of the expert committee. If he/she can pass the proposal is forwarded to the technical committee of BLRI for funding allocation. (5) Technical committee review the budget and other components and finalize the funding.

At this point the project comes in operation. (6) The project begins in June-July session. And have to be renewed each year if extended. (7) There is also a mid-term evaluation of the running project by expert committee for maintaining good project quality.

The input of the workflow is project proposal and funding. And the output is enhancement in technology or a new technology.

### 3.3.2.1 Root Level Training Program Workflow

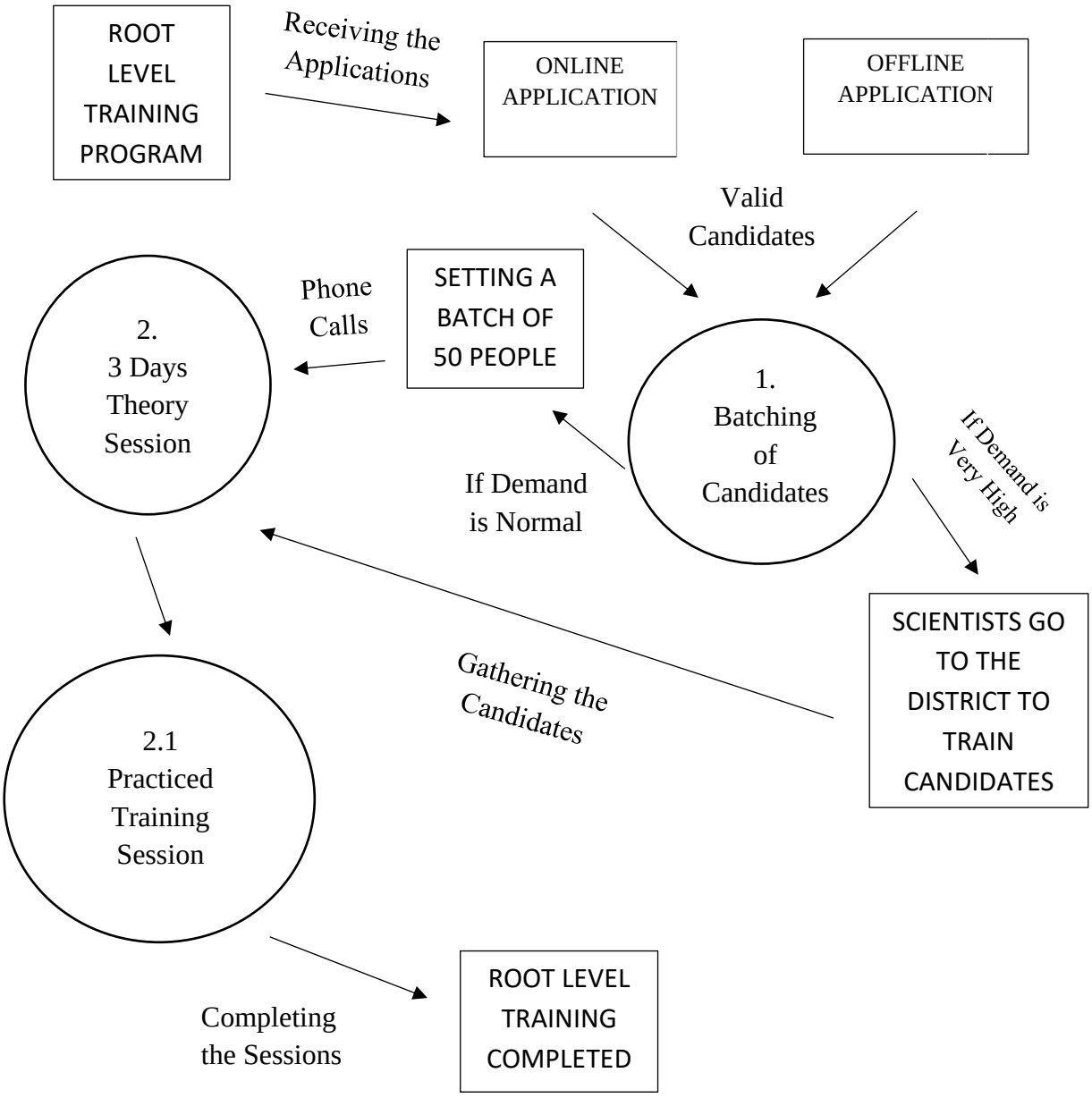



Fig : DFD of the Root Level Training Program System.

### 3.3.2 Root Level Training Program Workflow

BLRI hosts many root level training programs for farmers and livestock farm owners for the betterment of livestock quality.

After announcing BLRI accepts both online and offline application. From the applicants the organization forms batch of candidates. (1) Each batch has 50 participants. Then BLRI confirms participants with a phone call. Then they arrange a 3 days theory and practical session. (2) If there are too many applications from a certain region, scientists go there to train them hands-on.

This training is held in both central and regional stations.

## 3.4 Analysis of the Interview

From the above-mentioned interview, we have found some major problems that we didn't understand our initial study.

**The regional stations are don't have separate finance.** That's why these are not self-sufficient. For this reason, senior officers can't be assigned here.

We find a reason behind lagging in research work is that this organization **can't offer PhD degree**. If that was possible than the research activity would certainly increase. Also, the **workforce limitation** can be somehow mitigated this way.

We also came to know from the interview that **no project management software is used to maintain the project timeline.** That makes the project timeline less flexible. Also, there's no separate project manager position. Scientists themselves maintain the project. So, there may be some lacking.

Also, the employees lack some skills and need more training.

## 3.5 Analysis of the Data Flow Diagrams

The first DFD of the project workflow shows that the process is very sophisticated actually.

In the second DFD of root level training system we found that this is not applicant friendly. Root level farmers are not capable of online application. Also, it's hard for

them to download and fill up an application form in rural areas. Thus, we suggest a SMS application system to make the program reach everyone.

## 3.6 Analysis of Some Newspaper Report

From some news we found online, we come to a conclusion that one of the biggest problems of this system is corruption. It's lowering the organizations value and research output.

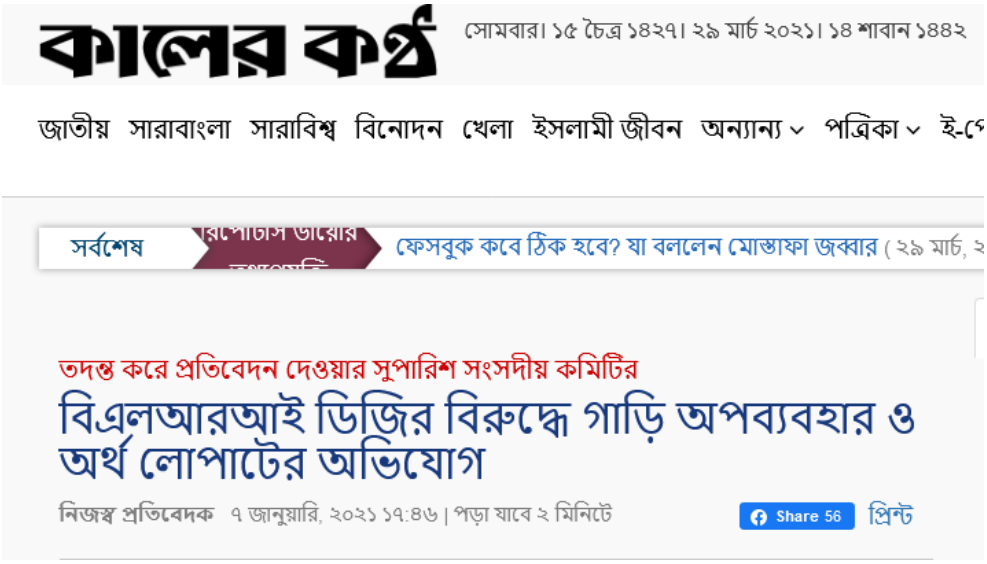



Fig: Corruption of DG, BLRI

বাংলাদেশ প্রাণিসম্পদ গবেষণা ইন্সটিটিউটের (বিএলআরআই) নির্বাহী প্রকৌশলী আশরাফুল ইসলামের বিরুদ্ধে সাতটি নির্মাণ কাজে অনিয়মের অভিযোগের মধ্যে তদন্ত কমিটি তিনটির সত্যতা পেয়েছে। বাকি চারটি অভিযোগের তদন্তের জন্য অভিজ্ঞ প্রকৌশলী নিয়োগের সুপারিশ করে তদন্ত প্রতিবেদন দাখিল করেছেন প্রাণী উৎপাদন গবেষণা বিভাগের বিভাগীয় প্রধান ও তদন্ত কর্মকর্তা ড. মো. আবদুল জলিল। প্রায় সাড়ে সাত মাস পর তদন্ত প্রতিবেদন ১৮ অক্টোবর জমা দেয়া হয়েছে। দুর্নীতি দমন কমিশনের নির্দেশে এক সদস্যের তদন্ত কমিটি গঠন করে বিএলআরআই। তদন্ত প্রতিবেদন পর্যালোচনা করে এ তথ্য জানা গেছে।

এর আগে চলতি বছরের ৩ ফেব্রুয়ারি বিএলআরআই'র নির্বাহী প্রকৌশলী আশরাফুল ইসলামের বিরুদ্ধে বিভিন্ন প্রকল্পে অনিয়ম, ঠিকাদারদের সঙ্গে যোগসাজশে ভুয়া বিল-ভাউচার তৈরি, প্রকল্পের কাজে কমিশন বাণিজ্যের মাধ্যমে অন্তত ১ কোটি ৩০ লাখ টাকা আত্মসাতের সুনির্দিষ্ট অভিযোগ এনে বাংলাদেশ প্রাণিসম্পদ গবেষণা ইন্সটিটিউটের মহাপরিচালক বরাবর একটি লিখিত অভিযোগ করেন নজরুল ইসলাম নামে এক ব্যক্তি। যার অনুলিপি দুর্নীতি দমন কমিশনের চেয়ারম্যান বরাবর দেয়া হয়।

Fig: Corruption of BLRI executive engineer (currentnews, 26-Nov-2020)

# Chapter 4: Feasibility Analysis

## 4.1 Introduction

In the 2nd chapter we identified the problems regarding the current system and conducted some initial feasibility study. In this chapter we are going to analyze our proposed candidate system to find out if it matches the performance requirements.

A feasibility study is an analysis of how successfully a project can be completed, regarding the factors those affect it such as economic, technological, behavioral, legal, scheduling factors. A project manager gets the potential positive and negative outcome of the project by conducting a feasibility analysis.

## 4.2 Proposed Candidate Systems

Having the problems found out in chapter 2 and more information gathered in chapter 3, we are proposing some solutions below to mitigate the problems in the management sector of the organization.

1. Candidate System-I
   a) **Increasing the administration size:** BLRI is basically a research institute. Sole purpose of this institute is to enhance the livestock in our country. And according to the employees there are enough scientific officers there. But there're fewer people in administration. Thus, scientists have to share work lowering the research output. Also, to enrich the regional branches the administration size is needed to be increased. We suggest to increase the size by 30%.

   b) **PhD offering facility:** This institute have all the qualities to offer and conduct PhD program. PhD candidates working as a research assistant with the scientists will boast up the research outcome many times.

   c) **Separate Budget for Regional Stations:** Regional stations should have their own budget to function properly. This is also needed to appoint the senior officers there.

d) **Automation of Project Management:** The projects should me managed using project management software. This will help to organize projects even more.

e) **SMS Application for Training:** Farmers should be able to apply for training by a single sms.

2. Candidate System-II
    a) **Separate Pay scale for researchers:** Researchers should have separate pay scale than the government employee pay scale.
    b) **In situ Promotion:** Promotion over time, not only on availability.
    c) **Achievement Reward:** Researchers should be awarded annually for brilliant research outcomes of their works.

    d) **Appoint Senior Officer in Regional Station:** This will boast up the activities in regional stations.
    e) **SMS Application for Training:** Farmers should be able to apply for training by a single sms.

We think these solutions will enhance the current management system of BLRI. We are now going to discuss the feasibility considerations regarding our proposed solutions.

### 4.3 Feasibility Considerations

Feasibility study has three key considerations – Economic Feasibility, Technical Feasibility and Behavioral Feasibility. Now we will discuss this feasibility considerations of our proposed candidate systems.

#### 4.3.1 Feasibility Considerations of Candidate System-I

- **Economic Feasibility:** This is the most frequently used method for evaluating a candidate system. It's the study if the candidate system benefit can outweigh the implementation and maintenance. Also, if there's enough resource for implementing a candidate system.

For our candidate system-I there lies a huge cost but the benefit is even more. As it is a government organization to enhance the livestock it has to have a top-notch research output. Our system will introduce a continuous increase in budget. But if the research outcome is high than it can manage that budget.

- **Technical Feasibility:** For automation of project management there's a cost of software procurement. But this will lower the project maintenance cost in future. Also, the software price is affordable.

- **Behavioral Feasibility:** Automation of project management will need some technical skills. Aged employees may react to this. But according to our study, if they are trained there will not be that much problems.

### 4.3.2 Feasibility Considerations of Candidate System-II

- **Economic Feasibility:** This system will also introduce some additional costs but these are related to employee satisfaction. So, this will benefit the organization in the long run.

- **Technical Feasibility:** This candidate system does not require additional technical set up.

- **Behavioral Feasibility:** Salary increment will affect the employees in a positive manner. But as the administration size is not increased the work load will still pressurize the employees.

## 4.4 Identifying the Characteristics of Candidate Systems

To find the best among the two above mentioned candidate systems we first summarize the characteristics of the candidate systems in a table.

Table 4.1: Characteristics of the Candidate Systems

| Characteristics | Candidate System-I | Candidate System-II |
|---|---|---|
| **Type of Cost** | Salary, Installation | Salary and benefit increment |
| **Effectiveness** | Permanent | permanent |
| **Reaction Time** | Quick | Moderate |
| **Workload** | Decrease | Same as before |
| **Employee satisfaction** | Good | Very Good |
| **Training Requirement** | Yes | No |

## 4.5 Performance and Cost Effectiveness:

In this section we will compare the system's trade off performance and cost.

Table 4.2: Candidate Qualitative Evaluation Matrix

| Evaluation Criteria | Candidate System-I | Candidate System-II |
|---|---|---|
| **Performance** | | |
| Solution Accuracy | Excellent | Good |
| Growth Potential | Very Good | Very Good |
| Impact on work Environment | Excellent | Very Good |
| **Cost** | | |
| System Development | Excellent | Good |
| User Training | Good | Excellent |
| Pay back | Excellent | Very Good |

## 4.6 Weigh system performance for Candidate Systems

Sometimes candidate quantitative evaluation matrix is not clear enough to determine the best candidate. That's why we need the weigh system performance to get a precise outcome of a system.

Table 4.3: Weigh System Performance Matrix

| Evaluation Criteria | Candidate System-I | Candidate System-II |
|---|---|---|
| **Performance** | | |
| Solution Accuracy | 95% | 80% |
| Growth Potential | 99% | 95% |
| Impact on work Environment | 99% | 90% |
| **Cost** | | |
| System Development | Salary budget increment by 30%<br>6 months to process | Salary budget increment by 10% |
| User Training | 1 Month | No extra training |
| Pay back | Withing 6 months | Gradually over years |

## 4.7 Best Candidate

According to our feasibility study, candidate system-I is the best option. In candidate system-I we focus more on the long-term effect, lowering work pressure and strengthening the regional sights, whereas for candidate system-II more focus in employee benefits. But that can't solve everything. Workload will lower the outcome in the long run.

## 4.8 Cost Benefit Analysis

In this section we discuss the cost for installing and maintaining the candidate system and the future benefit against it. First, we have to separate the costs and benefits into categories.

### 4.8.1 Cost and Benefit Categories

- Hardware Cost: The institute needs 10 computers in the regional stations for the automation of the project management system which will cost about 8,00,000 BDT.
- Personnel Cost: It's the biggest cost involved in this system. If the administration size increases in 30% it will cost 10,00,000 BDT. Also, there will be additional 5,00,000 BDT for PhD students.
- Recruitment Cost: There are some additional costs recruiting new officers.

- Office Cost: As the number of employees increased so do the office cost. Employees need more chambers or other office facilities.
- Software Cost: There is an operating cost for computers and yearly payment of the project management software. SMS registration system will cost some thousands yearly

### 4.8.2 Tangible and Intangible Cost and Benefit

Cost or benefit which can be measured or quantified as asset or have monetary values are tangible cost or benefit. Most of the costs for new system are tangible.

Likewise, intangible benefit is a kind of benefit that can't be that can't be quantified or measured with equivalent money. BLRI is a non-profit research institute. It works for the betterment of the livestock of our country. Here the main benefit of our system is the enhancement of research quality. Also, the rural training program will be more comfortable for the farmers.

## 4.8 Conclusion

Through various comparative methods we choose candidate system-I to be our new improved management system. This system decreases workload significantly. Also, Automates the project life cycles. Moreover, it makes the rural training easier. It introduces PhD program in the institute which gives some enthusiast fresh blood in research field that will boast the research output, thus making it the best choice.

# Chapter 5: System Design

## 5.1 Introduction

After going through many constraint methods, we have selected a candidate system to solve the existing issues in the management system of the organization in the previous chapter. Now we are going to design our new proposed system. In this chapter we discuss the details structure of our candidate system.

## 5.2 Significance of New System Design

System design is a solution, a "how to" approach. It translates the system requirements into ways of operationalizing them. System design reviews the current physical system, prepares output specifications, prepares input specifications, prepares edit, security and control specifications, specifies the implementation plans, prepares logical design walkthrough of the information flow, output, input, controls and implementation plan, Reviews benefits, costs, target dates, and system constraints.

## 5.3 Reviewing the Limitations of the Current System

After thoroughly investigating the current management system of BLRI, we have found some limitations. Salary disappointment, fewer administrative employees, low service of motivational factors, early age of retirements, insufficient allowance, no PhD offering ability are the most backlashing points of the current system.

## 5.3 Objective of the Proposed System

The main objective of our proposed system is to overcome the limitations of the current system. The primary objectives of our proposed system are below:

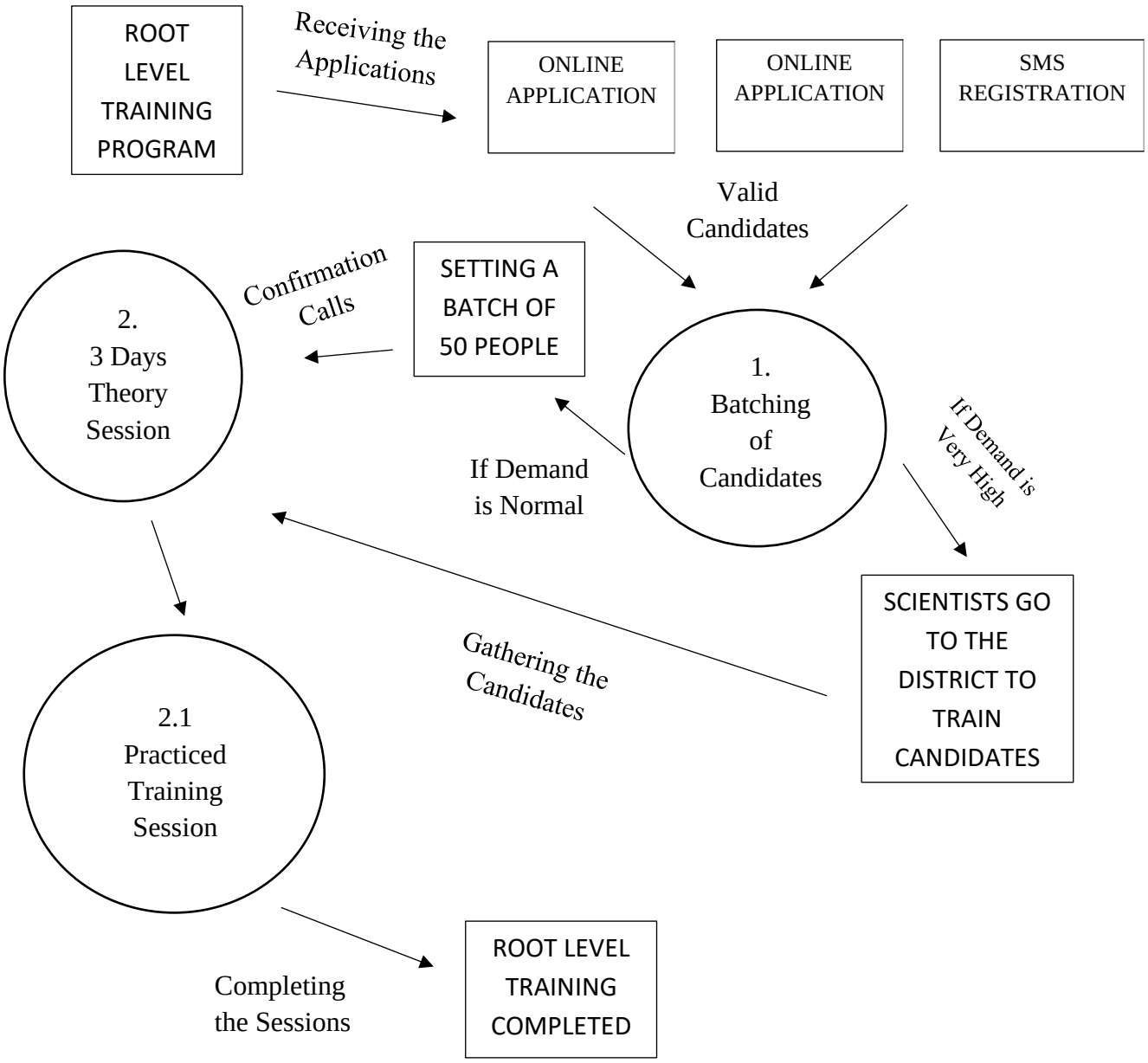
We want to solve the bullet problems in our proposed system and therefore we aim to solve in the new design are stated below:

1. To design a system which is more research friendly.
2. To design a system with more employee satisfaction and low workload
3. To design a project management system with is automated.

## 5.4 Data Flow Diagram of the Proposed System

### 5.4.1 DFD of Root Level training Program

One of the problems we found previously was in root level training program. Farmers had to download the application form and submit online or in person which is difficult for them. Here we added a new SMS registration system in our proposed system data flow diagram. Thus, anyone can register for the training just by an sms.



### 5.4.2 Description of the DFD of Root Level training Program

BLRI hosts many root level training programs for farmers and livestock farm owners for the betterment of livestock quality.

In our new proposed system design, after announcing the circular and the notice for training campaign program, BLRI will accept both online and offline application also through mobile SMS. From the applicants the organization forms batch of candidates.

The new addition to this program is the mobile SMS system as most of the farmers and root level workers don't have frequent access to the smart devices and technologies. But a basic mobile phone is more likely available to all. So that is the soul reason for this SMS registration feature in this program.

After the completion of the application and registration process, BLRI forms some batches -

(1) Each batch has 50 participants. Then BLRI confirms participants with a phone call.

(2) After that they arrange a 3 days theory and practical session in this program.

(3) If there are too many applications from a certain region, scientists go there to train them hands-on.

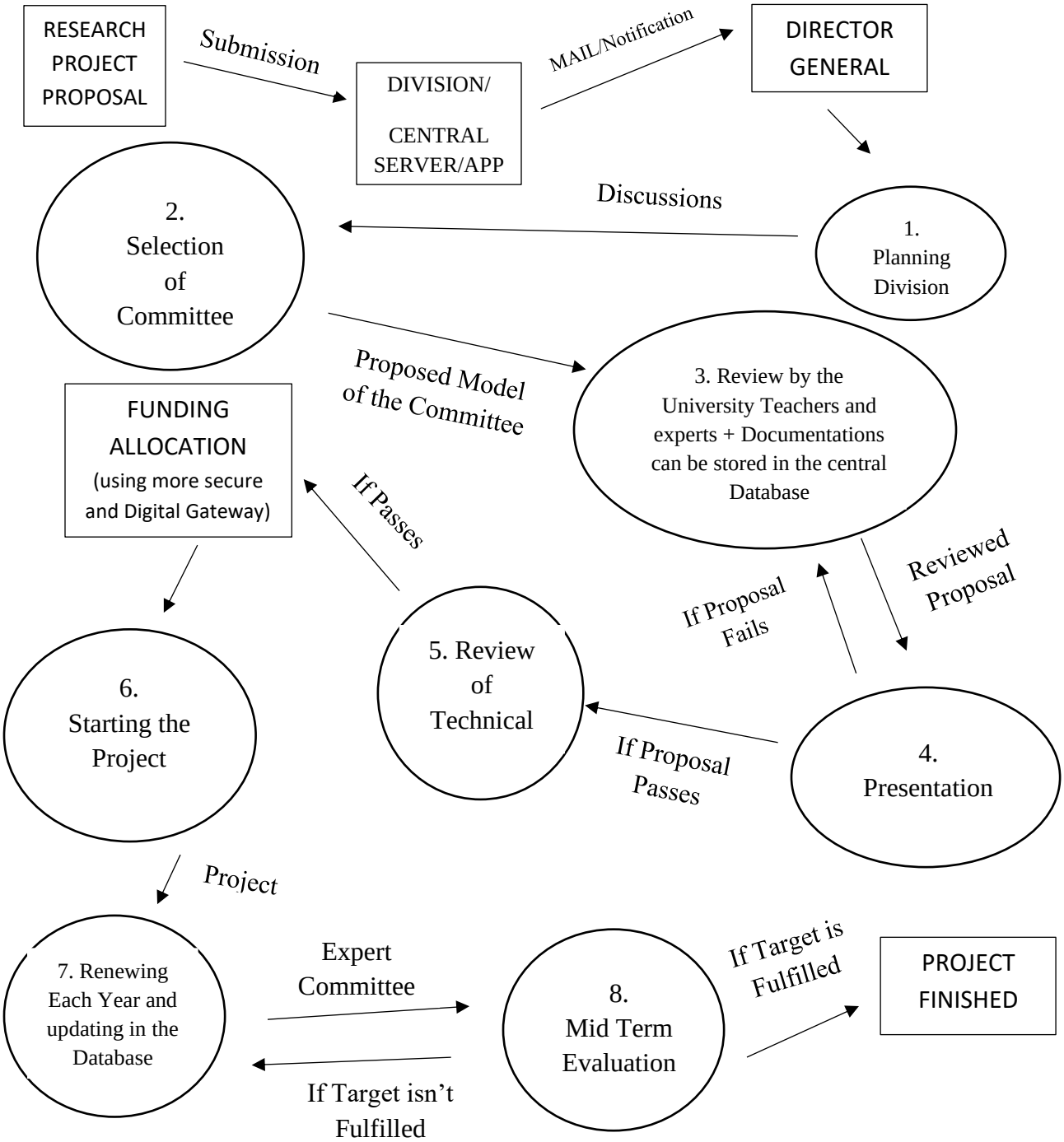
(4) This training is held in both central and regional stations.

(5) The Trainers team can be divided into some groups based on different types of field of interest and work pattern of the training program.

The goal of our proposed system design is to make the best outcome of the management system of BLRI compared to their current management system and making it more efficient and effective. This change in the training program can increase the engagement of the trainee with the trainers with impactful outcomes as well.

### 5.4.3 DFD of the Automation of Project Management

As BLRI is a governmental Research Institute, BLRI has to go through a lot of project scheduling and management and make those project successful before the deadline. Since these projects are managed in a very traditional and manual way, it takes a lot of time. So An automation of the project management or digitalizing the system co-ordination can be a good thing to the organization.



### 5.4.4 Description of the DFD of the Automation of Project Management

In our proposed system Design, the automation of project management is one of the important factors that can be way more effective and efficient for the organization. Previously in BLRI's System, all the proposal documents of the new projects were delivered to corresponding division. In our new system,

(1) There should be a central server or app/dedicated private website where only the internal officers can access with individual credentials to submit their project proposal. So that any branch or regional office of BLRI can have that project under monitored and evaluated.

(2) Only the selected officers and project managers can access the database to modify and sorting out the proposal for further processing.

(3) Automated mailing service or app/web notification features can be introduced to deliver the paper works to the corresponding General Director and other personnel make the process more fluent and faster.

(4) After the selection of the committee to review the proposal and reviewing the papers, selected papers should be uploaded to central database and sorted as well.

(5) The selected papers need to go through a presentation by the authors. This way the project preparation can be done within the shortest possible time if we implement the automation and digitalization here.

(6) Then Funding allocation can be done both offline and online as there can be more chance of getting international assistance for online. Also the security of this funding allocation in online state needs to be stronger. A secured payment gateway can be introduced. This additional change can also introduce some new employment role for this organization to manage and protect the server from being vulnerable.

(7) After starting the project, project manager, team leader and members can collaborate and update the project progress in the database in real time through the app or website by being logged in with their own credentials. With the saved progress in the database, project can be monitored, reviewed and finished within the deadline.

## 5.5 Structure Chart

Structured design is a data-flow-based methodology. The approach begins with a system specification that identifies inputs and outputs and describes the functional aspects of the system. The system specifications, then are used as a basis for the graphic representation—data flow diagram (DFD)—of the data flows and processes. From the DFD, the next step is the definition of the modules and their relationships to one another in a form called a structure chart, using a data dictionary and other structured tools. We have already presented the Data Flow Diagram (DFD) of some modules of our Candidate system. The modified DFD of Root Level Training Program and the DFD of Automation of Project management of our proposed system are already described in this chapter.

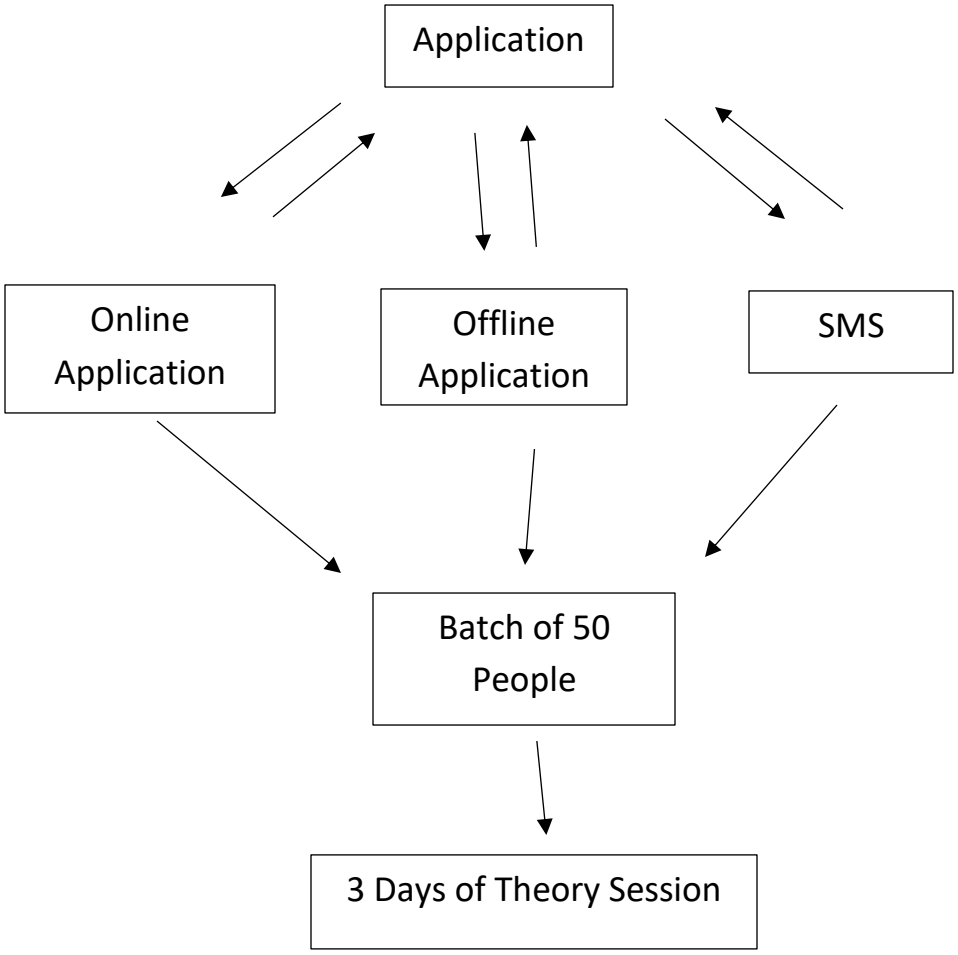



**Fig**: Structure Chart of Training Program

Project Automation was another part of our system design. Our proposed system has some changes from its original structure. Here is the structure Chart of the Project Automation of our proposed system design.

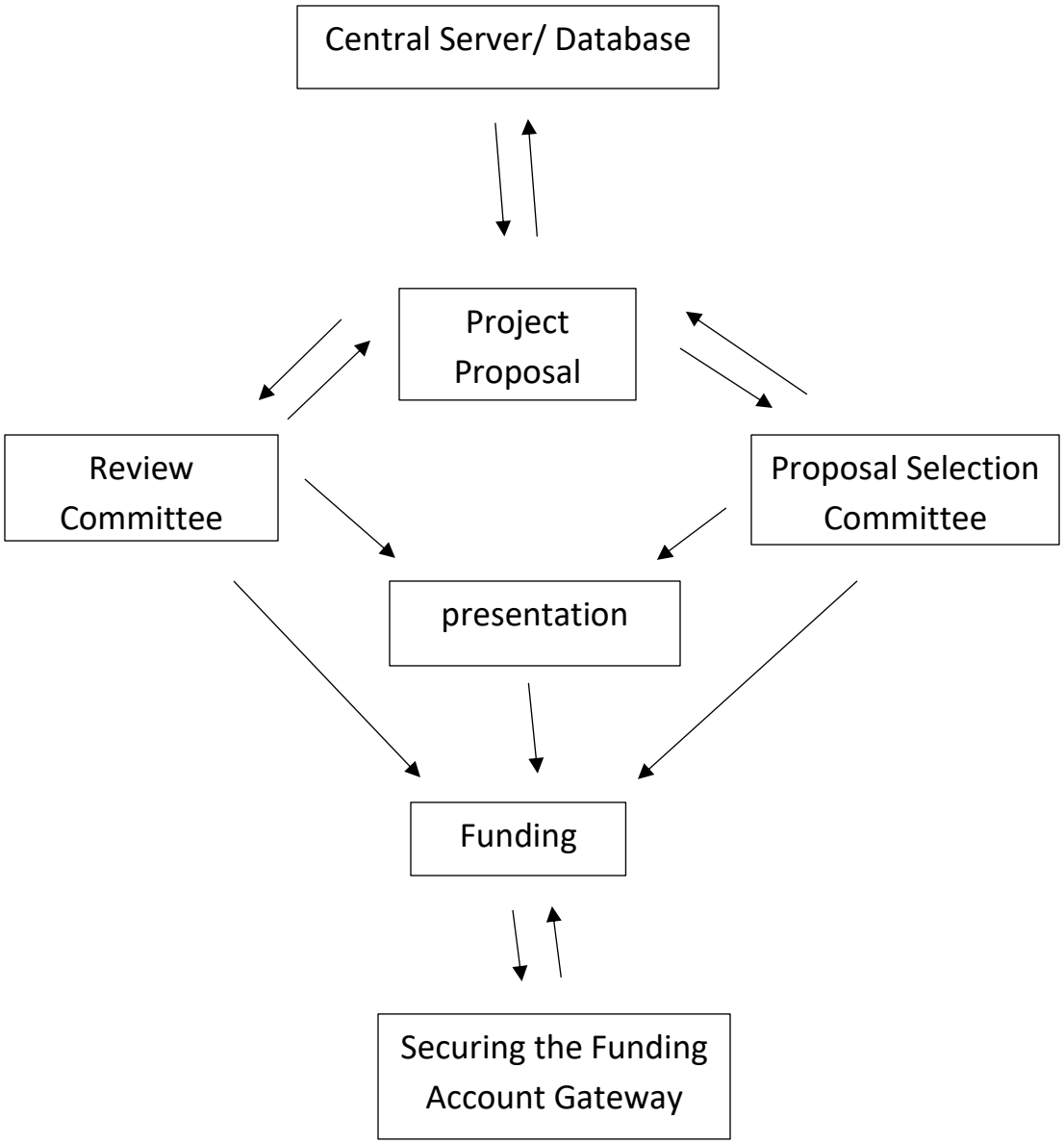



**Fig**: Structure Chart of Project Automation System.

## 5.6 Major Development Activities

During structured design, a number of development activities are carried out. Database design, implementation planning, system testing, system interface specification, and user documentation are among them.

1. **Database design:** This activity is concerned with the physical database design. It's crucial to figure out how the access paths will be implemented. A logical path leads to a physical path. Pointers, chains, and other mechanisms may be used to implement it.

2. **Program design:** Prior to conversion, a choice is made on the programming language to be utilized, as well as the flowcharting, coding, and debugging procedure. The programming languages that can be used on the system are limited by the operating system. Following the completion of the system design, the implementation plans and test cases are necessary. As a result, precise timetables for system testing and user training must be established.

3. **System and Program Test Preparation:** There are separate test requirements for each aspect of the system. After all of the programming and testing has been finished, the automation project management system is tested. Acceptance testing is a type of test that aims to persuade the user that the candidate system will fulfill the stated requirements. It takes place in front of users, audit representatives, or the entire team.

4. **System interface specification:** This phase outlines how information should enter and exit the system for the user. The designer provides the user with a number of possibilities. The system interface of our proposed database and full automation system interface specification is maintained in this phase.

There are more improvements we investigated on the existing system and proposed these more updates in our system.

**Increasing the administration size:** BLRI is basically a research institute. Sole purpose of this institute is to enhance the livestock in our country. And according to the employees there are enough scientific officers there. But there're fewer people in administration. Thus, scientists have to share work lowering the research output. Also, to enrich the regional branches the administration size is needed to be increased. We suggest to increase the size by 30%.

**Separate Budget for Regional Stations:** Regional stations should have their own budget to function properly. This is also needed to appoint the senior officers there.

**PhD offering facility:** This institute have all the qualities to offer and conduct PhD program. PhD candidates working as a research assistant with the scientists will boast up the research outcome many times.

## 5.7 Personnel Allocation

In the past, a medium or large project was handled by a team of programmers with the goal of speeding up implementation. Unfortunately, there was more emphasis on numbers than on talent. The structured approach to design and implementation is useful in facilitating the planning process. Emphasis is on allocating the right programmers to the task within a realistic timetable.

A completed structure chart gives the designer a realistic outline of the programming work to be done. Programmers can be assigned to meet the workload rather than the other way around. A team of programmers is assigned a subsystem that is strongly cohesive and loosely coupled to other subsystems. Once this responsibility is assigned a subsystem are allocated within each team. The designer, of course, oversees the work of the teams. illiterates how a structure chart is assigned among various teams.

In our Project Automation segment, the personnel allocation is very important as different types of projects need different set of skillful personnel.

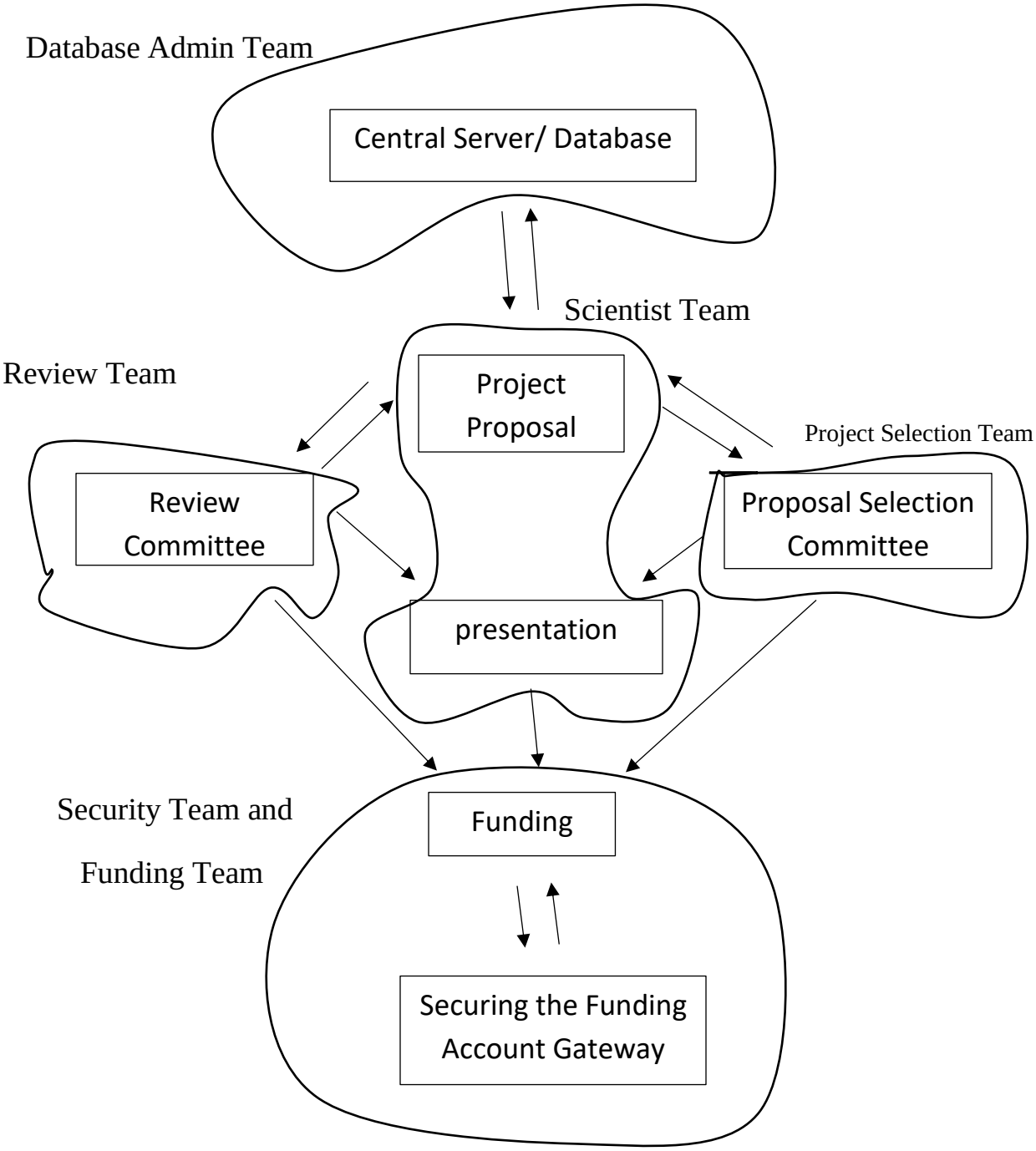



**Fig**: Personnel Allocation Using Structure Chart of Project Automation.

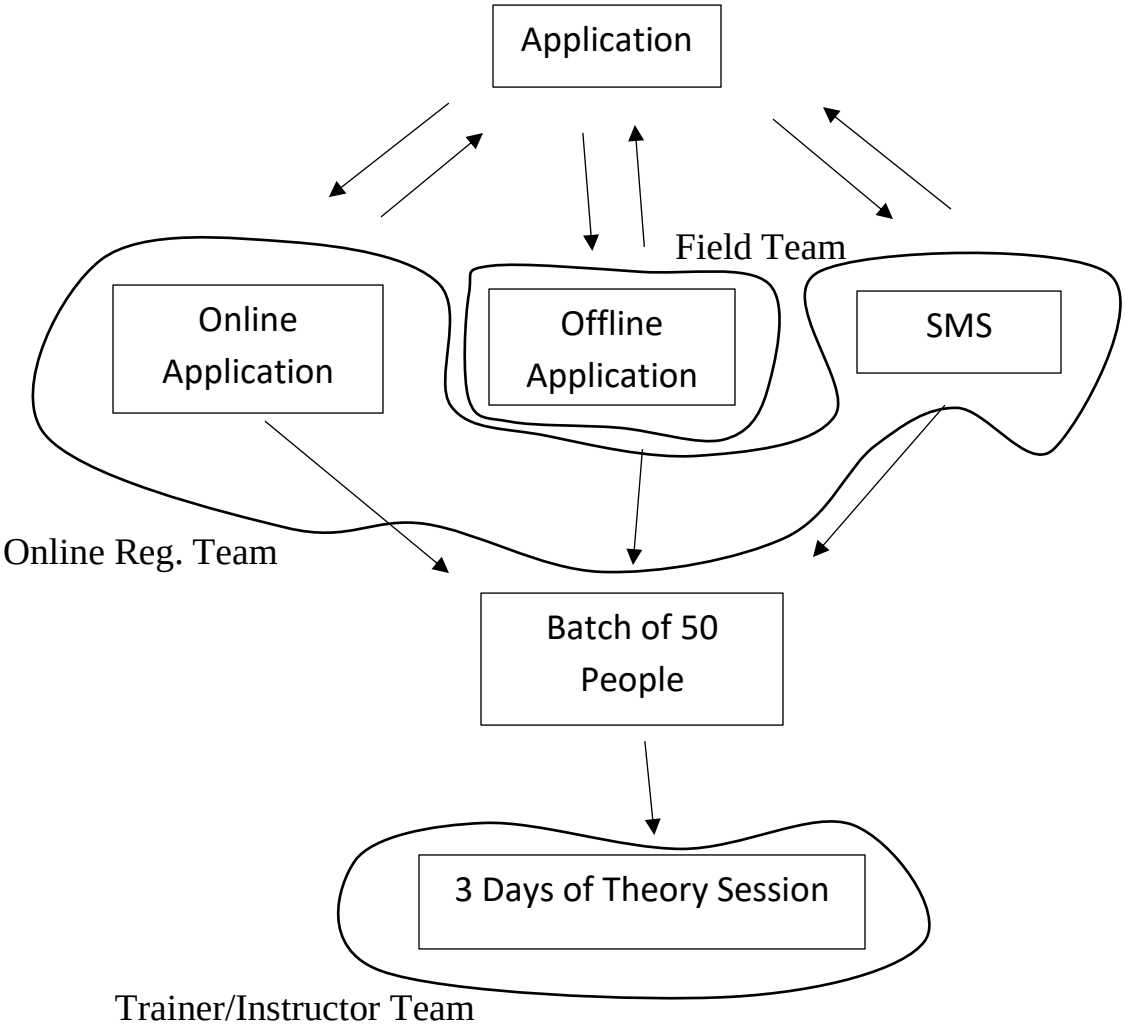



**Fig**: Personnel Allocation Using Structure Chart of Training Program.

# Chapter 6: Database Design

## 6.1 Introduction

We designed a new system in the previous chapter. In this chapter we have designed a well-structured and normalized database.

## 6.2 Database design for Bangladesh Livestock Research Institute

Bangladesh Livestock Research Institute has a lot of projects. A good number of people researches and works in these projects. So, we need a database for storing all the important information to run this institute. So, we designed a database which will store information for all the employees, projects, trainees of the organization. The name of the database is BLRI database.

### 6.2.1 ER diagram Design

The ER diagram defines the conceptual view of a database. It works around real-world entities and the associations among them. At view level, the ER diagram is considered a good option for designing databases. Any object, for example, entities, attributes of an entity, relationship sets, and attributes of relationship sets, can be represented with the help of an ER diagram. Entities are represented by means of rectangles. Rectangles are named with the entity set they represent. Attributes are the properties of entities. Attributes are represented by means of ellipses. Every ellipse represents one attribute and is directly connected to its entity (rectangle).

Our designed database can be represented by means of three ER diagram. One is for all the employees another is for the ongoing research, training and development projects and the other is for managing the trainees. The first ER diagram represents the employee management system. Three entities are connected in this system named Employees, Salaries, projects. The Employees entity has eight attributes while the other two has four attributes each. The entities are connected with a one-to-one relationship. Figure 6.1 shows the ER diagram for the employee management system. Salary has nine attributes and projects has five attributes.

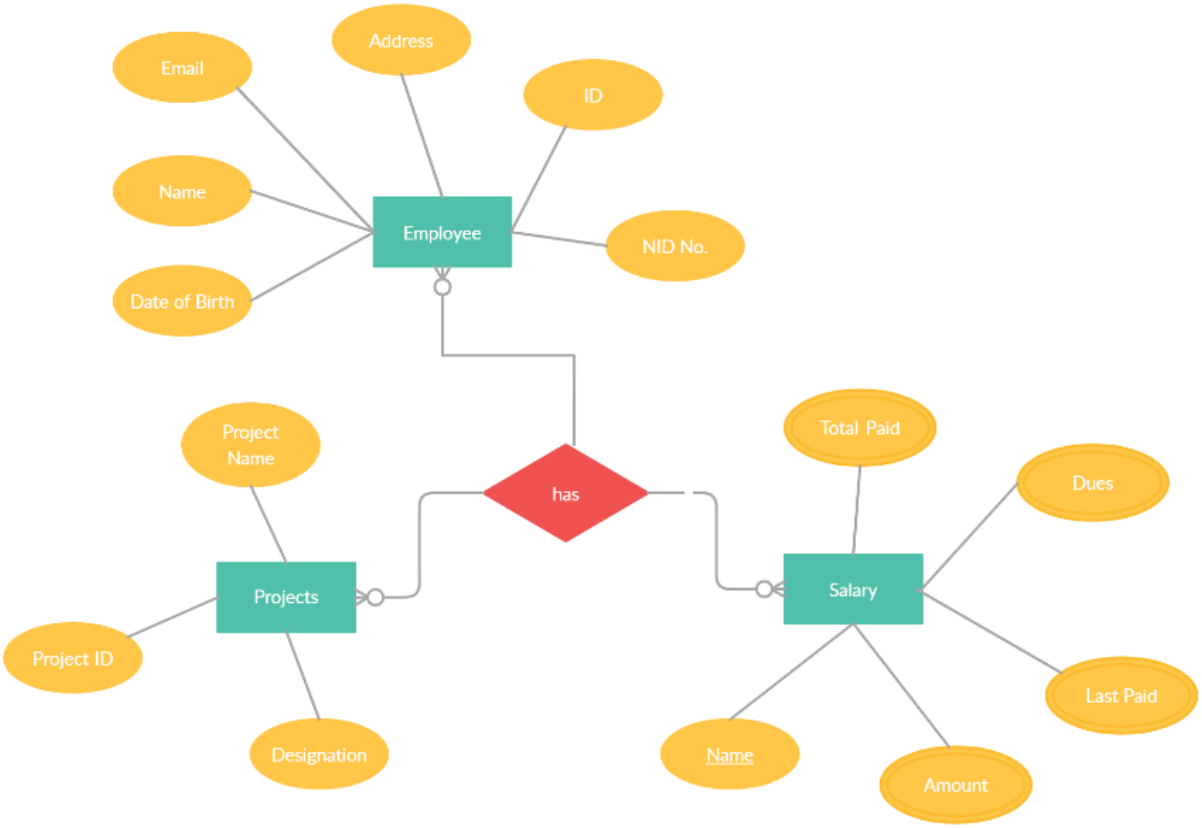



Fig 6.1: ER Diagram of BLRI Database

## 6.3 Database Tables

A database contains one or more tables. Each table is identified by a name. Tables contain records (rows) with data. For a database of the system, we created seven database tables. The structure of the database tables is defined below:

### 6.3.1 Employee Information Table:

The employee table has 8 attributes. They contain all the necessary information of the employees of BLRI. The primary key of this table is the Employee Id.

| Employee Id | Employee Name | Date of Birth | Address | Email | NID no. | Contact No. | Designation |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

Table 6.1: Employees Information Table

### 6.3.2 Salary Information Table

The Salary table has 9 attributes. They contain all the necessary information of payment procedure of the employees of BLRI. The primary key of this table is the Employee Id.

| Employee Id | Employee Name | Salary | Joining Date | Retirement Date | Last Paid Date | Last Payment (TK) | Dues | Total Paid |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

Table 6.2: Salary Information Table

### 6.3.3 Research Projects Information Table

The employee table has 5 attributes. They contain all the necessary information of all the ongoing projects of BLRI. The primary key of this table is the Project Id. The table also contains In Charge ID which is unique and also the employee id of the institute.

| Project ID | Project Name | Project In Charge Name | Project In Charge ID | Starting Date |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

| | | | | |
|---|---|---|---|---|
| | | | | |

Table 6.3: Research Projects Information Table

### 6.3.4 Research Projects Employees Information Table

The employee table has 5 attributes. They contain all the necessary information of all the ongoing projects employees of BLRI. The primary key of this table is the Employee Id. The table also contains Project ID which is the project id of corresponding working project of each employee.

| Employee ID | Employee Name | Working Project | Project ID | Project Managing Designation |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

Table 6.4: Research Projects Employees Information Table

### 6.3.5 Trainee Information Table

The table has 5 attributes. They contain all the necessary information of all the ongoing training projects of BLRI. The primary key of this table is the Employee Id. The table also contains Project ID which is the project id of corresponding working project of each employee.

| Trainee ID | Trainee Name | Training Project Name | Project ID | In Charge ID | Address | Contact Number |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Table 6.6: Training Projects Information Table

## 6.4 Conclusion

Database is a crucial asset to digitalize the organization. It lowers the amount of paper works and make any official processes easier. There's almost no data loss like in traditional systems.

# Chapter 7: Project Scheduling

## 7.1 Gantt Chart