

Report On

The influence of IoT-based Agrotech system in Bangladesh on
developing urban farming.

By

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An internship report submitted to the BBS in partial fulfillment of the requirements for
the degree of
Bachelor of Business Administration

BRAC Business School
BRAC University
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Declaration

It is hereby declared that

1. The internship report submitted is my/our own original work while completing the degree at BRAC University.
2. The report does not contain material previously published or written by a third party, except where this is appropriately cited through full and accurate referencing.
3. The report does not contain material that has been accepted or submitted, for any other degree or diploma at a university or other institution.
4. I/We have acknowledged all main sources of help.

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Letter of Transmittal

Dr. Ekramul Islam,
Assistant Professor,
BRAC Business School,
BRAC University
66 Mohakhali,
Dhaka-1212

Subject: Internship Report Submission.

Dear Sir,

With due respect, I am submitting my internship report “The influence of IoT-based Agrotech system in Bangladesh on developing urban farming.”.

My first priority was to acquire as much practical knowledge in the agricultural technology industry as possible during my internship period. With your valuable supervision, I could complete my report for fulfilling the course essentials alongside extensive learning. With a lot of effort, I have tried my best to make a good report with all the necessary data and statistics to support my facts.

I believe the report will be satisfactory enough.

Sincerely yours,

Pranto Barua

17204038

BRAC Business School

BRAC University

Non-Disclosure Agreement

As part of the agreement negotiated and signed by and between Adorsho pranisheba Ltd. and the undersigned student, Pranto Barua, a student at BRAC University, has promised not to transmit confidential information relating to the Organization.

Adorsho pranisheba

Pranto Barua

Acknowledgment

I would first like to express my sincere thankfulness to God for giving me a chance to work for the agrotech business Adorsho pranisheba Ltd.

I was able to finish this report thanks to the guidance and help of a select group of people. I want to thank them for the direction and supervision they have provided me, which makes me feel highly honored.

Working on the paper with Dr. Ekramul Islam sir, an assistant professor at BRAC Business School, is a privilege. Sir guided me through all of the challenges I had with the report.

Additionally, I was honored to work with one of the top teams in the Sales and Marketing Division of Adorsho pranisheba Ltd. My team provided the most significant support and direction throughout my internship program. My line manager has my sincere gratitude.

Senior manager Md. Hasan Ali provided me with appropriate direction and periodic comments on my job. Because my colleagues consistently encouraged and pointed me in the proper order, I could make a solid connection between my theoretical knowledge and the practical position.

Finally, I'd like to express my gratitude to all the workers and colleagues who assisted me in compiling this internship report by supplying the information I needed. They offer valuable input.

Executive Summary

We find ourselves in a scenario that is fluid at the moment. The agricultural sector is currently experiencing rapid transformation. To provide service to rural areas, a digital platform known as Adorsho praniSheba uses technologies such as the Internet of Things (IoT), RFID (Radio-Frequency Identification), AI (Artificial Intelligence), and face recognition achieved through machine learning.

I'll be discussing the impact of Bangladesh's IoT-based agrotech system on the growth of urban farming in this paper. I will also discuss the working atmosphere, culture, extra tasks, and many other factors to give my report a solid foundation. Once more, I will provide criticism and suggestions for improving the process based on my experience.

Keywords: sustainability, agrotech, dynamic, and IoT (Internet of Things).

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Chapter – 1

Internship Overview

1.1 Student Information

My name is Pranto Barua. I am currently enrolled in the BRAC University BBA Department, where I am pursuing a double major in Computer Information Management and E-Business.

1.2 Internship Information

1.2.1 Tenure, Company Information, Department/Division

My internship at Adorsho Pranisheba Ltd lasted three months, from March 1st to May 31st, 2022. I was assigned to the department of digital marketing.

1.2.2 Internship Company Supervisor Information

Md. Hasan Ali oversaw me at Adorsho Pranisheba Ltd. He oversees the marketing division as Senior Manager. Under his direction, I did many things that were entirely new for me— additionally, Md. Abu Bakar Siddique, a senior executive, was on our team.

1.2.3 Job Description

During the time that I spent working as an intern in the marketing division, I was responsible for a variety of activities that were linked to sales and digital marketing. The following is a list of the tasks that come with my job:

- Participated in developing projects such as easy package, pranisheba IoT, pranisheba financials, pranisheba shop (E-Commerce), and jouthokhamar.
- Keeping the loanee sheet for the cattle farmers up to date.
- Having conversations with super agents regarding new plans, projects, and information.
- Develop standard operating procedures (SOP) with the sales staff regarding the new agreements.
- Creating checklists for the many changes to websites

- Mapping of competencies with the coordinated effort
- Developed a training schedule for all of the staff members.

1.3 Internship Outcomes

1.3.1 Benefits to The Students

I had the chance to learn about several subjects during my internship. My knowledge grew due to the links I could make between what I was reading and what I was doing at work, thanks to the things I've learned via reading. After my initial exposure to the business's internal operations and company culture, I had a better knowledge of both. Additionally, I had the chance to pick the brains of very educated individuals and talented workers. Because of this, my technological and verbal communication skills both increased.

1.3.2 Problems and Difficulties Faced

I've had a lot of difficulties during my internship. If I were to classify them, they relate to one another both internally and outside. I will list some of the significant issues I have encountered below:

- As I had to completely alter my routine, working for 8+ hours at first was a challenge.
- In addition, since I lived far from the office, much time was well-spent in traffic, which seemed especially difficult in the summer.
- Finally, performing routine tasks occasionally seemed less interesting.
- The system took a lot of time because it needed to be faster.

1.3.3 Recommendation for The Company (Internship Program)

- To start, better equipment should be provided to the interns so that the work can be completed much more rapidly.
- Accessing specific Microsoft 360 features was restricted for interns, occasionally making things difficult.
- More difficult jobs ought to be given to interns.



Chapter – 2

Organization Part

2.1 Introduction

Pranisheba, a cloud-based insurance platform, uses IoT, Big Data, Machine Learning, and Artificial Intelligence, among other technologies, to create a network of connected cows. If fully implemented, it could change the way cattle are raised. Along with insurance for cattle, the platform offers facilities for monitoring their health, such as: Keeping digital records for Artificial Insemination and other things, Income/Expense ledger maintenance Getting a good read on heat. A disease must be reported at least 18–24 hours before it shows up outside the cattle—calving.



Figure 1: About Pranisheba

It kept track of movement and temperature. SMS alert service for messages telling people what to do. To become a one-stop shop for cattle farmers in the country, Pranisheba has added a few new projects to its list of services. These include Pranisheba Vet, Pranisheba Shop, Pranisheba

Cowshed Monitoring System, and a cattle identification technology that will use Data Science and Machine Learning to recognize the faces of cattle.

2.1.1 How Does PraniSheba Work?

- Keeping track of cattle
- Installation of Bolus/System for Recognizing Faces
- Move information from the Bolus to the Repeater
- Send information from the Repeater to the Base Stations
- Send information from the Base Station to the praniSheba cloud server
- Use the praniSheba app to show the information.

Before cattle are registered, all relevant information regarding the farms where they were raised and the cattle is stored in the praniSheba System. It is possible to determine a cow's owner by looking in a book known as a registration book, which has the bolus IDs.

2.2 Products and Services offered by Adorsho PraniSheba

2.2.1 R&D Projects

1. Base Station



Figure 2: Base-Station

The praniSheba Base Station is a device that is part of the Internet of Things (IoT), and it collects data from all wireless IoT sensors located far away. It can do so because it possesses both point-to-point (P2P) and point-to-multipoint (P2M) connections. This allows it to connect to sensors located in a variety of locations. After the Base Station has confirmed the sensor's identity with the server, the sensor will immediately establish a connection with the Base Station. It can protect against unexpected data loss while storing three days' worth of data from 100 sensor nodes. Users can view the device log, change their passwords, and adjust the settings of a computer, all from one intelligent server. Users can remotely set data thresholds according to their individual preferences.

2. Bolus



Figure 3: Bolus

A biosensor known as an RFID bolus is implanted into the reticulum of a cow to record temperature and mobility. These early disease warnings and accurate information on when a cow is in heat and when a cow will give birth are sent out by this bolus, which takes advantage of the Internet of Things (IoT) benefits. Early sickness detection (up to 24 to 36 hours before symptoms are noticeable), oestrus cycle data, and other information are communicated to farmers via SMS to take the appropriate precautions.

3. Remote Cowshed Monitoring Systems



Figure 4: Remote Cowshed Monitoring Systems

The praniSheba Remote Cowshed Environment Monitoring System, often known as the RCMS, is a sensor system that comes with everything you need to keep track of changes in the environment of your Cowshed. The gadget is capable of measuring smoke, ammonia (NH₃) gas, methane (CH₄) gas, temperature, and humidity simultaneously. Anyone can acquire a reasonably accurate picture of the state of the ecosystem on the farm. The user is provided with information about their Cowshed daily, monthly, or yearly via the praniSheba App and web dashboard. The user can more effectively complete the necessary processes in his Cowshed.

2.2.2 Services and Benefits

Services	Benefits
Preservation digital data	Detection of heat and instructions for administering the insemination at the appropriate moment determining the optimal timing for calving and finding a solution to the inbreeding problem Identification of cattle as well as insurance for cattle
Notifying affected individuals in advance of the disease	To avoid contracting the disease by spotting it in its early stages
All-time weather tracking	Early diagnosis and treatment of the illness
Sending a signal indicating the intensity of the heat	Determining the number of animals that were hit and lowering the number of times that the seed-filling call was repeated at the appropriate time
The ovulation took place at the ideal time	Determining the most likely time of delivery of the calf
Sending advance notification before the delivery	Taking precautions and ensuring preparation before the birth of the calf
Continual monitoring of the movements of the animals	Keeping a close eye on the health of the animals at all times
SMS notification system	Monitoring is available around the clock
Insurance for cattle against loss due to death, theft, and disability	Efforts made to reduce the dangers of raising cattle
Keeping an eye on the proportion of water consumed	Reducing the effects of heat stress

2.2.3 Cattle Insurance

Adorsho praniSheba and Phoenix Insurance Company Limited have formed a partnership to facilitate the value protection, lending, and insurance benefits associated with cattle. This will be accomplished through Bangladesh's first and only IoT-based livestock monitoring technology. Cow insurance shields farms against the financial fallout that could result from the unexpected death of their livestock or the theft of their animals. With the assistance of cow insurance, farmers will be allowed to enjoy comprehensive protection against the loss of animals. If the livestock is lost or stolen, the farmer will get 90 percent of the value of the animals within fifteen days of lodging a claim.



Figure 5: Phoenix Insurance

2.3 Organization Organogram of Adorsho Pranisheba

There are divisions of Adorsho Pranisheba. The divisions are given below-

Every organization uses an Organogram differently. The CEO, or chief executive officer, is in charge of organizing the business. There are heads of the department that oversee the divisions as a whole. The company-maintained positions like the senior manager, manager, assistant manager, senior executive, executive, and junior executive to administer the firm. Below is a diagram of the organogram:

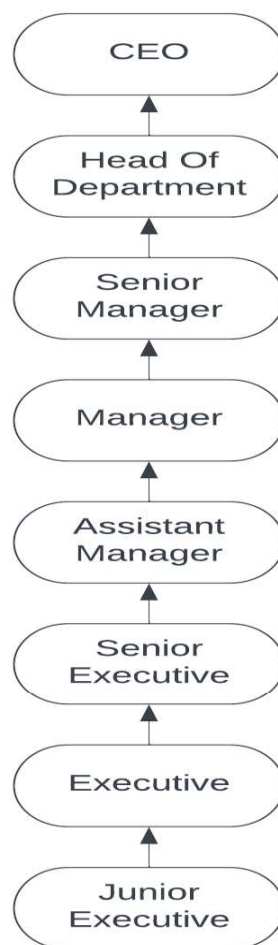


Figure 6: Organogram of Adorsho Pranisheba

2.4 Divisions of Adorsho Pranisheba

There are some divisions of Adorsho Pranisheba. The divisions are mentioned below-



Figure 7: Divisions of Adorsho Pranisheba

2.5 Departments of Marketing Divisions

In total, Pranisheba Marketing Divisions has three departments. The depths are listed below:

1. Sales Department: With 20 members, the sales department is the most significant marketing department. Their primary duties involve producing root-level sales from targeted clients, for instance, offering veterinary and consulting services, selling simple packages, insurance and loans for cattle, etc. Additionally, they are in charge of assisting any agents that need it.

2. E-Commerce Department: Generating direct B2C and B2B sales is the primary duty of the E-Commerce Department. The online store offers a wide variety of goods, including meats, fresh milk, fertilizer, etc.

3. Digital Marketing Division: Pranisheba's digital marketing division handles social media sites, website promotion, and SEO. The department of digital marketing plans out any planned events.



Figure 8: Departments of Marketing Divisions

2.6 Employee Metrics

In the last 6 months, there are a 4.5% growth in employee metrics, 27.3% in 1-year growth, and lastly, 59.1% in 2 years growth. There is employee retention in the past 2 years.

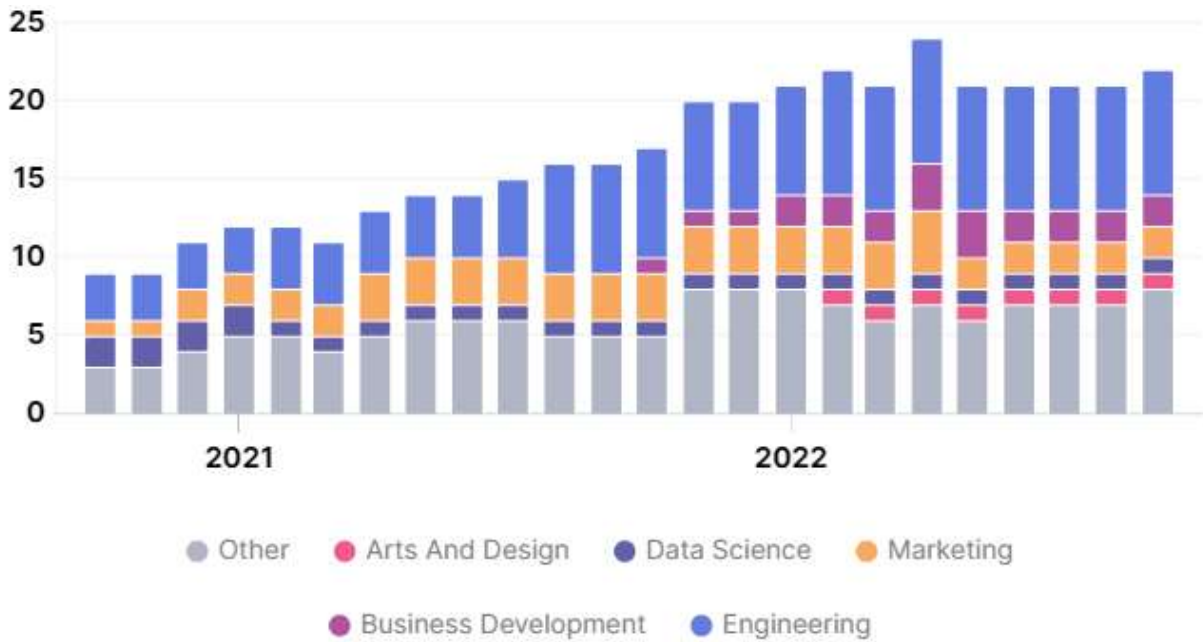


Figure 9: Total Employee Count



Figure 10: Employee Retention

2.7 Awards



*Figure 11: “Fintech Innovation of the year - Tech Award”,
Bangladesh Brand Forum, Bangladesh*



*Figure 12: "BASIS ICT Champion Award-2019",
Industrial-Agriculture Category, Dhaka, Bangladesh*



*Figure 13: "APICTA Champion Award-2019",
Ha Long Bay, Vietnam*

2.8 Porter's 5 Forces

Threat to new entrants: The new entrant who poses the greatest threat is any business with the ability to duplicate or improve upon the quality of the established company. The level of the entry barrier has a significant impact on entry. Competitors have a greater chance of entering if the barrier to entry is very high. For instance, many other well-known companies, such as ifarmer and Syngenta, can easily copy future products or services to enter the market because they already have a positive reputation.

Bargaining power of buyers: Industry buyers are any person who buys any product from the business. They may use them themselves or sell them to other customers. The buyers in this market are dealers and customers. Therefore, purchasers have enormous bargaining power.

Bargaining power of suppliers: Suppliers may have an advantage regarding their ability to increase prices, stop supplying goods, and have other forms of bargaining power. However, since the cost of raw materials is set in the telco industry, their bargaining leverage is also relatively low.

Threat to substitute: Products and services can permanently be changed if another company offers the same customers an excellent value addition. We communicate more and more through the internet rather than transferable credits. As a result, numerous agrotech businesses provide the same service to cattle ranchers. Substitution risk is, therefore, reasonably significant.

Threat to Rivalry: Introducing a sustainable competitive advantage is one way for competitors to gain an edge over their opponents. This can help them achieve a larger market share and establish themselves as the industry leader.

2.9 Summary

Adorsho PraniSheba is an impact firm in Bangladesh that puts "technology and financial inclusion first." The company's mission is to improve the lives of Bangladeshi smallholder farmers and rural communities while simultaneously offering bank-rate interest to rural farmers. Across Bangladesh, praniSheba portfolio companies constantly improve financial access, agricultural success, and cattle insurance. As a result, farming is becoming more profitable, resilient, environmentally friendly, and resistant to the effects of climate change.

2.10 Recommendations

The agrotech sector is doing exceptionally well for Adorsho Pranisheba. They take every new proposal seriously, and they always come up with highly creative company concepts that give them a competitive advantage. As time passes, it's clear that they are getting better.

However, Pranisheba's rivals in this sector are also quite powerful. To stay one step ahead of its major competitors, pranisheba must reevaluate and reorganize its business model. Additionally, pranisheba should modify employee salaries and perks to match what their rivals are providing. In any other case, top talent will quickly leave for the other company.



Chapter – 3

Work Experience

3.1 Duties and Responsibilities

As an intern in the Sales and Marketing Department's Digital Marketing Division, I joined Adorsho PraniSheba. Recently, the department underwent a new organizational structure. The departments of E-Commerce and Digital Marketing were combined with the department of Sales and Marketing. I worked on two of this department's big projects as an intern. They are the praniSheba Jouthokhamar (Shared Farming) and Qurbani Haat of the year 2022. I've listed my tasks below:

3.1.2 Pranisheba Jouthokhamar (Shared Farming)

PraniSheba Jouthokhamar is ensuring the availability of resources and technology with an eye toward a long-term solution for marginal farmers. Establishing connections between investors and farmers, providing critical veterinary services and consultations, and developing market connections to sell the output are distinctive elements of praniSheba Jouthokhamar. An adolescent bull between 18 and 24 months old is purchased through praniSheba Shared Farming and handed to a small-scale livestock farmer near the pranisheba branch office. The farmer raises these cattle over the following three to four months. The cattle are then sold to potential buyers at best possible price, either at the neighborhood market or via the praniSheba shop.

- I filled out information on the investor and farmer's identities, qualifications, enablers and derailers, prior experiences, etc., in Google Drive.
- I could record their contributions in the master Excel sheet because I could access all the templates. Since the information is private, just the database structure is displayed by myself and my colleagues.
- I was also in charge of getting in touch with all the farmers and investors who had technical problems with this template to find a solution.
- I maintained the communications between my company and farmers about their needs and others facts.

3.1.3 PraniSheba Financials

After a specific time period, PraniSheba forwards the Easy Pack customer as a lead for its partner BANKs/ NBFIs to provide financial access to the rural farmers. Then praniSheba renamed them as borrowers. Cattle farmers, who are the most successful in our easy package, are eligible for loans from PraniSheba in the form of cattle. The loanee sheet is the database containing all of the information regarding the people's finances recorded by praniSheba. The following is a detailed description of my working process:

- I was required to maintain continual communication with the employees to keep the loanee sheet up to date before the deadline and to resolve any questions or concerns the employees may have had regarding the feedback.
- After receiving the feedback, I went through the database and recorded, then checked, all of the data.
- I was in charge of maintaining service bills, and I stored all invoices on google drive along with a reference code.

Date: 12.04.22

Ref: aps/bdfl/b-01/12/4/22

Commission of Adorsho PraniSheba Limited

SL	Branch	Borrower Name	Disburse date	Disburse amount	Commission (1%) (In BDT)	Payable Amount (60%) (In BDT)
1	Shahjadpur	Sorna Agro Farm	09.01.22	250,000	2500	1500
2	Shahjadpur	M/S Munna Dairy Farm	13.12.21	250,000	2500	1500
3	Shahjadpur	Md. Jannat	20.01.22	250,000	2500	1500

Figure 14: Sample of Service Bill (1)

22	Gazipur	Ms Jakia Sultana Risbee	07.04.22	250,000	2500	1500
23	Shahjadpur	Md Jashim Uddin Rajib and Arifur Rahman Bandhan	31.03.22	750,000	7500	4500
			Total	6,250,000	62,500	37,500

.....
**Signature of
 Chief Accountant**

.....
**Signature of
 Head of Department**

Figure 14: Sample of Service Bill (2)

Serial Numbers	Branch	Loan sanction date	Nature of Facility	Borrower Name	Proprietor Name	Mobile	Village	Union	Upazila	Facility Amount	Disburse Amount	Loan Declined Amt	Disburse Date	Installment date	Loan Tenure End Date	Loan Tenure	No of Actual Purchase	Fund Utilization	No of Cattle	OTF Collection	MRF Collection	Insured Amount	Total pS Earning	Respective RO	Loan status	Insurance Status	Cattle UID	Policy No.
21	Shahjadpur	22-Feb	Short Term Loan	Mst Shahinur Khatun	Shahinur Dairy Farm	1.32E+09	Badoban, Ishorda	Magordaha	Shahjadpur	250,000	250,000		07.04.22	05.10.22	05.10.23	6 months			2	1,000	1,200		2200	Alamin				
40	Gazipur	5-Apr	Short Term Loan	Fayzi Tabassum	Amal Dairy Farm	1.66E+09	Sukandi	Marta	Gazipur Sadar	250,000	250,000		11.05.22	10.09.22	10.09.22	4 Months			2	1,000	800		1800	Aminul				
41	Ashulia	5-Apr	Short Term Loan	Rahidul Dewan	Nusrat Agro	1.98E+09	Paragram	Ashulia	Savar	250,000	250,000		11.05.22	10.09.22	10.09.22	4 Months			2	1,000	800		1800	Abdul Motin				

Figure 15: Sample of Loanee Sheet

3.1.4 Pranisheba Agents

Everyone in management, from the person in charge of managing to the CEO, is responsible for providing feedback to their superiors and peers. I have organized all of the input that the agents sent into a master file that I managed to put together. The following is a step-by-step breakdown of the working process:

- My supervisor put out an Excel file that was almost entirely automatic. Because each agent had a unique ID, it was much simpler to link the feedback they provided to their respective profiles.
- As a result, I needed to organize all of the remarks correctly.
- I had to exercise extreme caution because the task was so delicate, and we could not afford to miss up on even a single piece of feedback.
- While the feedback was being gathered, they were mailed to the employee responsible for processing them.
- Because the total number of emails was more significant than 4,000, they were sent using a mechanism exclusive to Microsoft Outlook called Mail to merge. This function enables bulk emails to be sent while maintaining an individual focus on each recipient.

3.1.5 Customers

The customer table will have a name, farm name, nationality, national id, contact number, occupation, present address, permanent address, date of birth, father's name, mother's name, gender, Bank information, etc.

- I make sure each customer will have access to their subscribed platforms to get their respective services/products.
- I incorporated all the transactions, and customer feedback will be into the APS sales module through API.

3.2 Qurbani Haat

I created all the below plan with my teams for qurbani haat 2022 project.

3.2.1 Qurban 2022 Prototype – Campaign Strategy

Target Audience: Rich and Corporates, Organization Objective: Selling Cattle at Fixed Price

3.2.2 Social Media Marketing

- A video will be most appealing than the poster
- Video can be an animation or in-person Need to create a view on
- The cattle are being nurtured in the best environment so it makes the cattle healthy inside.
- Benefits- Good meat quality, Vet certified (Disease free)
- Buying a physical time-consuming consuming and need bargaining as well
- Benefits- Saving Your energy o You can select your favorite Breed
- Benefits- Healthy Deshal

It can be a USP because people have high emotions about the breed. If we target the maximum customer whose objective is to buy a Halal, Healthy, Disease- Free- Deshal Cow then selling will scale and it can influence others (Buzz marketing)

3.2.3 Physical Marketing

- Brochure, Leaflets - Clubs, Mosque, Mall

3.2.4 Engagement with the previous Customer

- Telemarketing - Calling team will handle the 2021 customers and make them repeat customers and convince them to buy from our shop
- SMS and Texts



“গরুর হাটে আপনার টাকা নিরাপদ থাকবে জা ?”

ব্যাংক এর মাধ্যমে লেনদেন করুন

হাটে আপনার লেনদেন হবে নিরাপদ ও ঝামেলাহীন

গরুর হাটে ক্যাশ বহন করার ঝুঁকি সমূহঃ

হাটে অতিরিক্ত ক্যাশ টাকা বহন করা ঝুঁকিপূর্ণ ও অস্বস্তিকর।
টাকা চুরি, ছিনতাই ও হারিয়ে যাওয়ার সমূহ সম্ভাবনা থাকে।
ক্যাশ টাকা (কাগজের টাকা) অনেক রোগের জীবাণু বহন করে।
ক্যাশ লেনদেনের সময় বড় অংকের হিসাব করা সময় সাপেক্ষ ও জটিল।
ক্যাশ লেনদেনে জাল নোটের সমূহ ঝুঁকি থাকে।

গরুর হাটে ক্যাশ ছাড়া নিরাপদ লেনদেন করবেন যেভাবেঃ

আপনার যদি কোনো ব্যাংক একাউন্ট না থাকে তবে নিকটস্থ ব্যাংক থেকে
আজই একটি একাউন্ট খুলে ফেলুন।
গরুর হাটে হাসিল ঘরের পাশেই ব্যাংকিং লেনদেনের বুথ দেখতে পাবেন।
বুথে অবস্থানরত এজেন্টদের সহায়তায় নিরাপদে ব্যাংকিং লেনদেন সম্পন্ন করুন।
লেনদেনের পরবর্তীতে হাসিল ঘর থেকে আপনার হাসিল সংগ্রহ করুন।

“ গরুর হাটে ভিড়ের মাঝে যেকোনো সময় ঘটতে পারে পকেটমার হয়ে যাবার মত ঘটনা।
এবারে গরুর সাথে থাকছে বাংলাদেশ ব্যাংক কর্তৃক অনুমোদিত বিভিন্ন ব্যাংকের এজেন্ট ব্যাংকিং।
আপনারা গরু ক্রয় বিক্রয় এর ক্ষেত্রে নগদ টাকা লেনদেন না করে খুব সহজে এবং নিরাপদে
ব্যাংকের মাধ্যমে লেনদেন করতে পারবেন।
এতে আপনার অর্থ যেমন নিরাপদ থাকবে আপনিও থাকবেন নিশ্চিত। ”

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প্রাণিসেবা হাঁস খামার



Figure 16: Leaflet (1)



তারিখ:
খামারির নাম:
মোবাইল নম্বর:
কুপন কোড:
মেয়াদ:

নির্দেশনা ও শর্তাবলী:

১. এই কুপন কোডটি শুধুমাত্র আমাদের সম্মানিত ইজি প্যাকেজ গ্রাহকদের জন্য প্রযোজ্য।
২. একটি কুপন কোড সর্বমোট একবার ব্যবহারযোগ্য।
৩. কুপন কোডটি কোনোভাবেই বিক্রয়যোগ্য অথবা ফেরত যোগ্য নয়।
৪. স্মার্টফোন ক্রয়ের সময় কুপনটি অবশ্যই সাথে রাখতে হবে।



Figure 17: Leaflet (2)

3.3 Pranisheba Learning Calendar

Each year, the learning team at pranisheba creates a learning calendar distributed to all of the company's workers. This calendar displays the offline and online training events according to the dates that they take place. I was given a chance to put together the calendar for the lessons. The following is a detailed description of the working process:

- First, I had a conversation with my Line Manager about the different aspects of work that ought to be reflected in this calendar.
- I created the learning calendar per his directives by preparing the dates one after the other to ensure that the learning process is uninterrupted and flows without any friction.

3.4 Skills and Personal Development

I learned a lot throughout the four months I spent doing my internship. My motivation to produce more increased as I began to appreciate my profession. That is why I consented to pranisheba extending my contract. I have many chances to advance and sharpen my talents. My line manager often suggested how I might improve and achieve higher-quality results. I believe the following skills and personal development occurred:

- Excel was the primary tool I used for much of my work, so I had an excellent opportunity to hone my Excel skills by discovering time-saving formulas and functions.
- I was first exposed to MS Outlook and was unfamiliar with its features. I gained much knowledge about its uses and functions.
- I've learned to create various materials, including posters and video editing. As a result, I've also learned a lot about Microsoft PowerPoint.
- My technical abilities continued to advance.
- My speaking abilities considerably improved due to the regular communication I had with the staff.
- I communicated with staff members at all levels of seniority. I thus gained communication skills with workers at various levels of seniority.
- I'm more committed than ever.
- My time management improved as I tried to adhere strictly to deadlines.

- In addition, I now understand how businesses handle public appearances.
- Additionally, I've learned much about staff training and development and how to structure things from bottom to top.

3.5 Rapport with Supervisor and Co-workers

If my supervisor and coworkers hadn't cooperated, it would have been very tough or nearly impossible. My boss was helpful and kept in touch with me constantly. He instructed me, provided standards that were pertinent to my job, and made me realize my mistakes. He constantly challenged me to identify my errors until I became stuck, which helped me learn more. Throughout my internship, my team members and supervisor worked closely together. I've had a lot of fun working because I've had such a great staff. Additionally, all of Pranisheba's other employees were modest and assisted me in finishing my work by delivering everything on time. Because of this, I got along well with Pranisheba's staff.

3.6 Challenges Faced During Internship

I encountered a lot of difficulties and obstacles during my internship. They ranged in size from modest to significant. Every path has hardships and challenges, and my internship was no exception. It was an excellent task for me to go over them. The following list includes some of the principal difficulties:

- At first, I was having trouble breaking the ice. My fear of unfamiliar surroundings and people was negatively hurting the caliber of my work.
- Suddenly, putting my schedule back under a rigorous pattern was difficult.
- Because I had to take a bus from Bashabo to Gulshan, traffic congestion was a significant concern. I was delayed some days as a result of it.
- One of my biggest challenges was learning to use Microsoft Excel, PowerPoint, and Outlook the way Pranisheba expected.
- In my work, I've encountered problems, including that most of the personnel information entered was incorrect. I had to contact them again; as a result, to obtain the pertinent information.
- Sometimes, there was a miscommunication, so I had to redo my work.

3.7 Expectations vs Reality

I didn't have high hopes for the internship. I figured I would be given only a few significant projects, which could have hampered my learning. Additionally, I worried that I could have to complete tedious and straightforward chores, which would discourage me from working every day. I've heard from many individuals that interns are treated horribly in many companies. I, therefore, anticipated that to occur.

However, that was false. The events that occurred exceeded my expectations. I was given two of the department of Sales & Marketing and Digital Marketing primary assignments. I learned a lot via this and connected everything to my theoretical knowledge, which made my work more pleasurable. In addition, I received a lot of respect and love from everyone. Despite any dumb mistakes I may have made, nobody mistreated me. Instead, they provided me with constructive criticism so I could improve, which ultimately raised the caliber of my work. I was pleased with my overall experience with Adorsho Pranisheba Ltd.

3.8 Influence of the Internship on my career path

I finished university with a double major in CIM and E-Business. I have opportunities available for both sides as a result. I learned throughout my internship that the technical side is quickly taking over in digital marketing. Learning database management, data science, etc., can therefore be helpful. I aim to combine my CIM and E-Business learning and go toward E-Commerce. This will have a good effect on my career.



Chapter – 4

Project Part

4.1 Abstract: It is high time to enter the era of Internet of Things (IoT) based smart agriculture to increase the standard of living of the vast majority of people whose livelihoods are dependent on agriculture. In addition, it is essential to make an effort to satisfy the demand for electric power required to monitor and control IoT-based smart agriculture by using renewable energy sources. This is an essential step that must be taken. Bangladesh's agriculture industry is particularly significant because it accounts for 19.6 percent of the GDP and employs 63 percent of the population. As a result, this industry needs digitalization to increase efficiency and productivity. That's why it's crucial to keep an eye on and analyze data on agriculture's current state in real time. Modern intelligent technologies, such as the internet of things (IoT), computer vision, etc., make farming more accessible and offer more options for farm management. Conversely, agriculture is now possible even in urban locations, particularly on building roofs, open gardens, and enclosed greenhouses. Consequently, productive farming now requires careful farm management and accurate monitoring of agricultural characteristics, whether in a smart city or a rural location. This study proposes an Internet of Things (IoT) based Smart AgroTech system for urban farming, focusing on the importance of environmental factors such as humidity, temperature, and soil moisture.

4.2 Keywords: Bangladesh, IoT, AgroTech, Developments, Urban farming.

4.3 Background: Bangladesh depends a lot on its farming industry. Agriculture has been and will continue to be the most crucial sector in several other developing economies. About half of the population works in agriculture, and about 70% depend on it for their income [1]. Even though it's a waste of time, money, and people, our cultivable land and crop yield are still monitored and watered by hand, an old method that takes a lot of work. When it comes to agriculture, a new machine-controlled system that can be monitored remotely through the "Internet of Things" (IoT) can save time and money by reducing the amount of human work that needs to be done. The term "smart agriculture" refers to farming methods that use sensors to keep an eye on the condition of the soil and the environment around the farm. These sensors connect wirelessly to the internet and send their data to the user, who is a farmer in this case. This keeps the farmer up-to-date on what's happening so they can take the proper safety measures. So that this can be done, the machines that do things like water and fertilize crops can be controlled

and managed from a distance. A soil sensor can measure many different things about the soil, such as its temperature, moisture, humidity, electrical conductivity, and NPK (nitrogen, phosphorus, and potassium). Because there is wireless internet, the information from the sensors can be seen on a mobile device or a web page. This tells the person using it how the soil is doing and lets them figure out when and how much water the crop or soil needs. This saves a lot of money on both the cost of underground water and the cost of labor. Some of the first studies on intelligent agriculture based on the Internet of Things only looked at new ways to keep an eye on farming operations from afar. "Cloud IoT Based Greenhouse Monitoring System" is a research project that involves building a system that monitors greenhouses and uses CloudIoT [2]. The authors made a system that keeps track of changes in a greenhouse's temperature, light, humidity, and water level. Again, several research projects looked at irrigation systems that only used energy from renewable sources and were controlled by a stepper motor and an automatic valve regulation system that was turned on when a moisture sensor detected water [3]. This type of irrigation was also controlled by a stepper motor, which was also used to control an automatic valve regulation system. A report from the Bangladesh Bureau of Statistics (BBS) says that the country's urban population is growing faster than the country's overall population (Bangladesh Bureau of Statistics and Informatics Division Ministry of Planning, Population Monograph, Volume 12). Some of the many reasons that have been given are natural increases in the number of people living in cities, people moving from rural to urban areas for economic reasons, and changes in what is considered an urban area. People have also pointed to natural population growth in cities as another reason. (In the year 2021, this is from The Daily Star) [4] The main tasks of an all-inclusive Internet of Things (IoT) intelligent agriculture system can be broken down into many stages that get more complicated as they go. Each sensor node has sensors that collect information about the soil and weather. The primary node's wireless network protocol is then used to send this information to the primary node. The central node is in charge of getting data to a cloud server or servers, processing it, and storing it. The server uses several algorithms and makes comparisons with threshold values for a number of parameters to do the necessary data analysis and choose the proper corrective steps. For example, in "smart agriculture," we pay attention to things like-

- Reducing the need for human involvement through remote observation.

- Smart irrigation controls can reduce water use, saving money on utilities, resources, and time.

4.4 Methodology: This is a literature review-based study that examines recent and pertinent papers on using IoT on Agrotech in Bangladesh. Figure 2 depicts a five-step literature review technique developed by Mascarenhas et al. (2018).

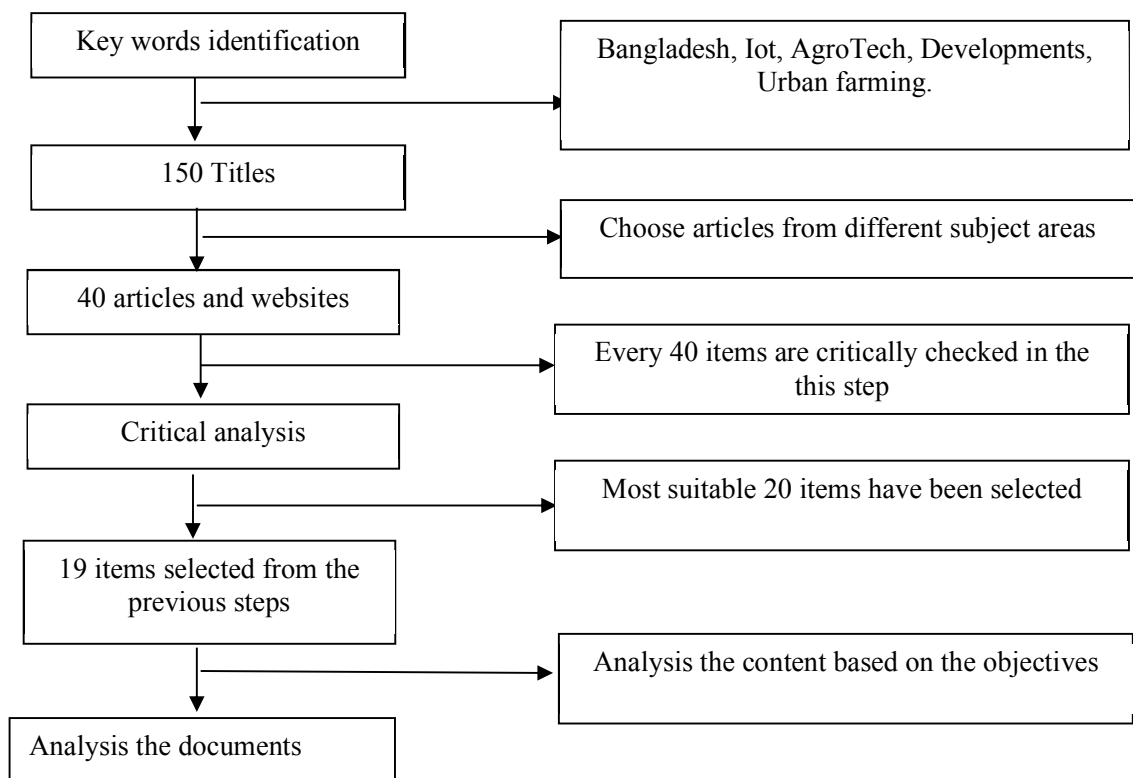


Fig.18: Authors' creation followed by (Mascarenhas et al. 2018; Hoque et al., 2020)

After deciding on the research characteristics and the study's purpose, the researchers utilized keywords to search for relevant publications in databases such as Scopus, Web of Science, Google Scholar, DOAJ, JSTOR, and other relevant websites, among other sources. The most common keywords were information and communication technology (ICT), Bangladesh, IoT, AgroTech, Developments, Urban farming, and so on. Based on the keywords, initially, 150 titles were found. But all of the titles were not relevant in relation to our objectives. In the second step, we selected

40 articles and websites which were more relevant to our topics. After critically analyzing those 40 articles and websites, finally we selected 19 articles and websites to complete the content analysis to achieve the chapter's objectives.

4.5 Limitations:

- Limitations on how much information may be kept and privacy considerations.
- Due to confidentiality limitations, some of the information presented is based on estimates.
- Time management was difficult for writing this report due to the high workload throughout the four-month internship program and the long office hours.
- A lack of understanding of the several scenarios needs.

4.6 IoT-Based Smart Agriculture Systems and Management: A generic Internet of Things-based innovative agriculture system can be broken down into various steps, each of which is responsible for one of the critical purposes of the system. After gathering data from sensors monitoring the soil conditions and the environment, each sensor node's onboard wireless network protocol transmits the information to the primary node so it may be processed. The primary node is the one that is responsible for receiving processes and storing data on one or more cloud servers. To identify which control actions are necessary, the server performs data analysis using several algorithms and then compares the results against threshold levels for some parameters.

Bangladesh has made significant and long-term gains in agriculture, owing primarily to government policy support and the enterprising role and contribution of its farmers. Bangladesh's agricultural efficiency is demonstrated by outstanding food production success and efficient supply and distribution. To ensure the agriculture sector's sustainability and its potential to contribute to overall growth, there is a need to increase productivity on the one hand and assess its multiplier effect on the economy on the other. Despite the size, scale, and magnitude constraints, agriculture continues to support GDP growth by increasing rural income and employment, providing stimulus to small and medium-sized enterprises (SMEs), including agro-based industries, and providing an efficient mix of labor-intensive and limited capital-intensive manufacturing. Increased agricultural yield and productivity can generate additional resources, allowing for the expansion of agro-supportive services. To ensure agriculture's sustainable and efficient contribution to growth, it is necessary to prioritize addressing this sector's critical challenges and constraints. (The Daily Star, 2021). [4]

4.7 Intelligent irrigation process control: In the case of intelligent agriculture or farm automation, the utilization of remote irrigation control that minimizes the need for human interaction is essential. Again, since we live in an age in which renewable energy generation is possible, using renewable energy is the only method that is enough to power the monitoring and irrigation process of an intelligent greenhouse or IoT-based smart agriculture. In the Internet of Things-based smart agriculture, several studies have been conducted on the control of irrigation processes. These studies range from decision-making to the control of water pumps. It can be fully automated (auto mode), operated manually (manual/remote control mode), where the user controls the switching of the irrigation process ON/OFF remotely by studying the data values displayed on a web page or Android app, or it is possible to use both auto mode and remote-controlled mode at the same time. iii. It is also possible to use both auto mode and remote-controlled mode at the same time.

An Internet of Things (IoT)-based innovative agriculture system was proposed by Shweta et al. [5], in which sensor nodes sensed soil parameters and transmitted data to a controller node using ZigBee. The data that has been received is first saved in storage (for example, on one or more cloud servers) by the controller node before it is processed. After determining which actions should be taken, the server then analyzes the data and sends the results to the sensor nodes. Following the completion of the guided actions, such as watering, the microcontroller of each sensor node subsequently transmits a report to the user regarding the most recent field information via an Android application [6].

In their article titled "Internet of Things (IoT) Based Smart Irrigation," the authors discussed a system that makes use of two sensor nodes (programmed Arduino boards) acting as a coordinated node, measuring moisture, humidity, and pH parameters, and sending data once every minute to an arranger node via the ZigBee wireless communication protocol. The data are stored and analyzed by the arranger node following the completion of wireless data collection of the parameters. The interface on the board is referred to as an "Associate in Nursing LAN," and it enables the user to examine information through a web browser and turn the irrigation system on or off from a remote location [6].

4.8 IoT-based, solar, or renewable energy-powered intelligent agriculture: The novel system based on the Internet of Things works twice or three times daily at maximum power consumption, and the rest of the time, the system is in "standby" mode, which uses the least amount of power

possible. As a consequence of this, the power requirements of the entire system may be effectively designed and managed by making use of renewable energy sources. Most of the people who work in agriculture in our country could benefit from innovative agricultural monitoring systems that can be accessed remotely and automated irrigation technology, which could save them time, money, and effort. Furthermore, powering the entire system with renewable energy can save a significant amount of grid-based power. To usher in a new era in which sustainable, renewable energy sources will be the only option for future energy generation, it would be an appropriate step to supplement our traditional, human-intervened agricultural process with conventional energy or a fossil fuel-based irrigation system. This would be an appropriate step to supplement our traditional, human-intervened agricultural process with conventional energy or automated irrigation powered by renewable energy. As a result of its geographic location, Bangladesh has decided to forego the use of solar energy in favor of wind energy and other kinds of electricity. Solar radiation ranges from 4.0 to 6.5 kWh/m² across different areas [7]. The government of Bangladesh has set a goal to increase the proportion of renewable energy used compared to conventional energy [8]. Because it is Bangladesh's most efficient kind of renewable energy, solar power should be prioritized in accomplishing this objective. Solar power generation systems have a reputation for being extremely dependable and low-maintenance. Still, they also come with the drawback of requiring more large financial investments and lower energy conversion efficiency [8]. Many researchers have already started using solar energy to power Internet of Things-based smart agriculture. S. Harishankar et al. [3] proposed a solar-powered irrigation system that automatically drives a water pump, pumping water from a bore well to a ground-level storage tank. From there, water flows to the field through a moisture sensor-dependent and intelligent algorithm-controlled simple valve mechanism, eliminating the need for a second pump. Researchers developed a development framework for constructing a utility model that served as a guide for developing a solar-powered smart agricultural irrigation and monitoring system [9]. They utilized the Internet of Things (IoT) and the Adaptive Gateways for the diverse multiple Environments (AGILE) approach. [9]

4.9 Urban farming to ensure food security: Urban farming helped innovative community leaders address food shortages. Dhaka North City Corporation (DNCC) allowed the community to clean up and remove them after protesting. Paraa is a Bangladeshi design and architecture studio that helps communities, connecting poor urban farmers and power practitioners. To help practitioners

grow food, Paraa distributed UN-Habitat seeds worth 50,000 BDT. The Korail community needed to find out who could farm which land, so neighbors often used each other. Paraa conducted a field survey, plotted households' lands, introduced a digital database management system, and assigned each household a plot number. The lakeside community liked a map of how they farmed. They believe an integrated lakeside farming practice map will reduce confusion and overlap and help them get resources from other organizations.

Lakeside urban gardeners collaborated. A group of 5–10 farmers manages, protect, and share a plot of land. This ensures someone manages plots and resources. Variety boosts crop yield and nutrition. Vine, creeper, and tree farmers plant leafy and root vegetables, spices, and fruits. They buy seasonal and year-round foods. Local stores sell seeds, and many practitioners use pesticides in certain seasons. The method requires lake water and easy-to-grow soil near lakes. This has a drawback: farmers must adapt their crop-growing methods to seasonal water availability. Neighbors shared fresh produce. The growing community blames the local government and municipality. The practice allowed community women to work on nearby lands and care for their children. 30% of lakeside farmers are women. Many people organize farms. Urban farmers could spread the idea if trained. Some high-income residents started growing their food at home to learn about fresh food and the joy of growing. The entire Gulshan-Banani lakeside, four times larger than the current project, could be used for farming [10] (ICCCAD,2021).

4.10 Digital Bangladesh Smart agriculture with Smart Technology: Fertilizers are critical guaranteed inputs for high-yielding and consistently yielding crops. At the moment, the main soil fertilizer used in Bangladesh is still chemical fertilizer; long-term and large-quantity fertilizer application can ensure stable yield and harvest increase of Bangladesh crops over time and to a certain extent; however, chemical fertilizer has the disadvantage of hardening soil, decreasing land fertility, and increasing plant diseases and insect pests. The short-term result is favorable but will cause significant ecological and human health issues, which will not bode well for agriculture's long-term development. For a long time, Bangladesh has used chemical fertilizers. Because balanced fertilizer is insufficient, nutrient proportions become unbalanced, leading to farmland's ecological environment, soil's physical and chemical properties, and soil microorganisms being destroyed at various levels, compromising the safety of agricultural goods to some extent. Farmland should have 3.5 percent organic matter, but just 1% does. We aim to meet the rising need for crop-based balanced/fortified organic fertilizers. NASL makes Bangladeshi crop-specific

Balanced Fertilizers and fortified organic fertilizers. Today's research hot topic, the Internet of Things (IoT), is also advancing smart agriculture. In Bangladesh's southern provinces, agriculturalists are using drones to monitor farmlands for the first time. Bangladeshi private enterprises have started IoT-based production and services for manufacturers, distributors, retailers, and consumers. Smart agriculture is helping China and the world create a new industry. To feed the world, agriculture must double production. To feed 2.3 billion people by 2050, the UN Food and Agriculture Organization recommends producing 70% more food. With limited resources, climate change, and growing electricity expenditures, this goal is ambitious. IoT can improve agriculture. IoT enhances farming methods and supply. Food for All is hoped to end hunger. [11] Nogor Krishok (Urban Farmer) is an agro-based group that promotes urban agriculture in Dhaka, Sylhet, and Chittagong by helping people grow vegetables, flowers, fruits, and ornamental and medicinal plants on rooftops and empty spaces. Senior agricultural specialists and experts run the institution. They pioneered rooftop gardens where anyone could grow fruits and vegetables. After all, there's no ground space for this. They wanted to rise! Climate change hits Bangladesh hard. For ecological equilibrium, a country needs 25% of its land to remain forest. Dhaka residents rarely see vegetation because every inch of land is covered with concrete. Planting trees on rooftops is the only solution. Vegetable, fruit, and ornamental gardens can provide fresh vegetables. City residents can acquire fresh vegetables from a rooftop garden, which is also a lovely sight. In 2009, Nogor Krishok began a pilot project in Mirpur, Dhaka, Bangladesh. The results were trustworthy. Therefore, the team broadened their efforts and took on twenty highly successful projects in various sections of Dhaka. Nogor Krishok offers city dwellers pesticide-free, organic, fresh vegetable packages, fruit packages, attractive rooftop packages, and profitable balcony packages. They ensure that the utmost care is taken in the planning, production, and harvesting of vegetables and preparing fertile soil with compost. Before marketing, each design, seed, soil, and seedling undergo rigorous testing. The objective is to provide authentic, high-quality service throughout the entire year. Nogor Krishok envisions a day when every inch of a metropolis will be covered in vegetation, resulting in a better and healthier future.

4.11 Roof Gardening: Residents of Dhaka use their rooftops throughout the year for various activities, including drying and washing clothing, playing, hosting guests, and sunbathing in the summer and winter, respectively. Most rooftops occasionally feature ornamental gardens, fruit gardens, and even vegetable gardens. Bangladesh is home to sixty different types of fruits and

vegetables. Not all types can be grown successfully on rooftops. In Dhaka, the types and mix are determined by the food requirements of individual households, the seed supply from rooftop gardens, the weather, and the amount of available soil. The majority of Dhaka city's rooftop food gardens cultivate a wide variety of fruits and vegetables, including guava, lemon, papaya, grapes, green chili, pumpkin, squash, onion, garlic, coriander leaves, tomato, mushroom, leafy vegetables (such as callaloo, jute leaf, and red amaranthus), and more (e.g., Cucumber, Flat bean, Bitter ground, Ribbed ground, Ladies finger, Amaranthus, Dhudi, Cowpea, and Brinjal). Several households cultivate various spices and medicinal plants. Even if many rooftops are vacant, the owners don't want to let outsiders on their property. This may violate their privacy. According to estimates provided by Afsar (1999), [12] a total of 80,220 hectares, or approximately 65 percent of the city of Dhaka, is covered by a continuous roof made of concrete. This location has the potential to increase green covering by cultivating agricultural land to offer jobs and food for urban residents. However, only a few city residents have begun cultivating gardens on rooftops. It places more importance on appearance than the production of food.

4.12 Conclusion: The suggested IoT-based Smart AgroTech system contributes to agricultural technology by increasing monitoring and time-to-time irrigation control. Because it is an IoT-based system, field conditions can be viewed in real-time while sitting in a room, and choices about whether or not to start irrigation can be made based on data from metrics such as temperature, soil moisture, and humidity. To facilitate more efficient irrigation management in agricultural settings, the Smart AgroTech system concept may be implemented in a smart city setting. It is an innovative and potentially fruitful technology that can save time, energy, effort, and money while conserving subsurface water. Examples include using renewable energy to power intelligent agricultural and irrigation systems. Implementing this idea of IoT-based intelligent agriculture monitoring in conjunction with a controlled appropriate irrigation system powered by hybrid renewable energy sources could considerably ease the suffering linked with energy and water constraint. This is a result of the global energy crisis and the water shortage it has generated as a direct consequence.

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