Uses Of Innovative Project Management Tools In The Establishment Of E-Centers (Solar PV System Installation Project) Without Electricity In Bangladesh: A Case Study On Ingen Technology Limited.

Md. Mohiuddin, Mohammod Naymur Rahman, Md. Zainal Abedin

ABSTRACT: Today's world is shaped by availability of Information and Communication Technology (ICT). Government of Bangladesh declared a vision of Digital Bangladesh by 2021 to ensure services at peoples' doorsteps. A total number of 4,501 UISCs (Union Information and Service Centers) have been established at all Union Parishads of Bangladesh. UISCs are the 'e-Service delivery outlets' which initiated a new era in information and service delivery for rural and marginalized people. With the aim to ensure services at citizens' doorsteps, UISCs are offering various government services, like public examination results, online university admission, birth-death registration, agricultural & law consultancy, telemedicine, life insurance; private services, like mobile banking, English learning, computer training, email, internet browsing and so on. Now-a-days UISC is a local knowledge Centre. But there is no electricity in each Union Parishad of Bangladesh. in that case, for establishment of e-Centre in Seven Divisions of Bangladesh at Unions without Electricity project needed to provide electricity in everywhere. Without Electricity, we can't imagine it. That's why Bangladesh Government decided to install the Solar PV system in different unions of Bangladesh division wise. This research aims to focus on the implementation of project management concepts in Establishment of e-Centre in Seven Divisions of Bangladesh at Unions without Electricity under Bangladesh Computer Council (BCC). Around 1000 union's e-Centre has been brought under solar power which is total 1800 KW for Rural infrastructure development under digital Bangladesh program. The purpose of the study is to identify and explore the processes of the InGen Technology Limited to show how the company accomplishes a Successful Project by formulating it through project management tools. The study investigates, measures, and evaluates the total processes or activities of InGen Technology Limited in accomplishing and delivering successful project according to the required demand of the clients by applying project management tools and techniques. To do this, emphasize is given on the primary data which were came from the organization observations, discussion with stakeholders and collection of actual working documents. The study is very innovative in nature. As a pioneer of the research area, the future researcher must be benefitted from the research results.

Keyword: Project, Project Manager, Project Stakeholders, Project Charter, Project Scheduling, Project Management Tools, Work Breakdown Structure, Project Schedule, SCM.

I. STATEMENT OF THE PROBLEM

This study focused on implementation of standard Project Management tools in accomplishing successful project on InGen Technology Limited. The study is all about to apply project management tools to get the available advantages and convey the benefits to the organization, so that the organization can achieve excellence in accomplishing and delivering their services to its clients.

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II. OBJECTIVES OF THE STUDY

- The objective of the study is to investigate, measure, and evaluate the total processes or activities of InGen Technology Limited in accomplishing and delivering successful project according to the required demand of the clients by applying project management tools and techniques.
- The another objective of the study is to identify the projects resources and scope of most importantly finished the project within the time frame, within the budget and within the required quality parameters. It will be found out by applying the project management tools like.
  - Project Charter
  - Work Breakdown Structure
  - Project Scheduling
  - Quality Checklist

III. METHODOLOGY OF THE STUDY

1. Research Approach:

- This is a qualitative research
- At first phase an exploratory research has been conducted to understand the nature of problem and its subcomponents.

2. Sources of Data

To meet the research objectives both primary and secondary sources of data have been used. More emphasis is given on primary data to conduct the research program authentically.

a) Primary Source:

- Observing the working process, procedures, and systems.
- Informal interviews with industry experts, stakeholders, and managers of InGen Technology Limited
- Observation of clients while taking services.
- Discussion with stakeholders.

b) Secondary Sources:

- Books and articles on project managesment tools, marketing and promotion.
- Collection of actual working documents of the organization.
- Various websites

Data Analysis Techniques (Analysis Methods):

- Using several templates and framework from project management tools, such as Project Charter, WBS, Project Scheduling, Quality Checklist etc.
- Using of Microsoft Project software for analyzing and presentation.
- Different Graphs, Tables, Charts and others instruments are used to make presentable the research results (Findings).

IV. InGen Technology Ltd. At a Glance:

The company was formed in 2007 to promote eco-friendly renewable energy products in Bangladesh. Its product comprises of Solar and Alternate Power Solutions like Solar Power Packs, IPS, and UPS. InGen Technology Ltd. is one of the first local companies to team up with IDCOL (Infrastructure Development Company Limited) for its persuasive sales of eco-friendly equipment. Complimented with quality human resource our present representation expands in 60 locations in form of Branch offices and currently we have 18000+ subscribers for Solar Homes. InGen is also associated with Telecom operators across the country in Installation and Commissioning of Solar System to 100+ BTS sites. Currently over 1000 Unions under Digital Bangladesh Project have been fitted with InGen Solar Power Solution which has allowed Union Level Offices with power supply where National Grid isn't available. InGen has successfully completed a project as one of the biggest in Bangladesh under the Grid-tie System Project for the Bureau of Statistics, generating 201KW of power. It has also set up a 50KW Hybrid System for Hi-Tech Park at Kaliakoir. It is dealer of Ascot of Italy for their full range of Hybrid DC Generators. Its contribution to Green Energy reflects generation of around 7MW of electricity through Solar Power and 1MW through Solar Homes. It also pledges to play an active role in promoting Green Products to create a pollution free Bangladesh for our next generation.

V. Literature Review

5.1 About Solar PV system business in Bangladesh

Bangladesh is a massively power-deficient country with peak power shortages of around 25%. More than 60% of its people do not have access to the power grid. The country only produces 3500-4200 MW of electricity against a daily demand for 4000-5200 MW on average, according to official estimates. Solar energy is an ideal solution as it can provide grid less power and is totally clean in terms of pollution and health hazards. Since it saves money on constructing electricity transmission lines, it's economical as well. Little wonder that it is becoming popular in Bangladesh. The number of households using solar panels has now crossed the one million mark, the fastest expansion of solar use anywhere in the world. In 2002, just 7,000 households in Bangladesh were using solar panels, but now more than one million households, or five million people, are benefitting from solar energy. The Government of Bangladesh has also grasped the solar agenda, and the Prime Minister now has a 21.6 kilowatt solar power system for her office. Last year the Bangladesh Bank, the country's central bank, installed a solar system on the rooftop of its main building to reduce pressure on the demand for electricity. This solar system, expected to last about 20 years, has an 8-kilowatt capacity. The Government of Bangladesh has also withdrawn all the import tariff and VAT (Value Added Tax) on the raw materials of solar panels for the current fiscal year. In his budget speech, the Finance Minister Abul Mal Abdul Muhit said that Bangladesh gets about 250 to 300 sunny days on average per year (rainy days are not included). He added that since the maintenance cost is very low, we could massively increase the use of solar power in the country. The solar panel providers in Bangladesh are now expecting the price of batteries and accessories to drastically reduce. In fact, solar panels and accessories imported from countries in the developed world like Germany cost a lot, but the same panels manufactured in China cost much less. The requirements of power in a typical Bangladeshi home are very small – almost 1/10th that of a Western home. The government owned **Infrastructure Development Company (IDCOL)** has been providing financing for these small solar panel projects in the country. **The Asian Development Bank (ADB)** has been at the forefront in funding solar energy in Asian countries like Thailand, India and now Bangladesh. The ADB and the Government of Bangladesh have recently signed technical assistance grant agreements of $3.3 million to provide renewable energy in rural areas with no access to grid electricity. The grant will provide $25 subsidy per Solar Home Systems (SHS) to a total of 80,000 low-income end-users. The assistance will also promote biomass, biogas, and wind as alternative sources of energy. In addition, the grant will help the state-run IDCOL improve its administrative and monitoring capacities. 'The assistance will support Bangladesh's efforts to increase access to electricity in remote rural areas and to reduce carbon emissions by overcoming market barriers for renewable energy development', said Thevakumar Kandiah, Country Director of ADB's Bangladesh Resident Mission. IDCOL estimates that each SHS saves at least $61.80 worth of kerosene every year and reduces carbon dioxide emissions by 375 kilograms

annually as a result. Therefore, the 80,000 new SHSs to be installed through this grant assistance will bring a reduction of about 27,600 tons of carbon dioxide emissions a year. On the other hand the government also plans to implement a mega solar project by setting up a 500 MW solar panel-based power installation with financial support from the ADB. Such a project will require a huge investment of $2-3 billion according to power ministry officials. As the lead agency, the power ministry has laid out a plan involving nine other ministries to implement this highly ambitious plan. Meanwhile, the Bangladesh Bank has set up a Tk. 200 million (US$ 2.70 million) revolving fund for banks and financial institutions to give loans at low interest in the solar energy, biogas and effluent treatment sectors. A top official of the Bangladesh Bank noted that the lack of institutional financing for renewable energy is impeding effective growth and the use of environment-friendly technology. In the capital city, Dhaka, the power department has set a pre-condition of installing solar panels on buildings applying for new connections. In the villages, solar power is even being used to operate pumps for irrigation. Today both urban city dwellers and villagers in remote areas of Bangladesh are using solar energy.

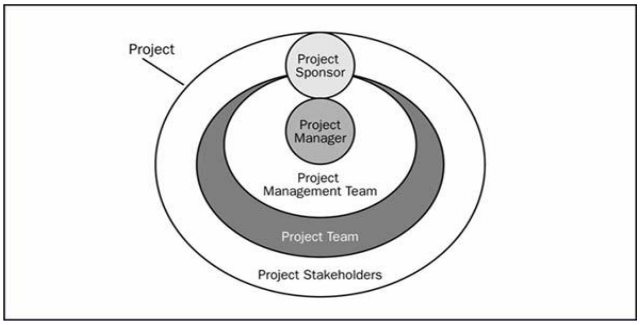
5.2 Project Management

Project management is the discipline of planning, organizing, securing, managing, leading, and controlling resources to achieve specific goals. A project is a temporary endeavour with a defined beginning and end (usually time-constrained, and often constrained by funding or deliverables), undertaken to meet unique goals and objectives, typically to bring about beneficial change or added value. The temporary nature of projects stands in contrast with business as usual (or operations), which are repetitive, permanent, or semi-permanent functional activities to produce products or services. In practice, the management of these two systems is often quite different, and as such requires the development of distinct technical skills and management strategies. Temporary means that every project has a definite beginning and ending. The end is reached when the project objectives have been achieved, or it becomes clear that the project objectives will not or cannot be met, or the need for the project no longer exists and the project is terminated. Temporary does not necessarily mean short in duration; many projects last for several years. In every case, duration of a project is finite as projects are not on-going efforts. A project creates unique deliverables – products, services or results. Projects can create –

- A product or artefact that is produced, quantifiable and can be either an end item in itself or a component item.
- A capability to perform a service, such as business functions supporting production or distribution.
- A result is outcomes or documents. For example, a research project develops knowledge that can be used to determine whether or not a trend is present or a new process will benefit the society.

Project management is the application of knowledge, skills, tools and techniques to project activities to meet the project requirements. It is a formal or informal and aids a project manager in effectively guiding a project to completion. Project management is accomplished through the application integration of the project management processes of initiating, planning, executing, monitoring & controlling and closing. Managing a project includes the following issues –

- Identifying the project requirements.
- Establishing clear and achievable objectives.
- Balancing the competing demands for quality, scope, time and cost.
- Adapting the specifications, plans and approach to the different concerns and expectations of the various stakeholders.



Relationship between project and stakeholders

Project managers have to deal with “Triple Constraint”. They are – project scope, time and cost in managing competing project requirements. Project quality is affected by these three factors. High quality products deliver the required product, service or result within scope, on time and within budget. These factors are correlated in such a manner that any change in one will affect the others. Therefore, managers have to deal with uncertainty to reduce the impact on the project objectives. Project management is viewed as a number of interlinked processes. It is a series of actions directed towards a particular result. The project management process group includes the following steps –

- Initiating processes
- Planning processes
- Executing processes
- Monitoring and controlling processes.
- Closing processes.

Project includes several knowledge areas which are equally important to meet the project objectives. They are as follows –

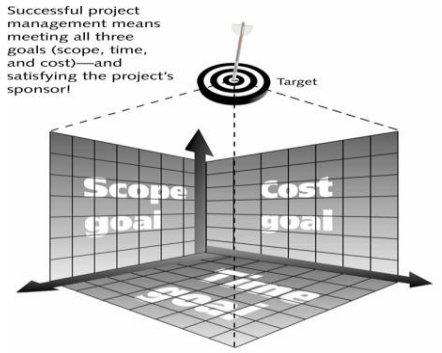
- ❖ Core knowledge areas –
  - Project scope management
  - Project time management
  - Project cost management
  - Project quality management
- ❖ Facilitating knowledge areas –
  - Project human resource management
  - Project communications management
  - Project risk management
  - Project procurement management
- ❖ Integrating knowledge area –
  - Project integration management

Managing a Project

Project management is the application of knowledge, skills, tools and techniques to project activities to meet the project requirements. It is a formal or informal and aids a project manager in effectively guiding a project to completion. Project management is accomplished through the application integration of the project management processes of initiating, planning, executing, monitoring & controlling and closing.

It includes the following issues –

- Identifying the project requirements.
- Establishing clear and achievable objectives
- Adapting the specifications, plans and approach to the different concern and expectation of the various stakeholders.
- Balancing the competing demands for targeting quality with respect to the triple constraints: scope, cost and time.



Project Management Triple Constraints

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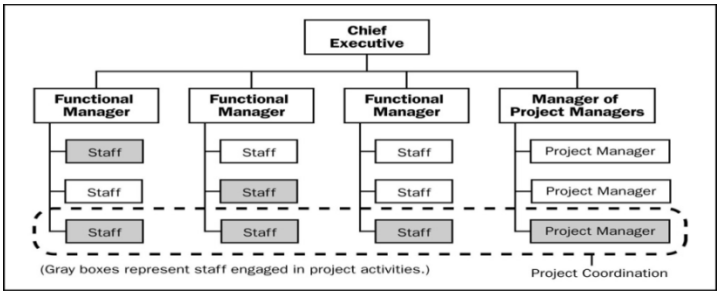
Organizational Structure

The structure of the performing organization often constrains the availability of resources in a spectrum from functional to projectile, with a variety of matrix structures in between. The following figure shows key project related characteristics of the major types of organizational structures –



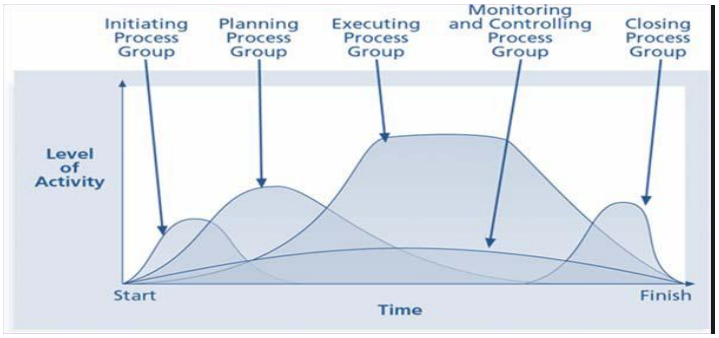
Organizational Structure Strong Project Management Matrix

Project Management Process Groups

A process is a series of actions directed toward a particular result. Project management is viewed as a number of interlinked processes. The processes are presented as discrete elements with well-defined interfaces. The process groups and their constituents guide to apply appropriate project management knowledge and skills during the project. In addition, the application of the project management processes to a project is iterative and many processes are repeated and revised during the project. The project manager and the project team are responsible for determining the processes to achieve the objectives.

Project management process groups comprises of the following processes –

- **Initiating processes** - Defines and authorizes the project or a project phase.
- **Planning processes**- Defines and refines objectives, and plans the course of actions required to attain the objectives and scope the project was taken to address.
- **Executing processes**- Integrates people and other resources to carry out the project management plan for the project
- **Monitoring and controlling processes**- Regularly measures and monitors progress to identify variances from the project management plan so that corrective action can be taken when necessary to meet project objectives.
- **Closing processes**- Formalizes acceptance of the product, service or result and brings the project or a project phase to an orderly end.



Level of Activity and Overlap of Process Groups over Time

Project Integration Management

The project integration management knowledge area includes the processes and activities required to identify, define, combine, unify and coordinate the various processes and project management activities within the project management process groups. In the project management context, integration includes characteristics of unification, consolidation, articulation and integrative actions that are crucial to project completion and satisfying stakeholder expectations. Integration is primarily concerned with effectively integrating the processes among the project management process groups that are required to accomplish project objectives within organization's defined procedures.

Project integration management processes includes –

- Developing the project charter that formally authorizes a project or a project phase.
- Developing the preliminary project scope statement that provides a high-level scope narrative.
- Documenting the actions necessary to define, prepare, integrate, and coordinate all subsidiary plans into a project management plan.
- Executing the work defined in project management plan to achieve project objective.
- Monitoring and controlling the processes used to initiate, plan, execute and close a project according the project management plan.
- Reviewing all change requests, approving changes and controlling changes to the deliverables and organizational process assets.
- Finalizing all activities across all of the project management process groups to formally close the project or a project phase.

Project Scope Management

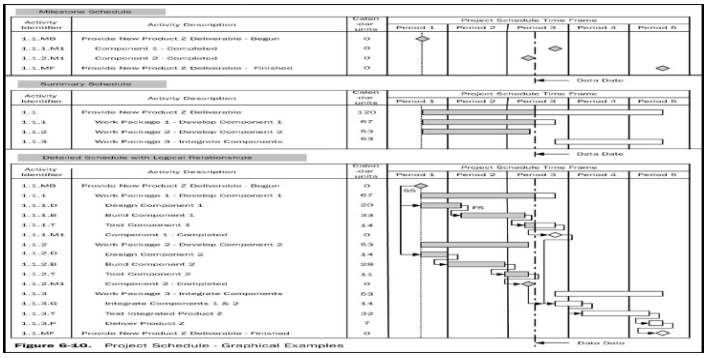
Project scope management includes the processes required to ensure that the project includes all the work required, and only the work required, to complete the project successfully. Project scope management is primarily concerned with defining and controlling what is and is not included in the project.

Scope management processes include –

- Creating a project scope management plan that documents how the project scope will be defined, verified, and controlled, and how the work breakdown structure (WBS) will be created and defined.
- Developing a detailed project scope statement as the basis for future project decisions.
- Subdividing the major project deliverables and project work into smaller, more manageable components.
- Formalizing acceptance of the completed project deliverables
- Controlling changes to the project scope

Project Time Management

Project time management includes the processes required to achieve timely completion of the project. On some projects, especially projects of smaller scope, activity sequencing, activity resource estimating, activity duration estimating, and schedule development are so tightly linked that they are viewed as a single process that can be performed by a person over a relatively short period of time.



Project Schedule - Graphic Examples

The project time management processes include-

- Identifying the specific schedule activities that need to be performed to produce the various project deliverables.
- Identifying and documenting dependencies among schedule activities. There are four types of dependencies. They are as follows –
  - Finish to Start (FS).
  - Start to Start (SS).
  - Finish to Finish (FF).
  - Start to Finish (SF).
- Estimating the type and quantities of resources required to perform each schedule activity.
- Estimating the number of work periods that will be needed to complete individual schedule activities.
- Analysing activity sequences, durations, resource requirements, and schedule constraints to create the project schedule.
- Controlling changes to the project schedule.

Project Cost Management

Project cost management includes the processes involved in planning, estimating, budgeting, and controlling costs so that the project can be completed within the approved budget.

The project cost management processes include –

- Developing an approximation of the costs of the resources needed to complete project activities.
- Aggregating the estimated costs of individual activities or work packages to establish a cost baseline.
- Influencing the factors that create cost variances and controlling changes to the project budget.

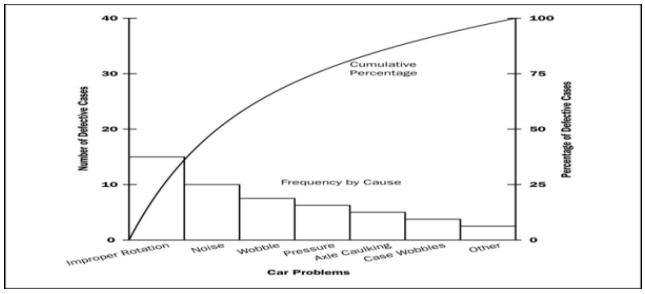
Project Quality Management

Project quality management includes the processes and activities of the performing organization that determine quality policies, objectives, and responsibilities so that the project will satisfy the needs for which it was undertaken. It implements the quality management system through policy and procedures, with continuous process improvement activities conducted throughout, as appropriate.

The project quality management processes include –

- Identifying the quality standards that are relevant to the project and determining the process to satisfy them.

- Applying the planned, systematic quality activities to ensure that the project employs all processes needed to meet requirements.
- Monitoring specific project results to determine whether they comply with relevant quality standards and identifying ways to eliminate causes of unsatisfactory performance.



Pareto Diagram (Quality Management) Sample

Project Human Resource Management

Project human resource management includes the processes that organize and manage the project team. The project team is comprised of the people who have assigned roles and responsibilities for completing the project. The type and number of project team members can often change as the project progresses.

Project human resource management processes include –

- Identifying and documenting project roles, responsibilities, and reporting relationships, as well as creating the staffing management plan.
- Obtaining the human resources needed to complete the project.
- Improving the competencies and interaction of team members to enhance project performance.
- Tracking team member performance, providing feedback, resolving issues, and coordinating changes to enhance project performance.

Project Communications Management

Project Communications Management includes the processes required to ensure timely and appropriate generation, collection, distribution, storage, retrieval, and ultimate disposition of project information. Progress report, tabular performance report, issue log etc. are popular formats used by the project management for communication purpose.

Project communications management processes include –

- Determining the information and communications needs of the project stakeholders.
- Making needed information available to project stakeholders in a timely manner.
- Collecting and distributing performance information, including status reporting, progress measurement, and forecasting.
- Managing communications to satisfy the requirements of, and resolve issues with, project stakeholders.

Project Risk Management

Project Risk Management includes the processes concerned with conducting risk management planning, identification, analysis, responses, and monitoring and control on a project. The objectives of Project Risk Management are to increase the probability and impact of positive events and decrease the probability and impact of events adverse to project objectives.

Project Risk Management processes include –

- Deciding the way to approach, plan, and execute the risk management activities for a project.
- Determining the risks might affect the project and documenting their characteristics.
- Prioritizing risks for subsequent further analysis or action by assessing and combining their probability of occurrence and impact.
- Numerically analysing the effect on overall project objectives of identified risks.
- Developing options and actions to enhance opportunities and to reduce threats to project objectives.
- Tracking identified risks, monitoring residual risks, identifying new risks, executing risk response plans, and evaluating their effectiveness throughout the project life cycle.

Project Procurement Management

Project procurement management includes the processes to purchase or acquire the products, services, or results needed from outside the project team to perform the work. It also includes the contract management and change control processes required to administer contracts or purchase orders issued by authorized project team members. Project Procurement Management also includes administering any contract issued by an outside organization (the buyer) that is acquiring the project from the performing organization (the seller) and administering contractual obligations placed on the project team by the contract.

Project procurement management processes include –

- Determining the way to purchase or acquire, and determining when and how to perform the purchase activities
- Identifying the potential sellers and documenting product, service and result requirements.

VI. ANALYSIS AND INTERPRETATION AND USAGES OF PROJECT MANAGEMENT TOOLS

6.1 PROJECT CHARTER

1. General Information		
Date:	June 02, 2014	
Project Title:	"Establishment of e-Centre in Seven Divisions of Bangladesh at Unions without Electricity" (Solar PV System Installation Project).	
Project Sponsor:	Md. Akhtar Hamid Khan (CEO)	
Start / Finish Date:	December, 2014	February, 2016
Budget Allocation:	BDT 12 (Twelve) Core (Around)	

2. Stakeholders				
SL	**Team Members**	**Name**	**Designation**	**Remarks**
1	**Project Manager:**	Shameem Ahmed	Head of Technical	EEE
2	**Account Manager:**	Md. Shahriar Aman Khan	Project Engineer (Solar)	EEE
3	**Technical Leader:**	Md. Sohrap Hossain	Project Engineer (Solar)	EEE
4	**Supervisor:**	Md. Skander Selim	Supervisor	Experienced
5	**Team Member:**	Selim Mia	Sr. Technician	Experienced
6	**Team Member:**	Azam Ali	Sr. Technician	Experienced
7	**Team Member:**	Sudir Toropder	Sr. Technician	Experienced
8	**Team Member:**	Md. Mizan	Sr. Technician	Experienced
9	**Team Member:**	Sajol Samader	Sr. Technician	Experienced

3. Project / Service Description

*** Project Objectives**

UISCs have been established with an aim to develop the UPs as reliable, dependable resourceful centres having connectivity among global, national and local network.

***Specific Objectives**

More specific objectives are as follows-
To ensure easy access of common people to government and commercial and social information and services.
To create ICT infrastructure at all union parishads and to increase efficiency of union parishads through prompt delivery of information and other day to day services.
To provide a supportive environment for creation of local entrepreneurs.
To ensure free flow of information for empowering rural community.
To create a vibrant, knowledge-based union parishad.

***Business Objectives**

To ensure maximum quality of the product; 80% efficiency level for minimum 1 year.
To ensure maximum usage of available resources.
To reduce the service cost by 20%.
To ensure proper communication with government authority.
To complete the project within the 14 months' time frame.

*** Project Deliverables**

Completion of the all sites survey (feasibility).
Completion of Galvanized steel structure (Solar Panel & Battary Rack).
Completion of batteries charging, initially (Lead acid battary).
Solar PV systems installation division wise district; With monitoring system.
Testing and commissioning.

*** Project Exclusion (Will Not be Include)**

The solar project excludes any work regarding to the delivering of ICT products.
The project excludes the responsibility of installation and maintenance of ICT products (Computer, Modem, Printer, Scanner, Multimedia projector etc).
All sites are divided by five division in Bangladesh (Dhaka [167 Sites], Rajshahi [186 sites], Khulna & Barisal [207 sites], Chittagong [170 sites], Sylhet [129 sites] Division), they are not related each other.

*** Project Milestones**

3. Project / Service Description	
Design approval from Government:	December, 2014 – January, 2015.
Completion of Rajshahi Division (186 sites):	February, 2015 – March, 2015.
Completion of Sylhet Division (129 sites):	April, 2015 – May, 2015.
Completion of Khulna & Barisal (207 sites):	June, 2015 – July, 2015.
Completion of Chittagong (170 sites):	August, 2015 – September, 2015.
Completion of Dhaka (167 sites):	October,2015 – November,2015
Testing and commissioning:	December, 2015 – January, 2016.
Project handover & Documentation:	February, 2016.
*** Project Approaches**	
Project schedule, Individual budget for different department, Progress report, Procurement log book, Weekly project meeting.	

* Assumption & Constraints
Continuing contact with BCC and supplier to maintain the quality, quantity and time schedule. Weather concern during the installation work. Budget constraints.
*** Project Success Criteria**
Understanding responsibilities, Good co-ordination between all the working groups, achieving milestone before deadline, maximum usage of resources, completing the project within the budget, keeping service cost 20% low.

4. Sign-off			
	Name	**Signature**	**Date(dd-mon-yy)**
Project Sponsor:	Md. Akhtar Hamid Khan		June 02, 2014
Project Manager	Shameem Ahmed		June 02, 2014
5. Comments (Handwritten or typed comments from above stakeholders, if applicable)			

6.2 PROJECT WORK BREAKDOWN STRUCTURE

1. General Information		
Date:	June 02, 2014	
Project Title:	"Establishment of e-Centre in Seven Divisions of Bangladesh at Unions without Electricity" (Solar PV System Installation Project).	
Project Sponsor:	Md. Akhtar Hamid Khan (CEO)	
Start / Finish Date:	December, 2014	February, 2016
Budget Allocation:	BDT 12 (Twelve) Core (Around)	

2. Project Deliverable:		
S/L	**Deliverable Name**	
1.0	Completion of Rajshahi Division (186 sites)	: Febuary, 2015 – March, 2015
2.0	Completion of sylhet Division (129 sites)	: April, 2015 – May, 2015
3.0	Completion of Khulna & Barisal (207 sites)	: June, 2015 – July, 2015
4.0	Completion of Chittagong (170 sites)	: August, 2015 – September, 2015
5.0	Completion of Dhaka (167 sites)	: October, 2015 – November, 2015
6.0	Testing and commissioning	: December, 2015 – January, 2016

3. Work Breakdown Structure			
Deliverable Name		1.0	Completion of Rajshahi Division (186 sites)
S/L		**WBS Element Name**	
1	.1	Delivery & installation of 10 sites in Nilphamari District	:February, 2015
1	.2	Delivery & installation of 7 sites in Panchagarh District	:February, 2015

3. Work Breakdown Structure			
1	.3	Delivery & installation of 13 sites in Rangpur District	:February, 2015
1	.4	Delivery & installation of 22 sites in Kurigram District	:February, 2015
1	.5	Delivery & installation of 19 sites in Bogra District	:February, 2015
1	.6	Delivery & installation of 24 sites in Gaibandha District	:February, 2015
1	.7	Delivery & installation of 21 sites in Dinajpur District	:March, 2015
1	.8	Delivery & installation of 7 sites in Thakurgaon District	:March, 2015
1	.9	Delivery & installation of 13 sites in Lalmonirhat District	:March, 2015
1	.10	Delivery & installation of 2 sites in Joypurhat District	:March, 2015
1	.11	Delivery & installation of 3 sites in Natore District	:March, 2015
1	.12	Delivery & installation of 7 sites in Nogoan District	:March, 2015
1	.13	Delivery & installation of 5 sites in Pabna District	:March, 2015
1	.14	Delivery & installation of 7 sites in Rajshahi District	:March, 2015
1	.15	Delivery & installation of 22 sites in Serajgonj District	:March, 2015
1	.16	Delivery & installation of 4 sites in Chapinababgonj District	:March, 2015

Deliverable Name		1.1-1.16 (Same)	Delivering of solar equipment & accessories to Different sites And installing the feasible sites in Different Districts of Rajshahi Division

S/L		WBS Element Name	
	1.1-1.16	.1	Find reliable transport for delivering the solar equipment & accessories to specific sites.
	1.1-1.16	.2	Collect contract cell number for each site for delivering the solar equipment & accessories.
	1.1-1.16	.3	Contract / Describe the time frame.
	1.1-1.16	.4	Collect received Challan from clients after delivering the solar products.
	1.1-1.16	.5	Sent expert solar technician team for installing the solar systems.
	1.1-1.16	.6	Give direction and Monitor the installation work of the solar system.
	1.1-1.16	.7	Run the solar systems.
	1.1-1.16	.8	Check the installed systems.
	1.1-1.16	.9	Collect the work completion certificates from the each site.

3. Work Breakdown Structure			
Deliverable Name		2.0	Completion of Sylhet Division (129 sites)
S/L		WBS Element Name	
2	.1	Delivery & installation of 44 sites in Sunamganj District	:April, 2015
2	.2	Delivery & installation of 7 sites in Sylhet District	:April, 2015
2	.3	Delivery & installation of 16 sites in Habiganj District	:April, 2015
2	.4	Delivery & installation of 16 sites in Mymemsingh District	:May, 2015
2	.5	Delivery & installation of 21 sites in Kishoreganj District	:May, 2015
2	.6	Delivery & installation of 22 sites in Netrokona District	:May, 2015
2	.7	Delivery & installation of 3 sites in Maulvibazar District	:May, 2015

Deliverable Name		2.1-2.7 (Same)	Delivering of solar equipment & accessories to Different sites And installing the feasible sites in Different Districts of Sylhel Division
S/L		WBS Element Name	

3. Work Breakdown Structure			
	2.1-2.7	.1	Find reliable transport for delivering the solar equipment & accessories to specific sites
	2.1-2.7	.2	Collect contract cell number for each site for delivering the solar equipment & accessories
	2.1-2.7	.3	Contract / Describe the time frame
	2.1-2.7	.4	Collect received Challan from clients after delivering the solar products.
	2.1-2.7	.5	Sent expert solar technician team for installing the solar systems.
	2.1-2.7	.6	Give direction and Monitor the installation work of the solar system.
	2.1-2.7	.7	Run the solar systems.
	2.1-2.7	.8	Check the installed systems.
	2.1-2.7	.9	Collect the work completion certificates from the each site.

3. Work Breakdown Structure			
Deliverable Name		3.0	Completion of Khulna & Barisal (207 sites)
S/L		**WBS Element Name**	
3	.1	Delivery & installation of 21 sites in Kushtia District	: June, 2015
3	.2	Delivery & installation of 6 sites in Jhenaidah District	: June, 2015
3	.3	Delivery & installation of 10 sites in Jessore District	: June, 2015
3	.4	Delivery & installation of 22 sites in Khulna District	: June, 2015
3	.5	Delivery & installation of 17 sites in Bagerhat District	: June, 2015
3	.6	Delivery & installation of 15 sites in Satkhira District	: June, 2015
3	.7	Delivery & installation of 9 sites in Narail District	: June, 2015
3	.8	Delivery & installation of 01 site in Meherpur District	: June, 2015
3	.9	Delivery & installation of 19 sites in Barisal District	: July, 2015
3	.10	Delivery & installation of 33 sites in Patuakhali District	: July, 2015
3	.11	Delivery & installation of 11 sites in Barguna District	: July, 2015
3	.12	Delivery & installation of 4 sites in Jhalakathi District	: July, 2015
3	.13	Delivery & installation of 8 sites in Pirojpur District	: July, 2015
3	.14	Delivery & installation of 31 sites in Bhola District	: July, 2015
Deliverable Name		3.1-3.14 (Same)	Delivering of solar equipment & accessories to Different sites And installing the feasible sites in Different Districts of Khulna & Barisal
S/L		**WBS Element Name**	
	3.1-3.14	.1	Find reliable transport for delivering the solar equipment & accessories to specific sites
	3.1-3.14	.2	Collect contract cell number for each site for delivering the solar equipment & accessories
	3.1-3.14	.3	Contract / Describe the time frame
	3.1-3.14	.4	Collect received Challan from clients after delivering the solar products.
	3.1-3.14	.5	Sent expert solar technician team for installing the solar systems.
	3.1-3.14	.6	Give direction and Monitor the installation work of the solar system.
	3.1-3.14	.7	Run the solar systems.
	3.1-3.14	.8	Check the installed systems.
	3.1-3.14	.9	Collect the work completion certificates from the each site.

3. Work Breakdown Structure			
Deliverable Name		4.0	Completion of Chittagong (170 sites)
S/L		**WBS Element Name**	
4	.1	Delivery & installation of 19 sites in Brahmanbaria District	: August, 2015
4	.2	Delivery & installation of 19 sites in Chittagong District	: August, 2015
4	.3	Delivery & installation of 26 sites in Comilla District	: August, 2015
4	.4	Delivery & installation of 28 sites in Chandpur District	: September, 2015
4	.5	Delivery & installation of 10 sites in NOAKHALI District	: August, 2015
4	.6	Delivery & installation of 31 sites in Rangamati District	: September, 2015
4	.7	Delivery & installation of 3 sites in Lakshmipur District	: September, 2015
4	.8	Delivery & installation of 16 sites in Bandorbon District	: September, 2015
4	.9	Delivery & installation of 14 sites in Cox'bazar District	: September, 2015
4	.10	Delivery & installation of 01 site in Feni District	: September, 2015
4	.11	Delivery & installation of 03 sites in Khagrachori District	: August, 2015

Deliverable Name		4.1-4.11 (Same)	Delivering of solar equipment & accessories to Different sites And installing the feasible sites in Different Districts of Chittagong Div.
S/L		**WBS Element Name**	
	4.1-4.11	.1	Find reliable transport for delivering the solar equipment & accessories to specific sites
	4.1-4.11	.2	Collect contract cell number for each site for delivering the solar equipment & accessories
	4.1-4.11	.3	Contract / Describe the time frame
	4.1-4.11	.4	Collect received Challan from clients after delivering the solar products.
	4.1-4.11	.5	Sent expert solar technician team for installing the solar systems.
	4.1-4.11	.6	Give direction and Monitor the installation work of the solar system.
	4.1-4.11	.7	Run the solar systems.
	4.1-4.11	.8	Check the installed systems.
	4.1-4.11	.9	Collect the work completion certificates from the each site.

3. Work Breakdown Structure			
Deliverable Name		5.0	Completion of Dhaka Division (167 sites)
S/L		**WBS Element Name**	
5	.1	Delivery & installation of 10 sites in Manikgong District	: October,2015
5	.2	Delivery & installation of 27 sites in Shariatpur District	: October,2015
5	.3	Delivery & installation of 31 sites in Gopalganj District	: October,2015
5	.4	Delivery & installation of 8 sites in Narsingdi District	: October,2015
5	.5	Delivery & installation of 3 sites in Rajbari District	: October,2015
5	.6	Delivery & installation of 19 sites in Jamalpur District	: November,2015
5	.7	Delivery & installation of 14 sites in Faridpur District	: November,2015
5	.8	Delivery & installation of 14 sites in Madaripur District	: November,2015
5	.9	Delivery & installation of 11 sites in Narayanganj District	: November,2015
5	.10	Delivery & installation of 11 sites in Tangail District	: November,2015

3. Work Breakdown Structure					
5	.11	Delivery & installation of 19 sites in Sherpur District : November,2015			
Deliverable Name			5.1-5.11 (Same)	Delivering of solar equipment & accessories to Different sites And installing the feasible sites in Different Districts of Dhaka Division	
S/L		**WBS Element Name**			
	5.1-5.11	.1	Find reliable transport for delivering the solar equipment & accessories to specific sites		
	5.1-5.11	.2	Collect contract cell number for each site for delivering the solar equipment & accessories		
	5.1-5.11	.3	Contract / Describe the time frame		
	5.1-5.11	.4	Collect received Challan from clients after delivering the solar products.		
	5.1-5.11	.5	Sent expert solar technician team for installing the solar systems.		
	5.1-5.11	.6	Give direction and Monitor the installation work of the solar system.		
	5.1-5.11	.7	Run the solar systems.		
	5.1-5.11	.8	Check the installed solar systems.		
	5.1-5.11	.9	Collect the work completion certificates from the each site.		

3. Work Breakdown Structure					
Deliverable Name		6.0	**Testing and commissioning**		
S/L		**WBS Element Name**			
6	.1	Testing and commissioning (Rajshahi Division): December, 2015			
6	.2	Testing and commissioning (Sylhet Division): December, 2015			
6	.3	Testing and commissioning (Khulna & Barisal Division): December, 2015			
6	.4	Testing and commissioning (Chittagong Division): January, 2016			
6	.5	Testing and commissioning (Dhaka Division): January, 2016			
Deliverable Name			6.1-6.5 (Same)	Delivering of solar equipment & accessories to Different sites And installing the feasible sites in Different Districts	
S/L		**WBS Element Name**			
	6.1-6.5	.1	Testing and commissioning of electrical works		
	6.1-6.5	.2	Testing and commissioning the backup time of the solar systems		
	6.1-6.5	.3	Documentation of the project		

6.3 COST ESTIMATION

6.3.1 Purchasing Solar equipment

1. General Information	
Date:	June 2, 2016
Project Title:	"Establishment of e-Centre in Seven Divisions of Bangladesh at Unions without Electricity" (Solar PV System Installation Project).
Project Manager:	Shameem Ahmed

2. Project Deliverable	
S/L	**Deliverable Name**
1.0	Purchasing Solar equipment (Imported Products)

3. WBS Cost Estimate

S/L		WBS Element Name	Labour Cost	Equipment Cost	Material Cost	Subtotal WBS Element Cost
1	.1	Solar PV panel, 135 Wp, 12 Volt	N/A	1,39,15,800.00	N/A	1,39,15,800.00
1	.2	MPPT Solar Charge Controller, 45Amps	N/A	2,14,75,000.00	N/A	2,14,75,000.00
1	.3	Deep Cycle Lead Acid Batteries, 200AH	N/A	3,43,60,000.00	N/A	3,43,60,000.00
1	.4	Solar Inverter, 24 Volt, 2 KVA	N/A	1,71,80,000.00	N/A	1,71,80,000.00
Subtotal WBS Cost			N/A	8,69,30,800.00	N/A	8,69,30,800.00
Subtotal WBS Cost Percentage			N/A	N/A	N/A	N/A

4. Deliverable Cost Estimate	
Fixed Cost	**8,69,30,800.00**
Contingency Cost	N/A
Total Deliverable Cost	N/A

6.3.2 Purchasing Local Accessories, Cable & Accessories

1. General Information	
Date:	June 2, 2016
Project Title:	"Establishment of e-Centre in Seven Divisions of Bangladesh at Unions without Electricity" (Solar PV System Installation Project).
Project Manager:	Shameem Ahmed

2. Project Deliverable	
S/L	**Deliverable Name**
2.0	Purchasing Local Accessories, Cable & Accessories

3. WBS Cost Estimate						
S/L		**WBS Element Name**	**Labour Cost**	**Equipment Cost**	**Struc., Cable & Accessories Cost**	**Subtotal WBS Element Cost**
2	.1	Steel Galvanized Structure (Panel)	N/A	N/A	17,18,000.00	17,18,000.00
2	.2	Battery Rack	N/A	N/A	1,71,800.00	1,71,800.00
2	.3	Dc Cable	N/A	N/A	20,00,000.00	20,00,000.00
2	.4	Ac Cable	N/A	N/A	18,00,000.00	18,00,000.00
2	.5	Accessories (Local)	N/A	N/A	6,00,000.00	6,00,000.00
Subtotal WBS Cost			N/A	N/A	62,89,800.00	62,89,800.00
Subtotal WBS Cost Percentage			N/A	N/A	N/A	N/A

4. Deliverable Cost Estimate	
Fixed Cost	**62,89,800.00**
Contingency Cost	N/A
Total Deliverable Cost	N/A

6.3.3 Installation Cost / Labour / Visit / Transportation

1. General Information	
Date:	June 2, 2016
Project Title:	"Establishment of e-Centre in Seven Divisions of Bangladesh at Unions without Electricity" (Solar PV System Installation Project).
Project Manager:	Shameem Ahmed

2. Project Deliverable	
S/L	**Deliverable Name**
3.0	Installation Cost / Labour / Visit / Transportation

3. WBS Cost Estimate						
S/L		**WBS Element Name**	**Installation Cost / Labour / Visit / Transportation**	**Equipment Cost**	**Material Cost**	**Subtotal WBS Element Cost**
3	.1	Site Visit (Engineer/Manager)	20,000.00	N/A	N/A	20,000.00
3	.2	Technician Conveyances	40,00,000.00	N/A	N/A	40,00,000.00
3	.3	Tour & Travel	10,00,000.00	N/A	N/A	10,00,000.00
3	.4	Daily Allowance	42,95,000.00	N/A	N/A	42,95,000.00
3	.5	Food & Lodging	40,00,000.00	N/A	N/A	40,00,000.00
3	.6	Transportation	1,00,00,000.00	N/A	N/A	1,00,00,000.00
3	.7	Accommodation	40,00,000.00	N/A	N/A	40,00,000.00
3	.8	Miscellaneous	20,00,000.00	N/A	N/A	20,00,000.00
Subtotal WBS Cost			2,93,15,000.00	N/A	N/A	2,93,15,000.00
Subtotal WBS Cost Percentage			N/A	N/A	N/A	N/A

4. Deliverable Cost Estimate	
Fixed Cost	N/A
Contingency Cost	**2,93,15,000.00**
Total Deliverable Cost	N/A

6.3.4 Total Cost of the Project

1. General Information	
Date:	June 2, 2016
Project Title:	"Establishment of e-Centre in Seven Divisions of Bangladesh at Unions without Electricity" (Solar PV System Installation Project).
Project Manager:	Shameem Ahmed

2. Project Deliverable	
S/L	**Deliverable Name**
4.0	Total Cost of the Project

3. WBS Cost Estimate						
S/L		**WBS Element Name**	**Installation Cost / Labour / Visit / Transportation**	**Equipment Cost**	**Struc., Cable & Accessories Cost**	**Subtotal WBS Element Cost**
4	.1	Purchasing Solar equipment (Imported Products)	N/A	8,69,30,800.00	N/A	8,69,30,800.00
4	.2	Purchasing Local Accessories, Cable & Accessories	N/A	N/A	62,89,800.00	62,89,800.00
4	.3	Installation Cost / Labour / Visit / Transportation	2,93,15,000.00	N/A	N/A	2,93,15,000.00
Subtotal WBS Cost			2,93,15,000.00	8,69,30,800.00	62,89,800.00	12,25,35,600.00
Subtotal WBS Cost Percentage			**23.9%**	**70.9%**	**5.2%**	**100%**

4. Deliverable Cost Estimate	
Fixed Cost	**9,32,20,600.00**

4. Deliverable Cost Estimate	
Contingency Cost	**2,93,15,000.00**
Total Deliverable Cost	**12,25,35,600.00**

6.3.5 Project hand over

1. General Information	
Date:	June 2, 2016
Project Title:	"Establishment of e-Centre in Seven Divisions of Bangladesh at Unions without Electricity" (Solar PV System Installation Project).
Project Manager:	Shameem Ahmed

2. Project Deliverable	
S/L	**Deliverable Name**
5.0	Project hand over

3. WBS Cost Estimate						
S/L		**WBS Element Name**	**Labour Cost**	**Equipment Cost**	**Material Cost**	**Subtotal WBS Element Cost**
5	.1	Testing and commissioning total system	N/A	N/A	N/A	N/A
5	.2	Employee training	N/A	N/A	N/A	N/A
Subtotal WBS Cost			N/A	N/A	N/A	N/A
Subtotal WBS Cost Percentage			N/A	N/A	N/A	N/A

4. Deliverable Cost Estimate	
Fixed Cost	N/A
Contingency Cost	N/A
Total Deliverable Cost	N/A

6.4 QUALITY CHECKLIST

1. General Information	
Date:	June 2, 2016
Project Title:	"Establishment of e-Centre in Seven Divisions of Bangladesh at Unions without Electricity" (Solar PV System Installation Project).
Project Manager:	Shameem Ahmed

2. Project Deliverable	
S/L	**Deliverable Name**
1.0	Completion of Rajshahi Division (186 sites)
2.0	Completion of sylhet Division (129 sites)
3.0	Completion of Khulna & Barisal (207 sites)
4.0	Completion of Chittagong (170 sites)
5.0	Completion of Dhaka (167 sites)
6.0	Testing and commissioning

2. Quality Checklist	
Purpose:	
Find out the quality of the product and supply the product according to the bill of quantity.	

2. Quality Checklist								
SL	Quality Checklist Item	Checked	Meets Expectation					
			Low				High	
			1	2	3	4	5	
.1	Purchasing Solar equipment (Imported Products)	[Y]					Y	
.2	Purchasing Local Accessories, Cable & Accessories	[Y]					Y	
.3	Installation Cost / Labor / Visit / Transportation	[Y]					Y	

3. Quality Checklist Agreement / Signature			
ID	Name	Signature	Date
N/A	**Shameem Ahmed**	N/A	June 2, 2016

6.5 PROJECT STATUS REPORT

1. General Information	
Date:	June 2, 2016
Project Title:	"Establishment of e-Centre in Seven Divisions of Bangladesh at Unions without Electricity" (Solar PV System Installation Project).
Project Manager:	Shameem Ahmed

2. Summary				
Overall Status:				
	Green [1] **(Controlled)**	Yellow [2] **(Caution)**	Red [3] **(Critical)**	Reason for Deviation
Budget:	**[ ]**	**[** Y **]**	**[ ]**	**Task is not going according to the budget & plan.**
Schedule:	**[ ]**	**[ ]**	**[** Y **]**	**Clients have maximum critical areas keeping the work delayed.**
Scope:	**[ ]**	**[** Y **]**	**[ ]**	**Every scope has not completed according to the plan.**
Quality:	**[** Y **]**	**[ ]**	**[ ]**	**Clients have satisfied with the quality of the product.**

Milestone	Completion Status (%)
Completion of Rajshahi Division (186 sites)	90%
Completion of sylhet Division (129 sites)	92%
Completion of Khulna & Barisal (207 sites)	98%
Completion of Chittagong (170 sites)	92%
Completion of Dhaka (167 sites)	90%

4. Accomplishments / Plans
.1 Accomplishments during this Reporting Period:
Initially when we were starting the work of the project, at that time the installation sites list was just confusing. But Initially I and supervisor made a plan. Unfortunately we did not follow this plan. Finally sudden planning was applied by us at that moment.
.2 Plans during the next Reporting Period:
After initial situation, day by day we were observing different factors of the project and facing different problems in practically and running for solving without project management knowledge at that moment.
.3 What went well during this Reporting Period:
The working environment was not bad. Team work was quite well. But the maximum selected sites were in remote areas. That's why sometimes it was very difficult to install the solar systems.
.4 What did not go well during this Reporting Period:
Working time was not good because we have to work on holy days, often at night as well as we did not have enough time to pick up the project immediately.

5. Controls
.1 Issue Statuses:
Clients were satisfied with the solar systems as those are very much effective for e-Centres. The working standard was standard level and nicely organized that has done beyond the clients expectations.

.2 Recommendations:
There were some very remote areas to reach in there. Some unions have not union complex building; it is a major barrier for solar system installations of this project. Faced solar panels installation space unavailability. Needed more expert technician and Engineers for this project.
.3 Project Change:
The project has not changed any project schedule during the working period except we faced transport, environmental, local, disaster etc. problems.
.4 Comments:
The project has completed within the budget but very much nearly of the company budget, with in the standard quality parameters but failed to complete within the time limit.

VII. Findings

Findings of the Study:

1) The project has completed nearly according to their estimated budget.
2) The project has maintained all the standard of quality parameters.
3) The project has not done within the time frame because of some imported equipment were entered in our country delaying and some selected sites are in very remote and rural areas. Another thing is unavailability of union complex building is in many unions; in that case we can't install solar systems in some of those selected sites.
4) The project has completed supplying of equipment as per Bill of Quantities.
5) The project has completed after installing of equipment as per specific Bill of Quantity.
6) The project has completed after testing and commissioning of the total systems supplied by as per Bill of Quantity in Division wise.
7) After completing the project, several times BCC and InGen arranged training for UISE.
8) There was not enough space to setup solar panels in some of selected sites.
9) As the project is under in deferent union praised offices so the project can't run continuously because sometimes concern persons were not available or holyday nobody in there, etc.
10) Solar energy now-a-days is very much popular in rural or remote areas where electricity is not available. And the e-Centers are successfully established.

VIII. Recommendations & Conclusion

Recommendations

1) The project team should practice the project schedule network diagram to unearth the critical paths of the project. It will help them to find certain areas for special monitoring and discover the time frame available to get to the bottom of it.
2) The project team should apply contingency planning and budgeting activities through a formal approach in their project management system. It will lend them a hand to face the uncertain situation.
3) The project team has to be more watchful about maintaining communication with other partners. Proper communication is the first requirement to be successful in any project. They have to make the partners answerable to them through formal proceedings in future.
4) The organization should exercise risk management system to identify the potential risks and threats. They should introduce proper format to track the threats and eliminate them in priority basis. It will assist them to be proactive to handle the risks.
5) The project team should include resource management in their management activities. It will help them to allocate the resources in a proper way and make the work process straightforward.
6) The organizations should practice risk management system to identify the potential risk and threats. They should introduce proper format to track the threats and eliminate them in priority basis. It will assist them to be proactive to handle the risk.
7) The organizations should practice proper project planning for a project.

Conclusion

Establishment of e-Centre at Unions without Electricity of BCC solar project is the solar History's largest project in Bangladesh. Under the government contract with InGen Technology limited supplied and installed the total 1800KW for Rural Ins fracture development under digital Bangladesh program to run the e- Centre in different union parishads. The study monitored the project and tried to evaluate the introduction process, execution and effectiveness of project management concepts in BCC Solar project. But actually the management of InGen Technology Ltd did not properly follow the project management processes. In that case we faced lot of problems when project was running. Not only during installation time but also the servicing period, it is making and creating lots of problems. On the whole, this research came across the implementation of practical project in the BCC Solar project in 1800 KW establishment of e-Centre. The study also told a set of recommendations for InGen Technology Limited to perform following project management processes and establish a prolific step for the organizations working in this sector.

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