5.3 APPLYING GREEN IT STRATEGIES AND APPLICATIONS TO A HOSPITAL

5.3.1 ABC Hospital

ABCis a hypothetical large hospital in a metro city, providing public sector medical services. The services includes out patient department and various specialities. After the preliminary Green IT audit of the hospital, it has been revealed that the hospital had a significant carbon footprint. Significant reviews of patient management processes, management of Electronic Patient Records (EPR), laboratory equipment management, medical drugs and material management, and management of equipment and buildings were undertaken.CGO was appointed and suggested that optimization was possible in all these areas of the hospital that will reduce its carbon footprint. The cost-**effectiveness and efficiency of the hospital's** service processes is as important as its carbon efficiency. Further to the attention on processes in terms of their carbonreduction, the initial investigation also highlighted that ABC has a significant investment in a data centre. Also, the building and infrastructure of this data centre is now more than 10 years old,and the server machines themselves are averaging 4 years in use.By Green enterprise transformation(GET), the hospital can influence many of its partnering organizations such as labs, pharmacies, and suppliers.

The Return On Investment (ROI) of the hospital's attempt to transform to a Green hospital is meant to go beyond the carbon focus and into the overall business optimization arena. Thus, the hospital leadership is keen to make effective use of new fund allocations that have been indexed to carbon reduction.

Preliminary Green Investigation

The green audit was done by CGO. The CGO, with theIT auditors, departmental heads, and the CIO sought input into the current state of the hospital. The framework for this audit was based on the four dimensions of GET namely Economic, Technical, Process and Social. The findings were:

The hospital has to undertake action in terms of measuring, reporting, and reducing its carbon emissions.

The hospital has significant opportunity to influence its partnering organizations.

OPD (out-patient department) of the hospital is a large and complex department that operates out of its own separate building and infrastructure. This department has 220 stationary desktop machines, 100 mobile laptops and PDAs carried personally by the staff and numerous supporting IT devices like printers. This department alone accounts for 60 to65 kT (kilo Tonnes) of carbon emissions of the hospital

Additional desktops, printers, fax, laptops and PDA are present in other departments as well. These devices amount to 20 kT of emission sat this stage.

Printers are heavily used for writing of scripts, printing of patient records and reports and related documentation. On an average, the hospital prints 5,000 pages of normal paper and consumes corresponding ink and printer time.

Hospital has an attached pathological laboratory that conducts diagnostic blood and related tests. The lab equipment is aging.

The data stored in the hospital's servers that provides that information to staff on the results from the tests is also significant consumer of power and generates carbon emissions.

Pre and post surgical activities requires electronics equipment and IT support

The hospital has to need to product substantial amount of legal documentation.

The hospital collaborates with external pharmaceutical organizations, manufacturers and distributors of drugs and hospital equipment.

Staff rostering is not optimized, leaving the administrative staff to occasionally use physical notepads, whiteboards, and diaries to book availability of doctors.

Scheduling system for patient appointments, surgical procedures and human relation (HR)is also not optimized and requires a major upgrade. Scheduling patient consultations, scheduling work rosters for nurses and administrative staff is many times happening manually.

A comprehensive multimedia data warehouse project is underway.

With the availability of a multimedia database, there is opportunity for optional extensions to the project is to incorporate possibility of remote consulting by doctors through audio and video media using high-speed connectivity.

Security of access and privacy of patient's data (EPR) is of top priority and is not to be compromised under any circumstances.

Internal administrative systems

There are provisional inventories that are in excess.

5.3.2 Green Business Objectives

The green objectives provide the basis for the transformation plan.

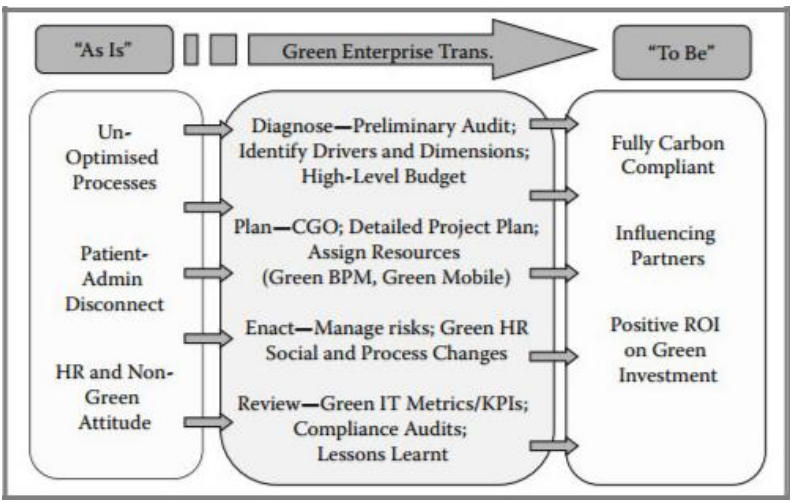

Fig 5.1: Green Transformation of ABC hospital

The four major phases of transformation—diagnose, plan, enact, and review—interspersed with metrics, are shown in this high-level transformation framework. Following are the important objectives of ABC in undertaking the GET:

Reduction in carbon emissions across all departments and processes of the organization

Compliance with carbon legislations and related carbon initiatives of the government

Be a leader in carbon management and, thereby, influence many business partners in reducing their emissions

Undertake electronic collaborations with partners, government regulatory bodies for monitoring and reporting

Undertake comprehensive Green BPM program that will enable result in modeling, optimization, and merger/elimination of processes

Aim for a comprehensive and holistic GET that is futuristic

Create positive green attitude across the entire staff through Green HR

5.3.3 SWOT analysis of ABC Hospital

SWOT analysis is helpful in understanding the approach that can be taken for the GET. A SWOT analysis makes it easier to understand how to capitalize on the inherent strengths of the hospital. The areas that will be directly affected by the transformation and bear risks will also become evident in such an analysis. SWOT analysis can help understand the scope and coverage of work during this transformation.

Strengths

Well-known public sector hospital.

Financially w ell supported by government.

Green IT budget.

Reputed teaching and research hospital

Weaknesses

Aging IT infrastructure.

Attitude not conducive to Green IT.

Carbon inefficient processes.

Opportunity

New Leadership (CEO, CIO)

Govt. Focus on Environment

Green Portals integrated with Regulatory

Portals

Uncertainty of Focus

Changing Legislations

Patient Privacy Risks exposure

Infrastructure/Change Management

Threats

Lack of collaboration with partners.

IT inexperience (new technologies).

Uncertainty of focus.

Changing legislations.

Patient privacy risks

Infrastructure/change management.

5.3. 4 Strategic Concerns of Management

The drivers of ERBS are shown in Fig 5.2.

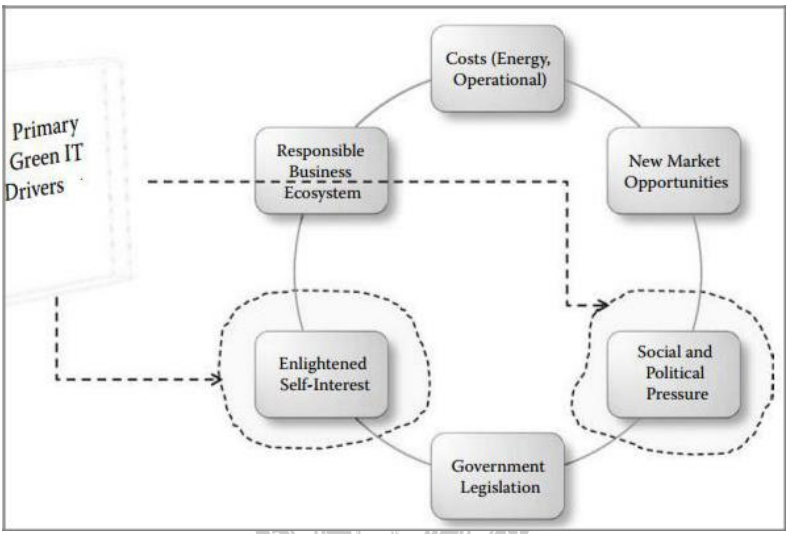

Fig 5.2: Green IT drivers

Sociopolitical pressure:

The hospital has a substantial standing in the community. There is significant social and political pressure on the hospital to demonstrate its environmental credentials. This pressure comes from the general community that views the hospital as a symbol of good service-based organization and cross-section of patients.

Enlightened self-interest:

The senior management of the hospital, the leaders/decision makers are keen to take up the challenge of changing their processes and internal social attitude to a

positive, green attitude. While they are certainly buoyed by the availability of funds dedicated for this purpose, they are themselves realizing the need to undertake this green enterprise wide transformation to enable them to remain as a leader in the upcoming carbon economy.

5.3.4 Steps in Developing a Hospital's ERBS

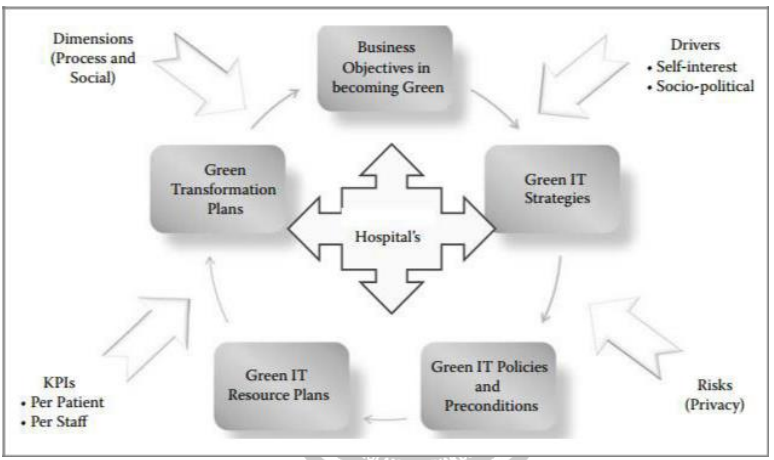

Fig 5.3: Development steps of ERBS

The business objectives of the hospital in becoming a green hospital were identified earlieron. These objectives and visions provide the initial direction for the hospital in its strategy formulation. The d rivers for the objectives are enlightened self-interest and sociopolitical pressure on the hospital.

Green IT strategies: These are the medium terms strategies that are driven by the CGO and that are based on the drivers and objectives of the organization. Strategies for Green IT also contain elements of risks or threats, as were identified during the SWOT.

Green IT policies and preconditions: These are the policies that are formed at the departmental level and are implemented by department heads.

Green IT resource plans: These include details of resources required in undertaking transformation.

Green transformation plans: These are the business transformation and change management plans that will focus on the dimensions and the work areas.

5.3.5 Green Transformational Elements

These elements are as follows:

The drivers and areas of influence.

The major dimension along with the GET will take place. This is the process dimension also supported by the social dimension for transformation.

The demographics of the organization can play a role in deciding on the type of transformation, its budgets, and its resources.

Maturity of its Green IT performance is very basic.

Some of the transformation measures:

User devices: Measuring, upgrading, and recycling monitors, PCs, laptops, and mobile phones; desktop virtualization; centralized green services

Data centre: Virtualization, optimization; self healing networks; network topology, database design, hardware and software components, security issues, and backup

strategies. Redesign of data centre to include flexibility and agility to enable easy upgrades of future infrastructure

Systems and lifecycle: IT systems supporting hospital processes like booking, consultation, diagnosis, treatment, prescription, and education; Equipment procurement, installation and usage; integration of supply chain with local as well as overseas pharmacies and drug suppliers. Interaction with government and other regulatory bodies should also be enabled electronically.

Wastage: Electronic waste resulting from unused or broken devices; also, due consideration is given to areas of bio waste.

Attitude: Undertaking training and consulting programs for staff and promoting it amongst patients and business partners. Internet-based system to facilitate global management of the administration, rosters as well as the most HR functions. Change management for telework and telehealth.

5.3.6 Green Transformation Project

The overall GET project is to last between 12 and 18 months, with the full carbon value realized **over 3 to 5 year's** strategic time period. $ 1 million is the budget sanctioned by the corporate board and the CGO is authorized to undertake this transformation.

The process is divided into six quarters of 3 months each.

First quarter: The hospital transformation is primarily focused on investigation and diagnosis. This work includes identification of the key drivers for green

transformation. The CGO will lead the strategic planning for the hospital, creating a 3 –5year actionable strategic **plan. Ā is plan will also include the return on investment** metricsfor the hospital.

Second quarter: This is the quarter where enactment of the plan created in the previous quarter takes place. The enactment of GET in this quarter deals withthe process dimension of transformation. Therefore, Green BPMcomes into play during this quarter. The process changes require extensive modeling, verification and validation, and tools support. Carboncontent of the key processes needs to be established beforehand.

Third quarter: This quarter of GET is dedicated to transformation ofthe social dimension. Therefore this quarter focuses on the attitude and behavior of individual staff . Social dimension also becomes important in a service organization as the output of the organization is the service to the customer (patient in this case). Thus while the employees are equipped here with training that enables them to tap into the environmental data, information and knowledge within the organization, the patients, and the society in general is updated with the changes occurring within the hospital. Metrics and measurements associated with the social dimensions come in to play.

Fourth quarter: This quarte**r is for the —Review‖ phase** of the transformation. There is heavy focus on measurements based on the earlier defined metrics: the Green KPI. The KPIs can also be fine tuned for ongoing and continuous improvement in the future. Review phase can include Green ITaud it to ascertain the maturity of the organization. Reduction in complexity of processes, improvement of quality of service and compliance with legislative requirements are included in the criteria for success.

Fifth quarter: If the Review phase indicates success in terms of GET, then the organization needs to immediately focus on providing the transformation support to its partners. These are the pharmaceuticals, laboratories, equipment suppliers and, various patient-related bodies such as medical insurance providers.

Sixth quarter: This is the quarter where feedback from the transformation will have a substantial effect on the next steps by the hospital. Formal external Green IT audits are conducted in this quarter and compliance with the regulatory requirements can be formalized. This quarter starts an ongoing journey for environmental program management for the hospital that will work closely with the Green HR function in ensuring Green IT specific roles are maintained, and individuals working in those roles are motivated and trained. Two important aspects to be noted here are

GET is closely tied with the profits

GET will lead to increase in the overall performance.

5.3.7 Social Dimension in Hospital GET

Changes to the social dimension of the hospital is particularly brought about during the third quarter of the transformation. These changes include the following:

Creation and delivery of training programs for staff at all levels

Review of attitude toward Green IT through quick surveys and feedback

Use of IT systems support to reduce the routine pressures on doctors beyond the needs oftheir own specialist or generalist skills

Implementation of metrics to provide real-time feedback to users on their daily carbon footprint.

Creation of telework program for support functions

Telehealth

Development of a Green HR function that includes training, reward, and growth structure, particularly for admin and support staff, in terms of Green IT.

5.3.8 Technology Changes in Hospital

Replacement of servers to the low-carbon emitting servers in the data centre.

Gradual replacement of devices to low-carbon devices.

Changes to the current backup, including off -site backups of data on the data servers.

Upgrade of IT systems to automate processes.

Upgrade to the EPR by implementing a strategy to move it on the Cloud. EPR can enhance medical record documentation and optimize the consulting process of the doctor with the patient.

Paper-less medical reports to reduce not only the paper wastage, but also time and effort in maintaining the manual records is saved.

Collaboration with partners

Green BPM for processes, including ordering and retrieving laboratory tests, prescription writing, consultation or referral notes, and billing.

CEMS will be involved in recording carbon data that corresponds to various clinical activities.

User devices changes includes end-user devices such as PCs in the consulting rooms, examination rooms, nursing workstations, and administrative hardware.

Communications and network equipment

Non-IT equipment and their lifecycle has to be subject to the Green Production, Operation and Development. These equipment, such as are used in operating theatres or X-rays or in the pathological tests may not come directly under IT domain, but are still significant contributors to carbon emissions.

Electronic wastage policies and procedures.

5.3.9 Applying Mobile Technologies in GET

A large number of hospital staff use mobiles to connect for both work and social networking. The following are the advantages from the perspective of carbon reduction:

- **Doctors:** Mobile technology can reduce carbon **throughout the physician's work and social processes. They can use handheld tools dedicated to a physician's**

  routine which can provide instantaneous data and information to the doctor. This improves health-care services to patients, eliminate geographical distances and reduce carbon content of the service. ABC hospital is providing dedicated health-care mobile tools and supporting technologies to all doctors that will enable them to serve the patients most efficiently, engage in

  conversations and conferences through their devices, and **have fast access to patients' data. The actions taken by**

  the physician are also documented through the device, enabling easy tracking of actions when a staff member hands over the care of a patient to another member.

  Nurses: The use of mobile technology is also helps the nursing staff to coordinate with the doctors andthe patients on a re gular basis. This helps in improving the consulting/advisory roles that nurses play and the record keeping activities.

  Patients: Use of mobile technology has given greater flexibility for thepatients without being physically go to the hospital for check up. The mobile technology has reduced patient movement, patient queuing and has provided location-independent advise to patients where

they needed it most. Additional mobile gadgets that monitor patient data remotely, provides it to the hospital and also raises relevant alerts has optimized the processes and reduced their carbon contents.

Suppliers: Mobile technology improves receiving and ordering processes between hospital and its drug supplier. It also provides better management and storage system.

5.3.10 Important Lessons Learned in Implementing Green IT Strategies

Following are the lessons learned as a result of the GET initiative for the hospital.

Strategic reduction in carbon will require significant changes in the social, process, and also technical dimensions of the business.

Service organizations are particularly influenced by customer expectations. The patients and the society in general was more keen to see the hospital becomea green hospital, as compared with the internal staff and administrators.

Telework and telehealth are likely to play a significant role in not only improving the business processes of the hospital, but also its carbon emissions record.

Operational carbon reduction is more effective when processes are to be changed as compared with the changes to the procurement and disposal cycle.

Training and education play a significant role in carbon reduction in a hospital and similar service organizations. They bring about a change in attitude and approach to Green IT restructuring to Green HR is also a significant boost to the carbon reduction effort from asocial angle.

Changes to IT systems that support business and technical processes should be made with the backdrop of environmental intelligence. Simple carbon data mining will not provide strategic value of directions for a transforming organization.

Ongoing monitoring of risks associated with GET should be planned for enacted. These risks are not restricted to only the main dimension for transformation but can emerge from any of the four dimensions.