EVALUATION OF CRITICAL SUCCESS FACTORS OF ENTERPRISE RESOURCE PLANNING (ERP) IMPLEMENTATION IN BANGLADESH

By

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NOVEMBER, 2009

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A thesis paper submitted to the Department of Industrial and Production Engineering (IPE), Bangladesh University of Engineering and Technology (BUET), Dhaka, in partial fulfillment of the requirements for the degree of Master of Engineering (M. Engg.) in Advanced Engineering Management (AEM).

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Certificate of Approval

This thesis paper titled " Evaluation of Critical Success Factors of Enterprise Resource Planning (ERP) Implementation in Bangladesh " submitted by Md. Ahsan Uddin Murad, Student ID-100708107 (F) of session October 2007, has been accepted as satisfactory in partial fulfillment of the requirement of the degree of Master of Engineering in Advanced Engineering Management on November 23, 2009.

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Declaration

I do hereby declare that the no part of this thesis has been submitted elsewhere for the award of any degree or diploma.

Md. Ahsan Uddin Murad

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Acknowledgement

I would like to express the deepest appreciation to my honorable supervisor **Dr. Nafis Ahmad**, who has the attitude and the substance of a genius: he continually and convincingly conveyed a spirit of adventure in regard to research and new thinking, and an excitement in regard to teaching. Without his guidance and persistent help this dissertation would not have been possible.

There are some other personalities, who have the impact and contribution on that project in many ways. Among them, there is Ms. Rehenuma Tarannum for her continuous support & encouragement, which never let me down. The author pays his deepest homage to his family members, whom he believes to be the cardinal source of inspiration for all his achievements. Finally, I would like to thank all the respondents who have taken the time and effort to answer the questionnaires, making it possible for me to carry out this research.

Abstract

Enterprise Resources Planning (ERP) software systems encompass a wide range of software products supporting day-to-day business operations and decision-making. The pricey ERP systems does not only tackle information technology (IT) issues but also attempt to solve problems related to human resources, enterprise culture, and organizational restructuring. Successful implementation of ERP can harvest gigantic benefits for organizations – or it can be disastrous for organizations that not succeed to deal with the implementation process. Hence, successful implementation of ERP system can improve enterprise performance significantly.

This research examines what factors facilitate or inhibit the success of ERP projects in Bangladesh. Data was collected by questionnaire & conducting interviews at various levels of employees of various organizations of Bangladesh. The study proposes that User's Involvement, Effective Communication, Education and Training, Management support, Consultants, Internal readiness , Training, Bangladeshi Organization culture, Adequate testing are pivotal factors of successful ERP implementation and Suitability of Software and Hardware, External Support and Change Management (BPR) are other important factors that are contributing to a successful implementation.

Chapter 1: Introduction

1.1 Introduction

Enterprise Resource Planning (ERP) systems are integrated, enterprise wide systems, which automate core corporate activities such as manufacturing, human resource, finance and supply chain management (Grover et al. 1995).Thus ERP systems are comprehensive, fully integrated software packages that provide automated support for most of the standard business processes within organizations. ERP systems are expensive, and once ERP systems are implemented successfully, significant benefits such as improved customer service, better production scheduling, and reduced manufacturing costs can be gained. However, the successful implementation rate is low and many firms that have gained some benefits from ERP have yet to exploit the full potential of ERP in their organizations. About 90 percent of ERP implementations are late or over budgeted (Miles et al. 1994) and ERP implementation success rate is only about 33% (Somers et al. 2001). In Bangladesh, ERP implementation problems become more acute because of the challenging Bangladeshi culture which is entirely different from cultures where these systems are developed.

1.2 Rationale of the Study

The appeal of the ERP systems is clear. While most organizations typically had software systems that performed much of the component functions of ERP, the standardized and integrated ERP software environment provides a degree of interoperability that was difficult and expensive to achieve with standalone, custom-built systems. For example, when a salesperson enters an order in the field, the transaction can immediately flow through to other functional areas both within and external to the firm. The order might trigger an immediate change in production plans, inventory stock levels or employees' schedules, or lead to the automated generation of invoices and credit evaluations for the customer and purchase orders from suppliers. In addition to process automation, the ability of ERP systems to disseminate timely and accurate information also enables improved managerial and worker decision-making. The contributions of the research are important for both practitioners and researchers. The findings and CSFs will provide a useful guide for organizations planning to implement ERP systems. International consulting organizations also will benefit from these insights.

1.3 Objective of the Study

Implementation of ERP systems requires a substantial investment in time, money and internal resources and is fraught with technical and business risk. There are a number of challenges that are associated with the implementation of ERP systems. First ERP systems are expensive and consequently require complex decision-making processes to purchase them. Second, ERP systems usually affect the whole organization. As such, requires a combination of technical and human expertise to select, develop and implement successfully (Escalle et al, 1999). Third, there have been many reported failures of ERP implementations. Examples include companies such as FoxMeyer Drugs, Applied Materials, Hershey, Mobil Europe, and Dow Chemicals (Bingi et al. 1999).

This research is an attempt to extend the ERP implementation research by defining the conceptual domains constructs and operational measures specific to ERP implementation CSFs to advance ERP research to find out the factors that play vital role behind the successful implementation of ERP system in Bangladesh.

1.4 Research Questions

Given the scale of ERP implementation projects as well as the possibility for both large successes and failures, it is reasonable to expect that ERP deployment have a significant and measurable effect on firm performance. In addition, because implementation is a difficult and uncertain process, firms that are successful in implementing ERP may gain competitive advantage over other firms that are unwilling or unable to make similar changes. Successful implementation of ERP can harvest gigantic benefits for organizations - or it can be ruinous for organizations that not succeed to deal with the implementation process. The main research questions are 1) How ERP systems can be implemented successfully? and 2) What are the success factors for ERP implementation?

1.5 Organization of the Study

The organization of this thesis paper is as follows: in the next section, literature review is illustrated. Research methodology follows with literature review which describe some theoretical basics of ERP are described which will give reader various aspects of ERP implementation project and research framework is developed after the literature review. In the section of research framework, details of the variables are explained. Then data analysis is conducted to explain the findings. Discussion is made on issues in the research and conclusion about the study ends the paper.

Chapter 2: Literature Review

ERP provides a technology platform where organizations can integrate and coordinate their major internal business processes. They address the problem of organizational inefficiencies created by isolated islands of information, business processes, and technology. A large organization typically has many different kinds of information system that support different functions, organizational levels, and business processes. Most of these systems are built around different functions; business units and business processes that do not "talk" to each other. Managers might have a hard time assembling the data they need for a comprehensive, overall picture of the organization's operations. For instance. sales personnel might not be able to tell at the time they place an order whether the items that were ordered were in inventory; customers could not track their orders; and manufacturing could not communicate easily with finance to plan for new production. This fragmentation of data in hundreds of separate systems could thus have a negative impact on organizational efficiency and business performance. Gargeya, V.B and Brady, C. (2005)

ERP systems solve this problem by providing a single information system for organization-wide coordination of key business processes. Enterprise software models and automates many business processes, such as filling an order or scheduling a shipment, with the goal of integrating information across the company and eliminating complex. expensive links between computer systems in different areas of the business. Information that was previously fragmented in different systems can seamlessly flow throughout the firm so that it can be shared buy business process in manufacturing, accounting, human resources, and other areas of the firm. Discrete business processes from sales, production, finance, and logistics can be integrated into company-wide business processes that flow across organizational levels and functions. An enterprise-wide technical platform serves all processes and levels.

In the next pages Fig. 2.1 and Fig.2.2. Illustrate the traditional arrangement of information systems and how enterprise systems work accordingly.

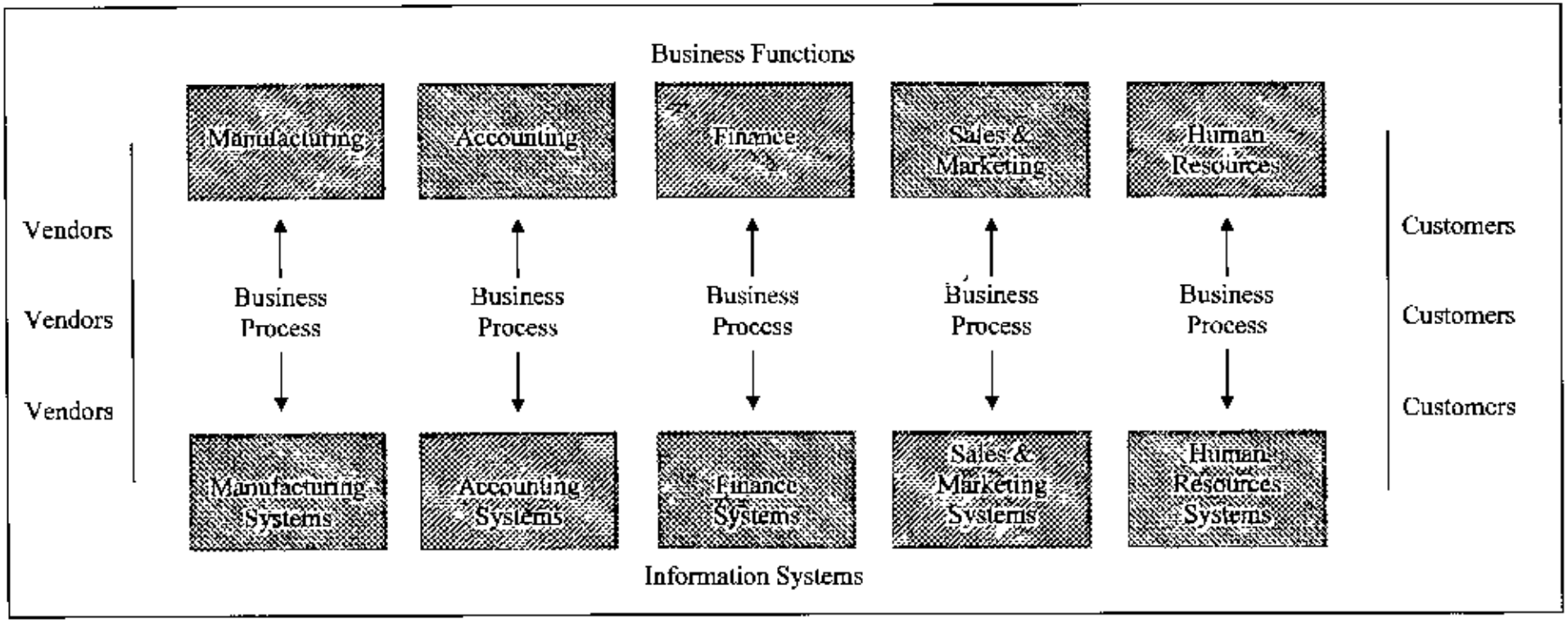

Fig:2.1 Traditional view of org systems [12]

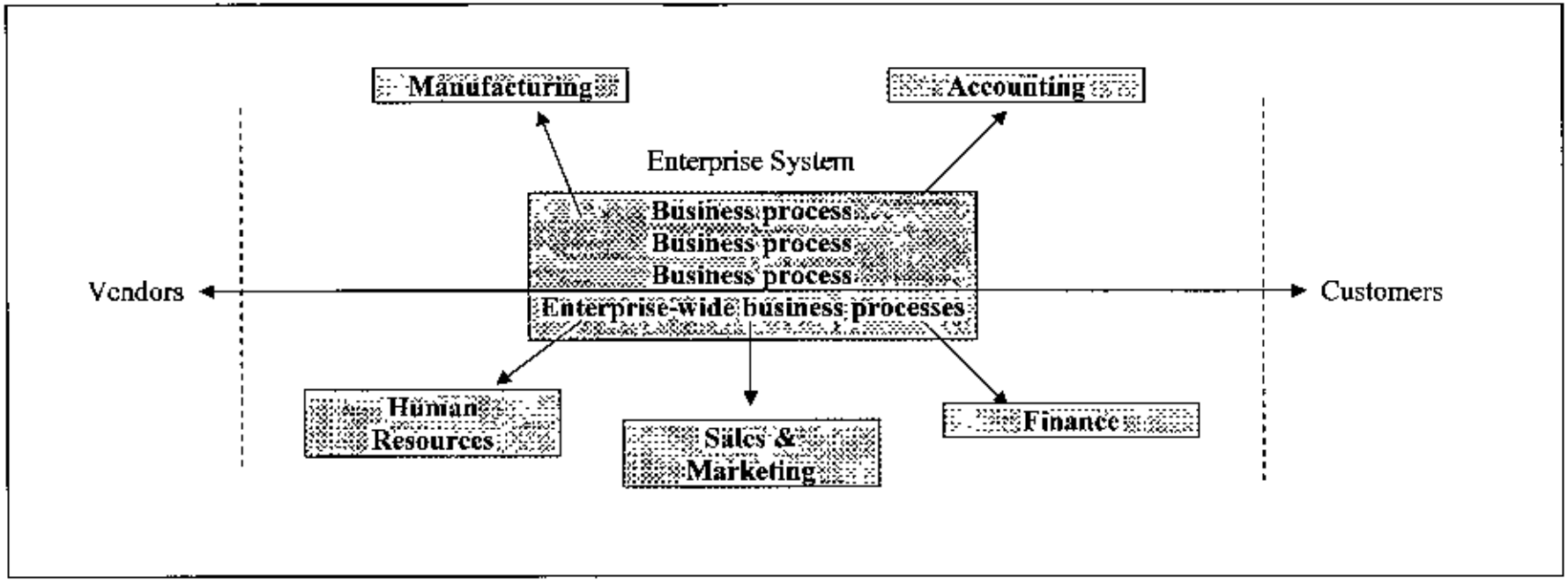

Fig: 2.2 Enterprise systems [12]

Typically, when a customer places an order, that order begins a mostly paper-based journey from in-basket to in-basket around the company, often being keyed and re-keyed into different departments' computer systems along the way. All that lounging around in in-baskets causes delays and lost orders. and all the keying into different computer systems invites errors. Meanwhile, no one in the company truly knows what the status of the order is at any given point because there is no way for the finance department. for example, to get into the warehouse's computer system to see whether the item has been shipped. "You'll have to call the warehouse" is the familiar refrain heard by frustrated customers.

ERP vanquishes the old standalone computer systems in finance, HR, manufacturing and the warehouse, and replaces them with a single unified software program divided into software modules that roughly approximate the old standalone systems. Finance, manufacturing and the warehouse all still get their own software, except now the software is linked together so that someone in finance can look into the warehouse software to see if an order has been shipped. Most vendors' ERP software is flexible enough that you can install some modules without buying the whole package. Many companies, for example, will just install an ERP finance or HR module and leave the rest of the functions for another day.

2.1 ERP and Improving Business Performances

ERP's best hope for demonstrating value is as a sort of battering ram for improving the way a company takes a customer order and processes it into an invoice and revenue—otherwise known as the order fulfillment process. That is why ERP is often referred to as back-office software. It doesn't handle the up-front selling process (recently most ERP vendors have developed CRM software to do this); rather, ERP takes a customer order and provides a software road map for automating the different steps along the path to fulfill it. When a customer service representative enters a customer order into an ERP system, he has all the information necessary to complete the order (the customer's credit rating and order history from the finance module, the company's inventory levels from the warehouse module and the shipping dock's trucking schedule from the logistics module, for example).

People in these different departments all see the same information and can update it. When one department finishes with the order it is automatically routed via the ERP system to the next department. To find out where the order is at any point, one needs only

log in to the ERP system and track it down. With luck, the order process moves like a bolt of lightning through the organization, and customers get their orders faster and with fewer errors than before. ERP can apply that same magic to the other major business processes, such as employee benefits or financial reporting.

2.2 Contribution of ERP

The contributions of ERP in companies' ongoing processes are discussed here.

2.2.1 ***Integrate Financial Information***— In a traditional company there may be many different versions of truth as all the departments and employees try to prove that their contribution to the revenue is higher than others. ERP creates a single version of the truth that cannot be questioned because everyone is using

2.2.2 ***Integrate Customer Order Information***—ERP systems can become the place where the customer order lives from the time a customer service representative receives it until the loading dock ships the merchandise and finance sends an invoice. By having this information in one software system, rather than scattered among many different systems that can't communicate with one another, companies can keep track of orders more easily, and coordinate manufacturing, inventory and shipping among many different locations at the same time.

2.2.3 ***Standardize and speed Up Manufacturing Processes***—Manufacturing companies—especially those with an appetite for mergers and acquisitions—often find that multiple business units across the company make the same widget using different methods and computer systems. ERP systems come with standard methods for automating some of the steps of a manufacturing process. Standardizing those processes and using a single, integrated computer system can save time, increase productivity and reduce head count.

2.2.4 ***Reduce Inventory***—ERP helps the manufacturing process flow more smoothly, and it improves visibility of the order fulfilment process inside the company. That can lead to reduce inventories of the stuff used to make products (work-in-progress inventory), and it can help users better plan deliveries to customers, reducing the finished good inventory at the warehouses and shipping docks.

2.2.5 ***Standardize HR Information***—Especially in companies with multiple business units, HR may not have a unified, simple method for tracking employees' time and communicating with them about benefits and services. ERP can fix that.

2.3 Costs of ERP Investment

Although different companies will find different land mines in the budgeting process, those who have implemented ERP packages agree that certain costs are more commonly overlooked or underestimated than others. Armed with insights from across the business. ERP pros vote the following areas as most likely to result in budget overrun.

2.3.1 ***Training*** - Training is the near-unanimous choice of experienced ERP implementers as the most underestimated budget item. Training expenses are high because workers almost invariably have to learn a new set of processes, not just a new software interface. With ERP, people of Finance will be using the same software as warehouse people and they will both be entering information that affects the other. To do this accurately, they have to have a much broader understanding of how others in the company do their jobs than they did before ERP came along.

2.3.2 ***Integration and Testing*** - Testing the links between ERP packages and other corporate software links that have to be built on a case-by-case basis is another often-underestimated cost. A typical manufacturing company may have add-on applications from the major—e-commerce and supply chain—to the minor—sales tax computation and bar coding. All require integration links to ERP.

2.3.3 ***Customisation*** - Add-ons are only the beginning of the integration costs of ERP. Much more costly, and something to be avoided if at all possible, is actual customisation of the core ERP software itself. This happens when the ERP software can't handle one of the business processes.

2.3.4 ***Data Conversion*** - It costs money to move corporate information, such as customer and supplier records, product design data and the like, from old systems to new ERP homes.

2.3.5 ***Data Analysis*** - Often, the data from the ERP system must be combined with data from external systems for analysis purposes.

2.3.6 ***Consultants ad Infinitum*** - When users fail to plan for disengagement, consulting fees run wild. To avoid this, companies should identify objectives for which its consulting partners must aim when training internal staff. Include metrics in the consultants' contract.

2.3.7 ***Post-ERP Depression*** - ERP systems often wreak cause havoc in the companies that install them. In a recent survey of 64 Fortune 500 companies, one in four admitted that they suffered a drop in performance when their ERP system went live. The true percentage is undoubtedly much higher. The most common reason for the performance

problems is that everything looks and works differently from the way it did before. When people can't do their jobs in the familiar way and haven't yet mastered the new way, they panic, and the business goes into spasms.

2.4 ERP Implementation

Shanks and Parr (2000) defined ERP implementation as "the process of developing the initial business case and planning the project, configuring and implementing the packaged software, and subsequent improvements to business processes". ERP implementation is considerably different from any traditional information system implementation for many reasons: (1) the integrated nature of ERP applications causes dramatic changes on work flow, organizational structure and on the way people do their jobs; (2) ERP systems are not built but adopted, this involves a mix of business process reengineering and package customization, (3) ERP implementation is not just a technical exercise but it is a socio-technical challenge as it poses new set of management procedures. In that sense, it has become clear that ERP implementation differs from traditional systems development where the key focus has shifted from a heavy emphasis on technical analysis and programming towards business process design and human elements (Gibson, 1999). ERP when successfully implemented links all areas of a company including order management, manufacturing, human resources, financial systems, and distribution with external suppliers and customers into a tightly integrated system with shared data and visibility (Chen, 2001). Potential benefits include drastic declines in inventory, breakthrough reductions in working capital, abundant information about customer wants and needs, along with the ability to view and manage the extended enterprise of suppliers, alliances and customers as an integrated whole (Escalle et al.,1999).

On the Basis of literature review, there are three common approaches to the ERP implementation. These are described in the following sections.

2.4.1 *Single Phase Adoption Strategy*

In this, the most ambitious and difficult of approaches to ERP implementation, companies cast off all their legacy systems at once and install a single ERP system across the entire company. Though this method dominated early ERP implementations, few companies dare to attempt it anymore because it calls for the entire company to mobilize and change at once. Most of the ERP implementation horror stories from the late '90s warn us abont companies that used this strategy. Getting everyone to cooperate and accept a new software system at the same time is a tremendous effort, largely because the new system

will not have any advocates. No one within the company has any experience using it, so no one is sure whether it will work. Also, ERP inevitably involves compromises. Many departments have computer systems that have been honed to match the ways they work. In most cases, ERP offers neither the range of functionality nor the comfort of familiarity that a custom legacy system can offer. In many cases, the speed of the new system may suffer because it is serving the entire company rather than a single department. ERP implementation requires a direct mandate from the CEO (Davenport, 1998).

2.4.2 *Franchising Strategy*

This approach suits large or diverse companies that do not share many common processes across business units. Independent ERP systems are installed in each unit, while linking common processes, such as financial bookkeeping, across the enterprise. This has emerged as the most common way of implementing ERP. In most cases, the business units each have their own "instances" of ERP—that is, a separate system and database. The systems link together only to share the information necessary for the corporation to get a performance big picture across all the business units (business unit revenues, for example), or for processes that don't vary much from business unit to business unit (perhaps HR benefits). Usually, these implementations begin with a demonstration or pilot installation in a particularly open-minded and patient business unit where the core business of the corporation will not be disrupted if something goes wrong. Once the project team gets the system up and running and works out all the bugs, the team begins selling other units on ERP, using the first implementation as a kind of in-house customer reference.

2.4.3 *Slam-dunk*

ERP dictates the process design in this method, where the focus is on just a few key processes, such as those contained in an ERP system's financial module. The slam-dunk is generally for smaller companies expecting to grow into ERP. The goal here is to get ERP up and running quickly and to ditch the fancy reengineering in favor of the ERP system's "canned" processes. Few companies that have approached ERP this way can claim much payback from the new system. Most use it as an infrastructure to support more diligent installation efforts down the road. Yet many discover that a slammed-in ERP system is little better than a legacy system because it doesn't force employees to change any of their old habits. In fact, doing the hard work of process reengineering after the system is in can be more challenging than if there had been no system at all because at that point few people in the company will have felt much benefit.

2.5 Critical Success Factors

Critical Success Factors (CSFs) approach was first used by Rockhart (1979) in Information System (IS) area. It has been applied to many aspects of IS including project management, manufacturing systems implementation, reengineering, and, more recently, ERP systems implementation [(Bancroft, 1996), (Brown, 1999), (Gibson, 1999)]. According to Rockart (1979, p5) CSFs "are a shorthand statement of those limited number of areas where "things must go right" for the IS function to be successful and for the IS executive's goals to be attained" in addition to being "the means to the objectives – which are the desired ends" (p7).

Boynton and Zmud (1984) see CSFs being "elicited from managers who represent a cross section of the organizations major functional areas" (p17). Within ERP implementation context, CSFs are defined as "factors needed to ensure a successful ERP project" (Gibson, 1999). As different factors are important in different stages, it is important to classify the CSFs identified into the phases of the ERP implementation life cycle where the factors may come into play (Nah et al., 2001). Many authors use CSFs, so general be viewed as possible influences on success rather than causal factors.

2.6 Critical Success Factors in ERP Implementation

There have been a few papers recently published on the factors contributing to ERP implementation. Holland and Light (1999) consider strategic and tactical factors for implementing ERP and propose a success factor model. Their model can be seen in Table 2.1.

ERP Implementations Process

Strategic	Tactical
Legacy System	Client Consultation
Business Vision	Personnel
ERP Strategy	BPC & Software Configuration
Top Management Support	Client Acceptance
Project Schedule & Plans	Monitoring & Feedback
	Communication
	Troubleshooting

Table. 2.1: A model with strategic and tactical factors, Source: (Holland and Light, 1999)

Umble & his associates. (2003) Identified 9 factors for successful ERP implementation.

1- Clear understanding of strategic goals

2- Commitment by top management

3- Excellent project management

4- Organizational change management

5- A great implementation team

6- Data accuracy

7- Extensive education and training

8- Focused performance measures

9- Multi-site issues

Nah & his associates. (2001) Identified 11 factors for successful ERP implementation.

The 11 factors noted by them are:

1. ERP teamwork and composition;

2. Change management program and culture;

3. Top management support;

4. Business plan and vision;

5. Business process re-engineering and minimum customization;

6. Effective communication;

7. Project management;

8. Software development, testing, and troubleshooting;

9. Monitoring and evaluation of performance;

10. Project champion; and

11. Appropriate business and information technology legacy systems.

Referring to the previous research, these factors can be generalized into 3 categories: strategic factors, tactical factors, and operational factors.

A. *Strategic Factors*

Top management support – earlier studies (Sumner (1999) showed that the ERP implementation was in general a top-down decision, and the success of such an implementation depended on the alignment of the ERP adoption with strategic business goals.

B. *Tactical Factors*

Effective project management – in order to successfully accomplish the decision to implement an ERP system, the effective project management comes into play to plan, coordinate and control such an intricate project Re-engineering business processes – it is

very important to consider the extent to which the company needs to re-engineer its current business processes in order to be compatible with the ERP software. Suitability of software and hardware – management must make a careful choice of an ERP package that best matches the legacy systems, e.g. the hardware platform, databases and operating systems.

C. Operational Factors

Education and training – when the ERP system is up and running it is very important that the users be capable to use it, hence they should be aware of the ERP logic and concepts and should be familiar with the system's features. User involvement – participating in the system development and implementation, the users go through a transition period that gives them time to better understand the project's consequences.

2.7 Organizational Cultural Issues in ERP Implementation

2.7.1 *Organizational Culture*

A single definition of organizational culture has proven to be very elusive (Scholl, 2003). No one definition of organizational culture has emerged in the literature. For most organizational writers, "culture" is a stable, conservative and resistant force that is likely to change only through management intervention. Both managerially and critically minded organizational researchers assume that resistance to change is rooted in culture stability (or, in critical terminology, that resistance to managerial oppression can be rooted in the solidarity of working class culture) (Hatch, 1993). Following are the two ways in which cultures often defined (Scholl, 2003).

1. Outcomes – Defining culture as a manifest pattern of behaviour; that is using the term culture to describe patterns of cross individual behavioural consistency (Scholl, 2003). Hofstede (1983) describes organizational culture as "the way things are done in the business." More specifically, organizational culture is the "shared perceptions, patterns of belief, symbols, rites and rituals and myths that evolve over time and function as the glue that holds the organization together." (Zamanou & Glaser, 1994) Based on these definitions, it is easy to see that the existing culture of an organization provides a corporate framework that provides guidance on issues like how work is done, the use of technology, how people think and standards for interaction and communication (Sheng et al., 2003).

2. Process – Defining culture as a set of mechanisms creating cross individual behavioral consistency. In this case, culture is defined as the informal values, norms, and beliefs that

control how individuals and groups in an organization interact with each other and with people outside the organization (Scholl, 2003).

Sheng, Pearson & Crosby (2003) described organization's culture as a kind of shared perceptions and beliefs that are fostered and cultivated by communications and interactions among people inside and outside the organization (Sheng et al., 2003). These perceptions and beliefs then effect and can be influenced by people's behaviors on things like how to solve problems, how to conduct a job and how to communicate (Bates et al., 1995). In turn, people's behaviors can influence the firm's performance (Sheng et al., 2003).

2.7.2 *Impact of Organizational Culture on ERP Implementation*

At the organizational level, culture has substantial and definite influence on organizational structure, behavior and management style (Thanasankit, 1999), (Weber, 1951)]. At the individual level, people bring to the workplace what can be regarded as cultural baggage; that they come to their jobs with specific cultural biases about how the world functions, how their job works, and how employers and employees are supposed to conduct themselves (Straub, 2001). Mobley et al. (2005) indicate that a strong organizational culture can be a primary generator of real motivation and commitment. In a strong and cohesive culture, the organizations core values are both intensely held and widely shared (Mobley et al., 2005). This high intensity of common beliefs makes it relatively easier to draw consensus among employees, to build a focus on important goals and objective, to reduce potential conflicts, to cultivate a learning environment, and to lower staff turnover (Mobley et al., 2005).

Fisher (1997) suggests that the working culture has programmed learned helplessness and non-responsibility into workers, where obedience takes precedence over initiative, discipline over risk taking and where showing up for work every day is considered fulfillment of the work contract (Stewart et al., 2000). Breen (1995) suggests that to successfully manage complex projects, an initiative must be taken in educating, encouraging and empowering project teams to cut across organizational barriers allowing organizations to overcome natural barriers to successful project management.

Developing countries face many difficulties when implementing and using western technologies, management processes, and information systems techniques imported from developed countries. This is commonly known as Information Technology Transfer (ITT) problems. Unlike traditional software development approach, which promotes building systems from scratch, ERP encapsulates reusable best business practices. Thus ERP

implementation becomes more challenging in Bangladeshi context where national and organizational culture with different value and belief system, resulting in different management styles, might not harmonize with Western business culture embedded in the predefined standard business processes of foreign ERP packages. Thus, Bangladeshi organizational culture is outlined as an important determinant of ERP implementation success.

2.8 *Challenges of ERP*

Although ERP can improve organizational coordination, efficiency, and decision making, they have proven very difficult and costly to build. They require not only large technology investments but also fundamental changes in the way the business operates. Companies will need to rework their business processes to make information flow smoothly between them. Employees will have to take on new job functions and responsibilities. Many barriers must be overcome before the benefits of ERP can be realized. Organization that do not understand how much change will be required or that are unable to make this change will have problems implementing enterprise systems or they may not be able to achieve a higher level of functional and business process integration.

ERP requires complex pieces of software and large investments of time, money and expertise. Enterprise software is deeply intertwined with corporate business processes. It might take a large company three to five years to fully implement all of the organizational and technology changes required by ERP. Because enterprise system is integrated, it is difficult to make a change in only one part of the bnsiness without affecting other parts as well.

2.9 Major ERP Vendors in Today's Market

2.9.1 *System Application Product (SAP)*

SAP, started in 1972 by five former IBM employees in Mannheim, Germany, states that it is the world's largest inter-enterprise software company aud the world's fourth-largest independent software supplier, overall. The original name for SAP was German: System, Anwendungen, Produkte, German for "Systems Applications and Prodncts." The original SAP idea was to provide customers with the ability to interact with a common corporate databasc for a comprehensivc range of applications. Gradually, the applications have been

assembled and today many corporations, including IBM and Microsoft, are using SAP products to run their own businesses

SAP is considered the pioneer of Enterprise Resource Planning (ERP) Software Systems. Almost 40,000 employees work here serving 38,000 customers throughout the world. SAP has been commanding a huge chunk of market share since ERP solutions first came to prominence. The company's ERP CRM suite rounds out its broad portfolio of business applications, enabling companies to truly improve every single aspect of their operations.

SAP's ERP CRM suite has also received numerous industry accolades, and was recently named the market leader by analyst firm Forrester Research.

SAP at a glance now:

- More than 35,000 customers, 120 countries
- Claim #1 CRM market share leader
- Built the client/server ERP market
- Definite #1 ERP market share leader
- Very impressive distribution/SCM
- Several industry solutions
- Priced at the high end

Features & Functions of SAP-ERP:

1. Employee self-services, Manager Self-services, Employee interaction center
2. Express planning, Business consolidations, Product design cost estimate

New general ledger, Management of internal controls, Contract accounting, Financial supply chain management

4. Recruiting, E-learning, Workforce performance management, Succession management
5. HR administrator, Universal work lists, Time management
6. E-procurement. Project self-services, Invoice management system
7. Order and quotation management, Selling via eBay, Internet pricing configuration
8. Automated credit card feeds, Integrated mileage calculation, Mobile travel and expense, Travel agency integration
9. Automated credit card feeds, Integrated mileage calculation, Mobile travel and expense, Travel agency integration

10. Occupational health, Waste management, Industrial hygiene, Dangerous goods management

Advantages:

Using the functionality that SAP ERP pro-vides for business processes, one can:

- More tightly link his business operations and improve visibility
- Enhance financial management and reporting
- Effectively manage his workforce –both locally and globally
- Achieve superior flexibility for addressing new business requirements
- Gain easier access to enterprise information and reports
- Lower the cost of deploying industry-based processes
- Simplify development and support of enterprise processes
- More easily integrate add-on applications and processes
- Reduce total cost of ownership

Some Perceived shortcomings of SAP:

As nothing is completed without any having any drawbacks so as SAP has some shortcomings. Though from the above discussion it is cleared that SAP is now became a reliable and most demanding accounting software for doing business activities it has some perceived shortcomings.

1) Cost

2) High understanding of the process.

3) Time consuming for implementation.

4) Huge documentation.

5) Maximum items selection limit for crediting bank/cash account is 12.

6) Once an entry is posted it cannot be altered without giving reversal entry.

7) Maximum time limit of log in duration.

Though there are some short comings SAP but other than this from the above discussion it is completely cleared that SAP is now very reliable and demanding accounting software in corporate world. Now SAP is mostly used accounting software for doing accounts and finance functions.

2.9.2 *Oracle*

Oracle was founded more than 30 years ago, and has been providing innovative business software solutions ever since. In recent years, the software giant has extended its portfolio of ERP solutions through the acquisition of companies such as PeopleSoft, Siebel, and JD Edwards. These mergers, as well as Oracle's take-over of Telephony@Work, a leading call center solutions provider, have given the company a solid edge – and a broad portfolio of offerings – in the ERP CRM market.

Today, Oracle's ERP CRM solutions are used by over 4.6 million end users across a variety of industry sectors. Additionally, a recent Gartner study shows that Oracle's ERP CRM applications were used in 60% of all CRM implementations in 2005.

Oracle at a glance now:

- Over 37,000 application customers
- Claim #1 CRM market share leader
- #2 ERP market share leader
- 30 year proven credibility
- New SOA architecture
- Deep software functionality
- Outrageous flexibility
- Priced at the high end

Advantages:

Integration:

Integration can be the highest benefit of them all. The only real project aim for implementing ERP is reducing data redundancy and redundant data entry. If this is set as a goal, to automate inventory posting to G/L, then it might be a successful project. Those companies where integration is not so important or even dangerous tend to have a hard time with ERP. ERP does not improve the individual efficiency of users, so if they expect it, it will be a big disappointment. ERP improves the cooperation of users.

Efficiency:

Generally. ERP software focuses on integration and tend to not care about the daily needs of people. I think individual efficiency can suffer by implementing ERP. the big question with ERP is whether the benefit of integration and cooperation can make up for the loss in personal efficiency or not.

Cost reduction:

It reduces cost only if the company took accounting and reporting seriously even before implementation and had pnt a lot of manual effort in it. If they didn't care about it, if they just did some simple accounting to fill mandatory statements and if internal reporting did not exists of has not been financially-oriented, then no cost is reduced.

Fewer personnel:

Same as above. Less reporting or accounting personnel, but more sales assistants etc.

Accuracy:

No. People are accurate, not software. What ERP does is makes the lives of inaccurate people or organization a complete hell and maybe forces them to be accurate (which means hiring more people or distributing work better), or it falls.

Disadvantages:

Expensive:

This entails software, hardware, implementation, consultants, training, etc. Or you can hire a programmer or two as an employee and only buy business consulting from an outside source, do all customization and end-user training inside. That can be cost-effective.

Not very flexible:

It depends. SAP can be configured to almost anything. In Navision one can develop almost anything in days. Other software may not be flexible.

2.9.3 *PeopleSoft*

Oracle and PeopleSoft were integrated on June 1, 2005. People Soft ERP is software that helps organizations to handle their H.R. functions easily. PeopleSoft ERP has helped companies in achieving path-breaking practices and highly acclaimed professional way of managing human resources. Apart from all it has reduced costs and time.

2.10 The Market of ERP:

The ERP systems evolution is taking an unusual turn. For those that may remember, ERP applications were originally introduced as mainframe and host-based monolithic applications in the 1970's and 1980's. McCormack and Dodge and MSA (Management Sciences America) were fierce competitors and between them owned the lions share of the ERP software market. The two rivals ultimately merged to become Dun & Bradstreet Software. Following the merger of the number one and number two market share leaders, Dun & Bradstreet Software believed itself to be an unstoppable ERP application titan,

however, was soon thereafter completely replaced by the introduction of client/server applications and later sold to Geac for a marginal fee valued largely on existing customer software maintenance contracts.

Starting in November 1992, the client/server ERP applications began appearing from no-name or lesser name software manufacturers such as Platinum Software, PeopleSoft, Oracle Financials, Baan and SAP. These distributed software and GUI interfaced applications grew at the expense of the mainframe ERP systems. Midrange systems such as the AS/400 continued to survive, however, their growth days were clearly over. The most notable of the client/server ERP players - SAP and Oracle Financials - stand alone as today's ERP application market share leaders. However, now they too are threatened by new technology paradigms from software as a service (SaaS) competitors and open source software.

Open Source ERP has yet to prove itself as a replacement to commercial ERP applications. While open source ERP applications are clearly growing, they are more often than not used to create first time business systems for young companies or replace antiquated custom built ERP applications with new custom built ERP applications this time built on open source technology.

While Microsoft, Oracle and SAP would be wise to reference the then seemingly unstoppable power of their Dun & Bradstreet Software predecessor, they appear to instead exhibit a similar behavior to Dun & Bradstreet. All three have scoffed at the SaaS delivery model and mocked the open source initiative. While they are now finally showing some interest, that interest appears to belittle more than dipping their toe in the water and their strategies appear to be more of a defensive tactic designed to slow down the market share loss of their customer base to these new ERP models. I suspect there will be a turning point where protection of their self interests will prove futile and these industry heavyweights will embrace at least the SaaS model and possibly show some substantive interests in the open source model.

2.11 ERP Software Specialists in Bangladesh:

Bangladesh Internet Press Ltd. (BIPL): Founded in the year 2000, BIPL is a strategic offshore IT and software services firm specializing in web, e-business, ERP and customized software solutions. Though there are various local companies providing ERP solution, no one solution is complete one to call it ERP solution. Production planning

module is absent in every solution. Description of some companies providing ERP solution in limited modules is given below.

1. ***EB Solutions limited***: EB solution's Enterprise Resource Planning (ERP) software can help your business farm evaluate the individual or integrated reports of the products, purchase, sales, human resource, accounts and any other sector on a single platform. This interestingly eases the process of policymaking and increases the progress rate of the concerned business.

2. ***Systech Digital ERP***: Systech Digital ERP combines the world's most complete, scalable, and effective software for enterprise resource planning (ERP) with a flexible, open technology platform that can leverage and integrate SAP and non-SAP systems.

3. ***CSL Software Resources Ltd***: ERP solution provider CSL Software Resources Ltd. came up with several ERP software namely Kandaree for garments industries, Kormee for human resource management, Shoilee for real estate and Dheeraj for financial management solution. CSL commonly targets garments industries, pharmaceutical companies, MNC, government organizations and real estate companies.

4. ***T&E Solutions***: T&E Solutions Release ERP Software for 8 Government Contractors.

5. ***Mancons Software Product Company***: Providing tailor-made solutions & delightful customer experience in Intranets, Web Applications, ERP Systems etc.

2.12 Limitations of ERP

It is a trait of human being that they do not like to change, and ERP asks them to change how they do their jobs. That is why the value of ERP is so hard to pin down. The software is less important than the changes companies make in the ways they do business. If one uses ERP to improve the ways his people take orders, manufacture goods, ship them and bill for them, he will see value from the software. But simply installing the software without changing the ways people do their jobs, he may not see any value at all—indeed, the new software could slow him down by simply replacing the old software that everyone knew with new software that no one does.

Chapter 3: Methodology

This chapter will discuss and motivate the approach that was decided to use in this research. Description of how data was collected and analyzed will be followed by a part discussion the trustworthiness of this thesis.

3.1 Research method

According to Cantzler (1992) there are two different research methods; quantitative and qualitative methods. Depending on what the researcher is looking for, how much time and resources the researcher has available; the two research methods can be done one by one or combined. Holme and Solvang (1991) claims that qualitative research is characterized by the proximity the researcher has to the respondent. In qualitative research, sample sizes are relatively small. (Cantzler, 1992). Qualitative research is often built upon interviews and open questionnaire. Due to the way data collection is done, the answers can vary and it also requires time and money to collect data this way (Cantzler, 1992).
Cantzler (1992) characterizes quantitative research as a method where a large amount of respondents can be researched and where the data collection is many times done through questionnaires and statistical methods can be applied to the collected data. My data was collected through a quantitative research method & my main focus was in Dhaka Bank Limited. Furthermore, a quantitative study is a good way to minimize the subjectivity which otherwise can impact the result of the study. But it is important to make sure that the subjectivity is not reflected in the questionnaire.

3.2 Data Collection

This research is based on a literature study and an empirical investigation. An empirical study is an investigation based on data, which has been collected through surveys or interviews. The questionnaire was emailed to a total of 150 employees of various organization of Bangladesh (Majorities are top & mid level employees who are directly involved in the ERP implementation Project. Details are given in the following table.

Level	Employees Received questionnaire	Usable response found.
Top Level	70	55
Middle Level	50	44
Lower Level	30	20

Table 3.1: Statistics of Questionnaire Recipients

The employee's contact information was extracted from organization's portal. Those who did not respond through e-mail that employee was visited physically and taken interviews. All the questions were evaluated carefully. Furthermore, some basic questions on the respondent's background were also included in the questionnaire. In this paper it was looked for the inherent relationship between the success factors and related ERP implementation issues, so the most significant related factors were chosen.

3.2.1 *Primary Data*

An empirical study is done to collect primary data. Furthermore researcher should select respondents to get access to deviating or typical cases. Collection of primary data through a questionnaire was chosen. It was tried to set the questions self-explanatory. This was done to ensure that no respondent would misunderstand the questionnaire due to the language. Interested readers can find the questionnaire in Appendix.

According to Saunders, Lewis & Thornhill (2003) the use of questionnaires works best if the questions asked are of a closed character and if different persons cannot interpret the questions differently, this is to achieve as high validity and reliability as possible. Furthermore, a well-developed questionnaire makes it easier to interpret and control the data gathered (Saunders & his associates, (2003).

All questionnaires were sent by email to their respondents, and physically visited the interviewees. Self-administrated questionnaire is a good way to collect truthfully data from the respondents; the reason for this is that the respondent does not try to please the interviewer, something that can occur when the researcher is doing interviews. This problem was addressed carefully. A way to work with this problem is to use e-mail to make sure the right person gets the questionnaire.

3.2.2 *Selection of Sample*

Sampling techniques provide a range of methods that enable us to reduce the amount of data we need to collect by considering only data from a sub-group rather than all possible cases or elements (Saunders et al. 2000). Non-probability sampling is done without chance selection procedures. A non-probability judgmental sampling was selected. Those companies are selected as a case which completed their implementation recently. Miles and Huberman (1990) suggest that investigating contrasting cases will help understand a single case finding, by specifying how, where and possible why it proceed as it does. Based on this reasoning, companies from divergent industries was included in the sample selection. A personal survey method was used to collect data. A straightforward approach to collect respondents was applied. All most all of the top-level employees

directly involved in the ERP implementation project were selected. Finally the sample was ended up with 250 employees of various organizations with e-mail contact information. About 140 people responded to the survey. After initial screening, a sample of 115 subjects was completed for this study.

Invitation to participate in the study was sent out to the employees with e-mail on May 20, 2008. The e-mail contained a letter to the recipient, which stated the purpose of the study and also a request to forward the letter the person who had most insight in the implementation of the ERP system. The e-mail also contained a link to the online questionnaire, which the respondents had to click to access the questionnaire. If the respondents did not fill out the questionnaire within one working week, a reminder was sent out containing an addition to the previous letter, which requested the respondents to answer the questionnaire in order to make my research as good as possible.

Though random sampling was used, but due to the limited resources it is believed that the sampling method is acceptable and provided us with an accurate sample.

3.3 Data Analysis

Once responses were come from the respondents, the values were entered into a spreadsheet model that was developed to summarize the answers. Each of the answers was entered manually and double-checked to minimize errors based on faulty entries. The spreadsheet model summarized the perceived importance of each factor for each one of the different stages. After that it divided the sums of under each factor with the total number of respondents that had replied to that factor to get the mean value.

The qualitative approach allowed us to study the data gathered more in depth. A qualitative approach allows the researcher to be flexible in the research and looking for relationships in the area studied. The qualitative approach was chosen to use when analysis of quantitative data allowed us to modify the problem at the same time as data were gathering. Finally, the qualitative approach gave the possibility to describe what was actually seen in the numbers presented and use the literature to find potential reasons for this.

3.4 Trustworthiness

To discuss this research's trustworthiness, there are four key issues to consider; validity, reliability, generalizability, and objectivity. Each one of these conceptions will be described and discussed further below and will also be reviewed in the final part of this thesis.

3.4.1 *Validity*

Inner validity is achieved if the survey used is measuring what is meant to be measured. Furthermore, outer validity is reached when the empirical study is coherent with the reality. This survey contained relevant questions since they measured what was wanted to find in the research. It was the main target to have a sample that reflects the reality, and therefore was strived to get results, which were coherent with the reality.

3.4.2 *Reliability*

To achieve as high reliability as possible, it is important that the study is condncted in the same way for all respondents. The question of the survey should be designed in the same way and measure the same things. Furthermore, other researchers should, independent of each other, be able to conduct the same research and achieve the same result.

In order to get the study reliable, the steps of the research were described carefully and also attached the survey was used in the research to make it easier for other researchers to conduct the same investigation.

3.4.3 *Generalizability*

A researcher dividing a study's generalizability into two segments; statistical and analytical. Statistical generalizability is not generated automatically for the population, but the analytical generalizability can provide information where patterns can be visible and new theories can be created.

Since the population was unknown, it cannot be proved that the sample of 119 respondents allows us to generalize to the entire population, but the sample is big enough to indicate tendencies of the population, although, this might not be totally generalized.

3.4.4 *Objectivity*

A researcher should strive to find facts in an objective and impartial way; the researchers' values and opinions should not influence the research. Theory in this thesis is based on research papers, and had put an effort in depict the theories in a correct way to make sure that information is not left out or twisted. The results from the survey were analyzed and the conclusions drawn were based on the analysis and from the collected theory. In order to achieve high objectivity during the analysis, it had to take the extended knowledge within the subject into consideration since it might affect the analysis.

Chapter 4: Descriptions of the Research Framework & Empirical Data

ERP systems implementation is a long-term program, not a short-term project that is finished just after system installation. Once organizations have purchased ERP packages from external vendors, a project team including external contractors' consultants and internal will be setup. In Bangladesh most ERP projects use consultants and project managers from external consulting firms or ERP vendors.

4.1 Research Framework

Based on the ERP literature, the researchers classified the hypothesized factors into five categories with:

(1) Organizational environments, including top management support, re-engineering business process, effective project management, and company-wide commitment;

(2) People characteristics, including education and training, and user involvement both at system requirements definition and ERP project implementation;

(3) Technical problems, including suitability of software and hardware and data accuracy;

(4) ERP vendor commitment, including vendor support; and

(5) Cultural impact including organizational cultures. (Liang et al. 2005)

This research describes ERP implementation success in Bangladesh as a function of interrelated CSFs and organizational culture. The hypnotized factors were formulated in two steps where:

• Literature relevant to IS implementation, ERP implementation, project management and Business Process reengineering was reviewed to extract a long list of all the critical factors affecting implementation success.

• This list was synthesized and operationlized through a series of interviews with key persons (i.e. project managers, consultants and vendor representatives) involved in ERP implementations in Bangladesh. The eleven independent variables are assumed as factors affecting mostly ERP systems implementation success from user's most subjective satisfaction. Since the hypotheses constructs are latent variables, which cannot be measured directly, multi-item scales, each composed of a set of individual items, were needed to obtain indirect measures of each construct. The items listed in this section represent the scales as drawn from the practitioners, and refined through an expert judge-based manual sorting process (Liang et al. 2005). These scales were further refined (and

some items were dropped) as a result of an empirical test of a survey instrument containing these initial scales. Following are the commonly identified CSFs and are pertinent for the success of ERP implementation project.

4.1.1 *Project Management*

Project Management involves the use of skills and knowledge in coordinating the scheduling and monitoring of defined activities to ensure that the stated objectives of implementation projects are achieved. According to Dennis Lock (1996), "project management has evolved in order to plan, coordinate and control the complex and diverse activities of modern industrial and commercial projects." ERP systems implementation is a set of complex activities, involving all business functions and often requiring between one and two years of effort, thus companies should have an effective project management strategy to control the implementation process, avoiding overrun of budget and ensuring the implementation within schedule. Thus, the following hypothesis is constructed.

H1: Effective project management has a positive impact on ERP implementation success.

4.1.2 *Business Process Reengineering*

Business Process Re-engineering (BPR) is defined by Hammer and Champy (2001) as "the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical contemporary measures of performance, such as cost, quality, service and speed" .Organizations should be willing to change their businesses to fit the ERP software in order to minimize the degree of customization needed. The implementation of ERP requires examination of many business processes, which believed to be one of the important and beneficial results of the implementation of ERP system. All the processes in a company must conform to the ERP model. Dimensions concerning business process reengineering are: (1) Company's willingness to reengineering; (2) Company's readiness for change; (3) Company's capability of reengineering; and (4) Communication. Prior studies claimed that the more willing an organization is to change, the more successful the implementation (Grover et al. 1995). If people within the company were not given enough information about the purposes of BPR, they would feel uncertainty about their jobs, which can impede the progress of reengineering. Management should answer every employee question and held companywide meetings to make the strategy understood by every people (Miles et al. 1994), (Grover et al. 1995). Thus, the following hypothesis is constructed.

H2: Business process reengineering has a positive impact on ERP implementation success.

4.1.3 *User's Involvement*

End users are the front line soldiers of the organization who have direct contact with the ERP system. User involvement refers to a psychological state of the individual and is defined as the importance and personal relevance of a system to a user. User involvement is effective because it restores or enhances perceived control through participating the whole project plan. There are two areas of user involvement when the company decides to implement an ERP system: (1) user involvement in the stage of definition of the company's ERP system needs, and (2) user participates in the implementation of the ERP systems (Zhang, 2003). As the functions of the ERP system rely on the users to use the system after going live , involving users in the stage of defining organizational information system needs can decrease their resistance to the potential ERP systems, since by which users have feelings that they are the people who choose and make the decision. Thus, the following hypothesis is constructed.

H3: Users' involvement in ERP implementation Project has a positive impact on ERP implementation success.

4.1.4 *Education and Training*

Education and training refers to the process of providing management and employees with the logic and overall concepts of ERP system (Jeff et al. 2002). In ERP implementation process many projects fail in the end due to lack of proper education and training. Users should get enough training on the logic and overall concepts of ERP systems (Zhang et al. 2003).Three aspects concerning the content of training are: (1) Logic and concepts of ERP; (2) Features of the ERP system software; and (3) hands-on training. If the employees do not understand how the system works, they will invent their own processes using those parts of the system they are able to manipulate. Thus, the following hypothesis is constructed.

H4: Education and training has a positive impact on ERP implementation success.

4.1.5 *Top Management Support*

Many studies have stressed the importance of top management support as a necessary ingredient in successful ERP implementation. Top management support in ERP

implementation has two main facets: (1) providing leadership; and (2) providing the necessary resources. To implement ERP system successfully, management shonld monitor the implementation progress and provide clear direction of the project. They must be willing to allow for a mindset change by accepting that a lot of learning has to be done at all levels, including themselves (Rao 2000).Top management needs to publicly and explicitly identify the project as a top priority (Wee, 2000). Senior management must be committed with its own involvement and willingness to allocate valuable resources to the implementation effort (Holland *et al.*, 1999). This involves providing the needed people for the implementation and giving appropriate amount of time to get the job done (Roberts et al. 1992).The implementation could be seriously handicapped if some of the critical resources (e.g., people, funds and equipment) are not available. Thus, the following hypothesis is constructed.

H5: Top management support has a positive impact on ERP implementation success.

4.1.6 *Team Work and Composition*

ERP team work and composition is important throughout the ERP implementation project. An ERP project involves all of the functional departments and demands the effort and cooperation of technical and business experts as well as end-users. The team should have a mix of consultants and internal staff so the internal staff can develop the necessary technical skills for design and implementation (Sumner, 1999). Both business and technical knowledge are essential for success (Bingi *et al.*, 1999; Sumner, 1999).The team should be given compensation and incentives for successfully implementing the system on time and within the assigned budget (Wee, 2000). The team should be familiar with the business functions and products so they know what needs to be done to support major business processes (Rosario, 2000). Thus, the following hypothesis is constructed.

H6: A balanced composition of ERP implementation teams has a positive impact on ERP implementation success.

4.1.7 *Bangladeshi Organization Culture*

Hofstede (1991) studied cultural variations extensively and developed a theoretical model which acts as a foundation for exploring the impact of cultural differences on the adoption and diffusion of IT-based innovations such as ERP systems. The difference of cultures between Western countries where ERP systems are developed and Bangladesh where these ERP systems are implemented makes culture an important determinant of

implementation success. Kumar and Bjorn-Anderson (1990) have concluded that information system design methodologies have built-in value biases reflecting the value priorities of the culture in which they are developed. Densley (1999) revealed that adapting the implementation to the prevailing cultural style was one important cause of project implementation failures. A company who implements an ERP system has to change its business processes to the ERP best practice processes. The change both impacts on the customer's organizational culture (i.e. the ways that things are done in the organization) and is constrained by it (Nah et al. 2001). Western organizations are dependent on information to make decision. While in Bangladesh, management does not rely on information much even though information systems have been implemented. Thus, the following hypothesis is constructed.

H7: Bangladeshi organizational culture has a negative impact on ERP implementation success.

4.1.8 *External Support*

The implementation process may be supported by some factors external to the organization such as vendor's and consultants' support. Vendor support represents an important factor with any packaged software including extended technical assistance, emergency maintenance, updates, and special user training. The relationship between the software vendor and the implementing organization is of great importance. The relationship should be of strategic nature where the ERP vendor enhancing an organization's competitiveness and efficiency. These partnerships appear to be a crucial part of the early stages (Somers et al. 2004).According to Holland and Light (1999) vendor tools are important and could for example be used to support customizing business processes without changing existing software code. It is not often that the implementing organization possesses all knowledge about the system. Therefore it is vital that the ERP vendor support the implementing organization during and after the implementation (Willcocks and Sykes, 2000).Three dimensions of vendor support are classified: (1) Service response time of the software vendor; (2) Qualified consultants with knowledgeability in both enterprises' business processes and information technology including vendors' ERP systems; and (3) Participation of vendor in ERP implementation. Software vendors should be carefully selected since they play a crucial part in shaping the ultimate outcome of the implementation. Thus, the following hypothesis is constructed.

H8: External support has a positive impact on ERP implementation success.

4.1.9 *Effective Communication*

Effective communication is critical to ERP implementation (Falkowski *et al.*,1998). It is essential for creating an understanding, an approval of the implementation and sharing information between the project team and communicating to the whole organization the results and the goals in each implementation stage. In addition to gaining approval and user acceptance, the communication will allow the implementation to initiate the necessary final acceptance. The communication should start early in the ERP implementation project and can include overview of the system and the reason for implementing it be consistent and continuous. Communication from Top Management also needs to be unambiguous. Communication improved as top management placed the ERP implementation project as an enterprise project, for example as one of their six most important personal objectives for the year, and factored in project success as a criterion for bonuses/ variable compensation. This combined with a strong business case for the ERP solution helped motivate all members of the hierarchy. Thus, the following hypothesis is constructed.

H9: Effective communication has a positive impact on ERP implementation success.

4.1.10 *Suitability of Software and Hardware*

Today there are many ERP vendors in this market, including traditional large vendors called the BOPSE group (the initial letters of the five vendors). Now BOSPE has become BOS, since Peoplesoft recently acquired J.D. Edwards, and was then merged into Oracle. Besides these giants, there are more and more newcomers who fit better for certain countries and cultures. since they would have to think about localization problems when dealing with a multinational company wanting to implement an ERP system. Due to the lack of professional expertise and experience on developing ERP systems in-house, many companies prefer to buy off-the-shelf systems to shorten the ERP implementation cycle from these vendors. But more or less they can't fully meet the company's needs, especially when the business processes of the company are unique. Finding a suitable software package is a vital step for ERP implementation. Some vendors provide very specific solutions to niche industries based on the characteristics of the operations environment (i.e. process and business) and enterprise size. For instance, an ERP vendor can offer decision support functionality for supply, manufacturing, and distribution planning at all enterprise levels. Thus, companies should conduct requirements analysis

first to make sure what problems need to be solved and select the ERP systems that most fit their requirements. The hardware then is selected according to the specific ERP systems' requirements. Three aspects should be cared when selecting software and hardware: (1) compatibility of software/hardware and company's needs; (2) Ease of customization. Thus, the following hypothesis is constructed.

H10: Suitability of software and hardware has a positive impact on ERP implementation success.

4.1.11 *Company –Wide Commitment*

Clear goals and objectives are essential to guide an ongoing organizational effort for ERP implementation as it usually exceeds the time frame for a typical business project. Clear goals and objectives were the third most CSFs in a study of MRP implementation. It is important to set the goals of the project before even seeking top management support (Slevin et al. 1996).Since ERP systems are enterprise-wide information systems that integrate information and information based processes within and across all functional areas in an organization, it's imperative to get support from all functional segments of the organization (Sum et al.1997). Every person and department is responsible/accountable for the overall system and key users from different departments are ensured to commit to the project implementation without being called back to their prior functional job position frequently. Two aspects of company-wide support are considered: (1) Functional department heads are champions of the ERP project; (2) They provide necessary resources to support their subordinates; (3) Other people outside the team support the project. Thus, the following hypothesis is constructed.

H11: Company-wide support has a positive impact on ERP implementation success.

4. 2 Methodology

Data was collected for this study by conducting a survey. The questionnaire was developed after an extensive review of the literature and was designed to look for feedback on the various identified CSFs by different stakeholders in order to validate the predicted CSFs. Survey instruments developed by Taylor and Todd (1995) and Bailey and Pearson (1983) serve as a framework for designing the questionnaire of this study. To test each hypothesis, this study attempts to conduct the hypothesis testing on the factors given maximum importance by the stakeholder on the survey.

Chapter 5: Analysis of the Data

5.1 Sample Data

Sampling techniques provide a range of methods that enable us to reduce the amount of data we need to collect by considering only data from a sub-group rather than all possible cases or elements (Saunders et al. 2000). Non-probability sampling is done without chance selection procedures. The sample selection of this research is based on a judgmental sampling, which is non-probability sampling. Those companies are selected as a case which completed their implementation recently. Miles and Huberman (1990) suggest that investigating contrasting cases will help understand a single case finding, by specifying how, where and possible why it proceed as it does. Based on this reasoning, companies from divergent industries were included in our sample selection. A personal survey method was used to collect data. About 140 people responded to the survey. After initial screening, a sample of 115 subjects was completed for this study.

5.2 Analysis of Statistical Result

The critical success factors to the implementation of ERP were based on a 5-point scale with preset response possibilities. The answers are rated by level of agreement, including very unimportant (disagree) to very important (agree). The distribution of these weights is given for each aspect. 105 of 140 respondents of 24 different companies believe that "Project Management" is very important or important with an average value of 4.85 (Table 5.1). After calculating the total value and average value of each CSF, the order of importance can be seen in the following manner. "Project Management" and "Suitability of Software and Hardware" are the top two CSFs with an average value of 4.85 and 4.7 respectively (Table 5.1).

Hypothesis	Mean *	Standard Deviation *
H1:Project Management	4.85	.52
H2:Business Process Reengineering	4.13	.24
H3:User's Involvement	4.15	.74
H4:Education and Training	4.68	.63
H5:Top Management Support	4.58	.51
H6:Team work and composition	4.82	.73
H7:Bangladeshi Organizational Culture	4.36	.62
H8:External Support	4.41	.91
H9:Effective Communication	4.12	.47
H10:Suitability of Software and Hardware	4.7	.82
H11:Company-Wide Commitment	4.24	.35

* Value derived from SPSS software package

Table 5.1: Hypotheses Result

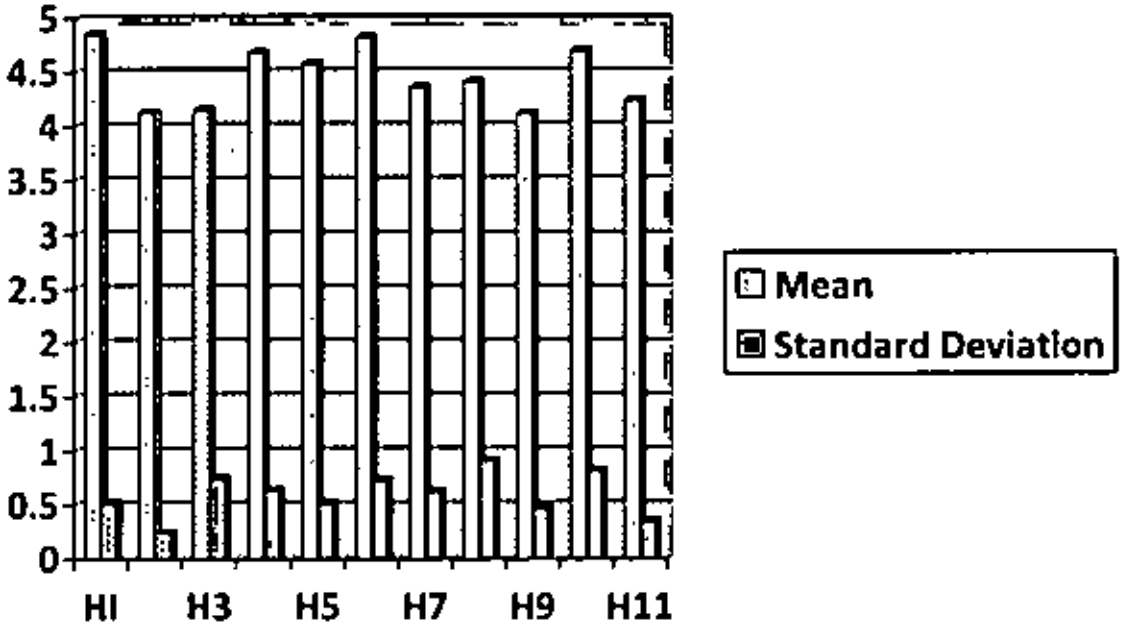

Figure 5.1: Mean value and Standard Deviation of the Hypotheses from the Survey

Another commonly cited factor is "Education and Training". The factor of BPR which was often cited in other research papers is at the end.

The project management is ranked as the top most important factor by the respondents. According to Somers and Nelson (2004) the project management is important during all the stages of the project life cycle. Rosario (2000) suggests that the scope is of great importance and Wee (2000) claims the importance of following timelines and budgets. According to Mabert et al. (2003a), smaller companies employ less functionality than larger companies, leading to the possibility for the project management to more efficient monitor the project.

Organizations should have a strong corporate identity that is open to change. An emphasis on quality, a strong computing ability, and a strong willingness to accept new technology would aid in implementation efforts (Nah et al., 2001). In the findings, the most difficult problem in implementation is mentioned as unwillingness to accept changes. Although there was campaigns and trainings for making users familiar with new system and encourage them to use this system, there are some problems yet. For example, in GENERAL PHARMACEUTICAL one of the leading drug companies of Bangladesh, accepting changes is mentioned as a critical factor and one of the contributors to implementation failure. AMBER COTTON INDUSTRY said that now they have a failure experience; think that it was better to involve their users in implementation. Education

should be a priority from the beginning of the project, and money and time should be spent on varions forms of education and training (Roberts and Barrar, 1992). Training, re-skilling and professional development of the IT workforce is critical. User training should be emphasized, with heavy investment in training and re-skilling of developers in software design and methodology (Sumner, 1999). In the case of RANGS group, training was done in different level and different approaches. They used demos and in-site training. Separate department in RANGS that has responsibility of all educations, also accepts responsibility of trainings for new system.

The ERP team should consist of the best people in the organization (Buckhout *et al.*, 1999; Bingi *et al.*, 1999; Rosario, 2000; Wee, 2000; Nah et al., 2001). Building a cross-functional team is also critical. The team should have a mix of consultants and internal staff so the internal staff can develop the necessary technical skills for design and implementation (Sumner, 1999). In NOVARTIS, one of the pioneer ERP users in Bangladesh, the team was selected from users in the company and mixed with consultants' team. Both consultants had experience in pharmaceutical industry and so the team was familiar with business. Also one of consultants was familiar with software and provides them technical knowledge. In RAHIMAFROOZ another production company of Bangladesh that now implementing SAP in their Ishawrdi Plant. the team is from Consultant Company. They think that this is one of problems with their project. Most of companies believe that project team is one of the most important critical success factors in ERP implementation. About giving compensations to team members, majority of the companies think that is not so much important and they think that this will create some other problems and some other think that it was a project that should be completed with its budget and there was no need for compensation for team members.

Top management support is mentioned both by the SMEs and the larger companies as one of the top five factors for successful ERP implementation. In fact, in our findings, top management support is perceived to be one of the most important factors. The top management support is also perceived to be among the top five factors in the previous researches, something stressing the importance of the top management.

Vendor-customer partnership (External Support) is ranked as the fifth most important factor by our respondents. Davenport (1998) suggests that the partnership could lead to lifelong strategic values. Somers and Nelson suggest that this factor is crucial in the early stages, something that our respondents to a certain extent agree with.

Finally it was examined whether the degree of CSFs is different among different companies. Previous theory and research evidence indicates that the significance of the CSFs is affected by all kinds of company characteristics. In accordance with this general idea, detailed hypotheses are further developed in the preceding section. These hypotheses are empirically validated in the table 5.2. From the multi-stakeholder analysis performed it is evident that eleven hypotheses presented within this study, has been validated. Sustaining these results is the overall mean scores obtained by each of the eleven hypotheses shown in Table 1.The results are evidence of stakeholder agreement to the proposed hypothesis. Total 30 questions related to various hypotheses were given to answer. Only most emphasized 15 questions were chosen to construct 11 hypotheses. As shown in table 2, ANOVA tests reveal that there exist a marginal statistical significance in H2, H5, H8 and H10. ANOVA tests also report a strong statistical significance in H3, H4. H7 and H9, while hypothesis testing on H1 and H11 shows no significance. Interesting thing is H2 shows strong statistical significant although before implementation hardly any employee knows about BPR. Therefore, it is found that administrators at the upper echelon, technical staffs, and end-users have different perspectives on the ERP systems implementation in their organization, in terms of user involvement, funding, BPR, technical support, and training. For instance, top management thinks they provided enough training, while other people think differently. It is concluded that such frictions among job types cause the difficulty or failure of ERP systems implementation in an organization of Bangladesh.

Hypothesis	F Value ***
H1:Project Management	3.215
H2:Business Process Reengineering	6.321*
H3:User's Involvement	8.237**
H4:Education and Training	7.985**
H5:Top Management Support	5.238*
H6:Team work and composition	3.282*
H7:Bangladeshi Organizational Culture	7.523**
H8:External Support	4.147*
H9:Effective Communication	8.292**
H10:Suitability of Software and Hardware	5.215**
H11:Company-Wide Commitment	2.235

* $p < 0.05$ ** $p < 0.01$

*** value derived from spss software package

Table 5.2: Statistical Significance of Hypotheses.

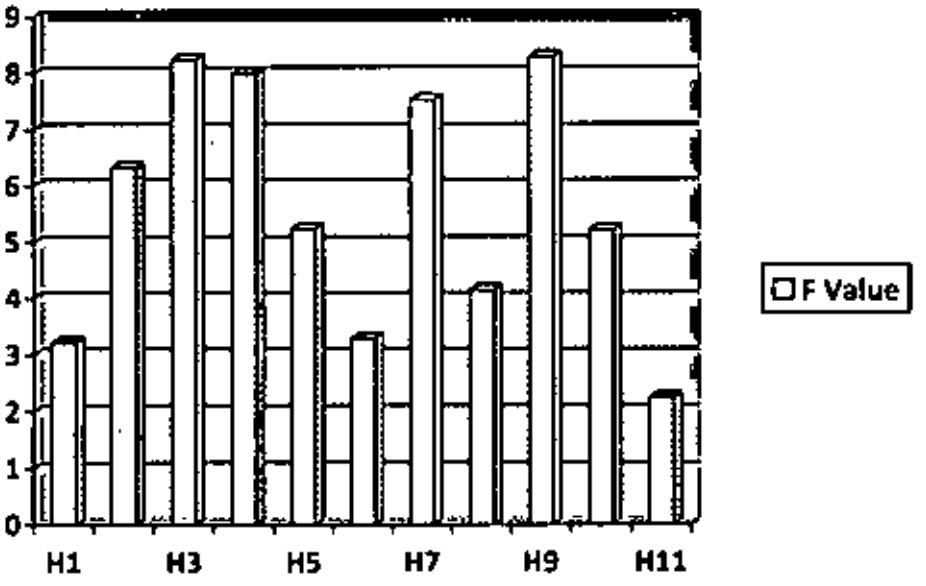

Figure 5.2: F Value of the Hypotheses

Chapter 6: Findings

Differences between the responses found from the stakeholders of ERP implementation project is thoroughly analyzed and identified. Finally, in the analysis it was tried to find reasonable explanations for the differences in the success factors respondents identified. Key findings of this interpretive study were derived from interviewees' perceptions, literature review and secondary data. The following conclusions can be drawn from the research. The factors that play most important role in the ERP implementation are mentioned as:

- User's Involvement
- Effective Communication
- Education and Training
- Management support
- Consultants
- Bangladeshi Organization culture
- Adequate testing

Following factors are validated as not so important, but should keep in mind before ERP implementation.

- Suitability of Software and Hardware
- External Support
- Change Management (BPR)

As far as success factors, the Needs Requirement had to be formal, detailed and lead naturally to an ERP solution choice. It also set a framework for scripts, tests, in later implementation phases. But there needed to be a certain humility and flexibility so that the benefits of the ERP solution are optimized. The Customer had to say I want this, this and this, but also listen carefully when the Editor said I can deliver this, this and that. Unless there was an overriding business, legal or fiscal reason, the economic path was one of compromise. A 'failure' factor could be either not sufficiently expressing objectives, needs, constraints clearly; or having done so, sticking to them so rigidly that the ERP solution was customized or interfaced to death.

The success factors to this point in time, i.e. at the ontset of the project implementation, often dictated whether the project would ultimately be in line with budget costs, delays

and expectations. To use the concrete metaphor already cited, the errors made at this stage would be difficult to correct later on.

In the early stages of the ERP implementation projects, top management support was clearly evident. Top management snpport is necessary for initiation and ongoing resourcing of such large, expensive and projects. Second, the need for a balanced project team was identified as a success factor and for the first two stages in ERP implementation. Balanced project teams contribnte to project success by providing a mix of IT people with ERP knowledge and end-users with a good understanding of organizational processes.

Implications for Practitioners and Researchers:

The findings here present some success factors that contribute most in successful implementation of ERP software solutions in Bangladesh. Case studies with more companies or diverse sectors will also help deepen the findings of sneeess factors of successful ERP systems implementation. Organizations should carefully consider these factors when planning for ERP systems implementation. Consulting organizations should be careful when applying ERP systems implementation approaches that have been successful in one organization in another organization. An awareness of organizational diversity will help practitioners properly plan ERP implementation projects. Further research about ERP implementation in different types of organizational situations needs to be conducted to strengthen the findings in this paper and to develop knowledge of ERP implementation processes further.

Chapter 7: Conclusions

In this research, a set of predicted CSFs extracted from literature and Bangladeshi organizational culture was developed and empirically tested. ERP implementation success index is predicted for various ERP implementation cases. Key findings of this interpretive study were derived from interviewees' perceptions, literature review and secondary data. Statistical results provide supporting evidence on the research hypotheses. An analysis of different perspectives leads to discovering the causes of ERP implementation difficulty in Bangladeshi organizations: lack of end-user involvement, inadequate funding for the project, lack of business process reengineering, improper technical support, lack of effective communication and insufficient training. Data analysis also provides sufficient evidence that insufficient planning time and insufficient research on vendors is significant determinants of ERP systems implementation in Bangladesh. Future studies can expand the sample with more organizations with diverse industries to enhance the empirical study. In addition, it will be interesting to compare the factors affecting ERP systems implementation in Bangladesh to find out their inherent relationship. A comparative study on different vendors such as SAP can be implemented for a further study. In conclusion, this research makes a significant contribution to the ERP system implementation literature by providing empirical study results in Bangladesh. The findings from this research will provide a good managerial direction for prospective administrators at organizations who consider ERP systems implementation in the future.

In summary, ERP is the foundation of present and future success of Electronic Commerce Business to Business. It is probable that the term ERP (never very explicit) will disappear, that the editors too will disappear if they cannot reinvent themselves. But the transformation toward new business paradigms will be achieved by the combination of a rethinking of processes, a performing ERP solution, and the Internet technologies. These elements taken separately do not explain the transformation we are witnessing today. It is the synergy of a combined effort process, ERP and technology, which leads to this transformation. It is in fact the first time that the company has the requisites to really situate the customer as sovereign.

The picture that emerges from the study is that some factors may be important independent of organizations, and some other factors may be organizations dependent. The findings in this study should be of assistance to multinational organizations implementing ERP systems, international consultancy companies working with clients in

different organizations, and organizations with Bangladeshi culture characteristics using foreign methodologies and consultants to help with their ERP systems implementation.

Recommendations for future researchers:

Crucial part of working with the ERP functionality is the ability to streamline operations. Doing business process reengineering and doing minimal customization in software code is very important.

- Broad reengineering should begin before choosing a system. In conjunction with configuration, a large amount of reengineering should take place iteratively to take advantage of improvements from the new system.
- Maintaining scope is just as important for small companies as it is for large organizations. The approach for "rolling out" their implementation is another very important consideration.
- The ERP team should consist of the best people in the organization. It is important that ERP be implemented by organizations themselves.
- Top management needs to publicly and explicitly identify the project as a top priority and managers should legitimize new goals and objectives.
- Consultants should have in-depth knowledge of software and company should be able to manage well these consultants
- The "people element" and training aspect of an ERP implementation is one the most important factors and companies should avoid to insist on assigning a fixed cost or percentage to the training effort.
- Change management is starting at the project phase and continuing throughout the entire life cycle. Enterprise wide culture and structure change, which include people; organization, and culture change, should be managed.
- Planning a sophisticated ERP project should not be taken lightly or with little forethought. Planning should be closely identified with maintaining scope during an implementation.
- Both team members as well as executive management should not be tired after months or years of project.

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Appendix

Questionnaire

I am a student of Department of Industrial & Production Engineering of Bangladesh University of Engineering & Technology, M Engineering (AEM) program. I am assigned to prepare a thesis report on Evaluation of Critical Success factors of Enterprise Resource Planning (ERP) in Bangladesh. My main objective is to find out the vital factors that played pivotal role in successful ERP implementation in Bangladesh. My honorable supervisor is Dr. Nafis Ahmad. The research paper is a comprehensive study on any particular topic leading to degree of M Engineering in Advanced Engineering Management. There is no absolute true or false answer of this questionnaire; your valuable comment regarding the particular issue will be final. I assure you that the information you provide will remain confidential and it will be used only for this research purpose.

Thank you very much for your time and support.

Name to the respondent :----------

Name of the Organization :----------

Designation :----------

Department :----------

Please answer in following rating scale throughout the questionnaire.

Put tick mark on:

5 if you think the factor should be addressed with highest importance or tick on 4 or 3 or 2 or 1 according to your judgment on level of importance.

1. Determining factors that fall under category Top Management Support.

a) ERP team should be cross-functional, mix of consultants and internal staff

5 (Highest Importance)	4	3	2	1 (Lowest Importance)

b) Team should have both business (familiar with business functions and products) and technical knowledge

5 (Highest Importance)	4	3	2	1 (Lowest Importance)

c) The team should be dedicated to ERP implementation

5 (Highest Importance)	4	3	2	1 (Lowest Importance)

d) ERP team should be given compensation and incentives

5 (Highest Importance)	4	3	2	1 (Lowest Importance)

e) Highly support and approval from top management is required during implementation

5 (Highest Importance)	4	3	2	1 (Lowest Importance)

f) Senior management must be committed with its own involvement and allocating valuable resources

5 (Highest Importance)	4	3	2	1 (Lowest Importance)

g) New organizational structure should be established and communicated to employees

5 (Highest Importance)	4	3	2	1 (Lowest Importance)

h) Top management should set policies to establish new system

5 (Highest Importance)	4	3	2	1 (Lowest Importance)

i) In time of conflict between previous and new system managers should be in middle

5 (Highest Importance)	4	3	2	1 (Lowest Importance)

j) Consultants should have in-depth knowledge of software

5 (Highest Importance)	4	3	2	1 (Lowest Importance)

k) Should be involved in different stages of implementation

5 (Highest Importance)	4	3	2	1 (Lowest Importance)

l) Consultants should have multiple skills covering functional, technical, and interpersonal areas

5 (Highest Importance)	4	3	2	1 (Lowest Importance)

m) Company should be able to manage well these consultants

5 (Highest Importance)	4	3	2	1 (Lowest Importance)

2. Factors related to education & training.

a) Users Have Basic IT Knowledge

5 (Highest Importance)	4	3	2	1 (Lowest Importance)

b) Heavy investment in training and re-skilling of developers in software design and methodology

5 (Highest Importance)	4	3	2	1 (Lowest Importance)

c) A support organization meets users' needs after installation

5 (Highest Importance)	4	3	2	1 (Lowest Importance)

d) Employees must be trained on the new system in order to use it to continue day-to-day operations

5 (Highest Importance)	4	3	2	1 (Lowest Importance)

3. Factors of the suitability of software and hardware and internal readiness.

a) Organization and people should be ready for changes

5 (Highest Importance)	4	3	2	1 (Lowest Importance)

b) A complex software package, ERP systems integrate all information processing to support business.

5 (Highest Importance)	4	3	2	1 (Lowest Importance)

c) Training, re-skilling and professional development of the IT workforce

5 (Highest Importance)	4	3	2	1 (Lowest Importance)

4. Worked with functionality/maintained scope.

a) Doing BPR and aligning the business processes with software

5 (Highest Importance)	4	3	2	1 (Lowest Importance)

b) Doing minimal customization to the software

5 (Highest Importance)	4	3	2	1 (Lowest Importance)

c) Considering vendor support and the number of previous implementations for choosing the package

5 (Highest Importance)	4	3	2	1 (Lowest Importance)

d) Maintaining the initial scope

5 (Highest Importance)	4	3	2	1 (Lowest Importance)

e) Choosing best way of implementation on individual basis

5 (Highest Importance)	4	3	2	1 (Lowest Importance)

5. Factors of Business Process Reengineering.

Business process re-engineering (BPR) is defined by Hammer and Champy (2001) as "the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in, contemporary measures of performance such as cost, quality, service and speed". BPR analyzes the process of an organization's business in order to identify the best way of doing things.

a) Employee resistance to change

5 (Highest Importance)	4	3	2	1 (Lowest Importance)

b) Inadequate attention to employee concerns.

5 (Highest Importance)	4	3	2	1 (Lowest Importance)

c) Inadequate and inappropriate staffing

5 (Highest Importance)	4	3	2	1 (Lowest Importance)

c) Inadequate developer and user tools

5 (Highest Importance)	4	3	2	1 (Lowest Importance)

e) Mismatch of strategies used and goals.

5 (Highest Importance)	4	3	2	1 (Lowest Importance)

d) Failure in leadership commitment

5 (Highest Importance)	4	3	2	1 (Lowest Importance)

6. Adequate Testing.

a) Vigorous and sophisticated software testing before go live date is essential

5 (Highest Importance)	4	3	2	1 (Lowest Importance)

b) Troubleshooting errors is

5 (Highest Importance)	4	3	2	1 (Lowest Importance)

c) There should be a plan for migrating and cleaning up data

5 (Highest Importance)	4	3	2	1 (Lowest Importance)

Thanks a lot to participate in this survey.