DIVISION OF COMPUTER SCIENCE

BP&ISR: An Analysis of Factors In The Sri Lankan Context

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Abstract

Research and case studies have shown that there are a number of practical issues that need to be satisfied for successful business process reengineering (BPR) (Weerakkody, Tagg & Bennett 1995, Willcocks 1995, Lombroso & Boyle 1995, Heracleous 1995, and Chodari, Haynes & Ridgway 1995). The success of business process and information systems reengineering (BP&ISR) would significantly increase if efforts were made to identify factors which may influence the implementation of BP&ISR prior to the actual BPR work.

This report uses a case study approach to analyse the business and IS/IT environment in five Sri Lankan organisations and identify factors which may influence the successful implementation of BP&ISR in Sri Lanka. While some of the factors and issues may be distinctive to the case study organisations, many could apply to most large and medium size organisations in Sri Lanka.

Although each case study organisation was unique and represented a different sector in the Sri Lankan business environment, the day to day work and the IS/IT procedures were very similar in these organisations. The successful implementation of BP&ISR will largely depend on a number of cultural, political, organisational, management, employee, and business and IS/IT factors. Therefore a BP&ISR approach will need to be tailored before it is used in the Sri Lankan business environment. The business and IS/IT environment, particularly in the state organisations is relatively backward in comparison to organisations in the UK. The work environment in organisations is functionally oriented and surrounded by functional (departmental) barriers. In the IS/IT field, most organisations use or have access to the latest hardware, but lack proper information systems to support their business requirements due to primarily the lack of expertise in the area of business systems analysis and design.

CONTENTS

Introduction

Introduction

Business Process Reengineering (BPR) is considered by many as one of the most innovative ideas to have emerged in the 1990's. It is a concept which has generated considerable interest among various levels of the business community and academics alike, and has become a centre of debate at a number of business and academic conferences in recent times. The IS/IT community in particular has embraced the concept and many consider BPR as the saviour for ailing organisations, just as IT was considered as the competitive edge in the 80's.

BPR is formally defined 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" (Hammer & Champy 1993, pp 32). However, authors, researchers and practitioners have their own interpretations for BPR to suit their respective business and research environments and needs. Demay & King (1996) state that BPR is reported, discussed and researched under the various rubrics of business process reengineering, business process redesign, business process innovation or business process transformation. Similarly, Harrington (1991) uses the term 'business process improvement' in preference to business process reengineering.

In the present competitive market many organisations need to reengineer their business processes and information systems repeatedly to meet the changing nature of modern business (Hammer & Champy 1993, Harrington 1991, Davenport 1993). BPR and its benefits is now recognised in developing countries in the South Asian region. In Sri Lanka a number of large multinational companies and some state owned organisations have already embarked on different quality improvement programs, such as total quality management (TQM) and 'reorganisation'.

As in industrialised countries, many large and medium sized organisations in Sri Lanka rely on IS/IT to run their day to day business activities and to some extent achieve their goals and objectives. The reliability, efficiency, productivity and cost effectiveness of these business processes depends largely on the information systems. Thus, any BPR initiative will involve to a large extent reengineering the information systems that support the core business processes. However, it is recognised that incorporating BPR changes into the business systems analysis and design (BSAD) life cycle is a difficult task (Childe & Maull 1994). In the Sri Lankan context of limited resources and ailing legacy systems, conducting an integrated business process and information systems reengineering project will be an even more difficult and complicated task.

An increasing number of organisations in the west have used BPR to improve their businesses and gain competitive advantage. However, the number of BPR projects that are falling short of initial expectations are also a cause for concern (Willcocks 1995). Some researchers attribute this to organisations overlooking factors such as organisation culture and structure, management vision and goals, business processes and systems, and human resource and skills related issues when carrying out BPR related work. Case studies by Masri, Biema & Kaufman (1995), McCarthy, Chodari, Haynes & Ridgway (1995), Heracleous (1995), and Lombroso & Boyle (1995) in both the UK and USA have revealed the importance of analysing similar factors.

This report describes five case studies undertaken in Sri Lanka from November 1995 to January 1996. The case studies concerned were conducted in five different organisations in Colombo, the business capital of Sri Lanka. The objective of the case studies was three fold. The first objective was to study the organisations in order to get a good understanding of the business, work and IS/IT environments. The second objective was to examine any BPR or related projects in the organisations in order to analyse the business, social, cultural, political and human impact of such projects, and to evaluate the methods and approach used in these projects. The third and final objective was to identify factors which may influence the implementation of business process and information systems reengineering (BP&ISR) in Sri Lanka. A case study approach was used in order to get a good understanding of the work environment in the organisations and to obtain the views of employees by spending adequate time in each case study organisation.

The case study research work was carried out by visiting the respective organisations and spending approximately eight hours a week with each organisation over a period of two and a half months. During these visits, in-depth interviews were conducted with members of staff and information on a number of issues were collected. These covered the business and IS/IT scene, work environment, management structure, work procedures and practices, general problems and environmental issues. Apart from the information gathered from the case study organisations, a wider understanding was gained of the general business and IS/IT environment in Sri Lanka. This was possible as a result of interviews with a number of highly experienced management and IS/IT consultants, leading academics and personal contacts in the business and IS/IT field. Names of organisations and individuals concerned have not been disclosed in this report and have been identified only as codes.

The next section in this report outlines the research method used for the case studies. Section 2, 3 and 4 describes the Sri Lankan business and IS/IT environment in general and in the context of the case study organisations. This is followed by an analysis of BPR related initiatives and the scope for BP&ISR in the Sri Lankan environment, in section 5. Section 6 identifies the factors influencing the implementation of BP&ISR and the report concludes by analysing the main findings of the case studies.

1. The Research Method

This section of the report describes the research method used to compile the information containing in this report. It also explains why case studies and interviews were used for data collection and understanding of the research area, and describes the process that was followed in this context.

Initial contact was made with approximately 20 leading organisations in Sri Lanka seeking permission to carry out case study research work on BP&ISR. After evaluating the replies from the respective organisations and subsequent communication with the more positive organisations, the five most suitable organisations were selected for case studies. In order to maintain confidentiality names of organisations are not revealed in this report and are referred to only as OrgSFL, OrgSIM, OrgSCM, OrgPML and OrgMML. Although a number of organisations agreed to provide facilities for BP&ISR related research, both at a formal and informal level (i.e. written and personal contacts), due to time constraints it was decided to

restrict the number of organisations to five. Short listing of the organisations was done on the basis of the organisations impact on the Sri Lankan economy, its business field, ownership status (i.e. state owned, multinational, private Ltd.), size and history. Personal contacts in some of the organisations also played an important part in this decision making process. One organisation was selected solely on the merit of its business background, i.e. being an educational and consultancy based organisation. This provided an opportunity to interview eight highly experienced consultants and obtain information on a wide range of issues in the context of many state and mercantile organisations in Sri Lanka.   A number of personal contacts were also consulted for research, including one consultant involved in BP&ISR related work, a leading academic, and personal friends in business and IS/IT industry.

The initial case study period in Sri Lanka was from November 1995 to January 1996. After proposing tentative dates for the case studies to the selected organisations and receiving letters of confirmation from them, a final plan was drawn up for the visit to Sri Lanka taking into account the division of time between the organisations, and the levels and roles of the employees to be interviewed. This also included the priority areas to cover during the case study research and a list of possible questions to be asked from the interviewees.

While in Sri Lanka initial contact was made with all five organisations by telephone and appointments made for a formal meeting with a representative of the respective organisation, usually a senior manager representing the IS/IT function. The purpose of this meeting was for introducing each other and to explain the requirements and expectations of both parties (i.e. the author and the organisation). At this stage a number of appropriate people were identified for interviews covering priority areas such as IS/IT and customer satisfaction. It was decided to identify more people as and when the case studies progressed and the interviewer became more familiar with the employees and the business environment in the organisation. A semi-structured interview technique was used to conduct the interviews. This was influenced by the list of questions drawn up in the work plan and also the culture, work environment, and employee attitude in the organisation. The information gathered from the interviews are documented throughout this report and the source (interviewees) in the five organisations are referenced as SFLxxxnn, SIMxxxnn, SCMxxxnn, PMLxxxnn and MMLxxxnn respectively. (see appendix A for details). Although many employees identified similar issues only the key interviewees are referenced in this report.

The atmosphere of the interviews varied depending on the interviewee. Usually it was a friendly, frank and informal atmosphere when interviewing the operational level managers, while it was the opposite with the middle and strategic level managers who appeared to be more protective of the organisation's image. In contrast, the non-executive clerical staff were over protective of themselves and defensive when answering questions. However, the overall objectives of the case studies were successful and sufficient information was gathered through the combination of interviews, observation and document reviews.

1.1 Interview Method

A semi-structured interview method was used when conducting the interviews. Two sets of separate, but formal questions were used as guidelines for interviewing IS/IT and non IS/IT employees. Slight adjustments were made depending on the interviewees job specification, roles and responsibilities. During the interviews data was recorded using either a tape recorder

or written notes depending on the interviewees preference. The interview results were then transferred to a case study logbook in which factors which may influence the implementation of BP&ISR were highlighted and a chain of evidence identified. On average each interview lasted anything between 45 minutes to 2 hours. Where possible requests were also made for documented information, and a number of documents such as company profiles and annual reports, organisation and business unit charts, mission and vision statements and business promotion brochures etc., were collected from the case study organisations.

1.2 Information, Proof and Validity

The factors and issues identified during the investigation were highlighted in the log book. These factors have been grouped into seventeen different areas as shown in table 1 in appendix A(1), and are discussed in section six of this report. Table 1 highlights the relationship between the various factors identified during the investigation against the source identifying it. It shows how particular issues are raised by more than one source, thus, arguably making these issues cause for more concern than the others. Some confidential information gathered during the case studies have not been disclosed in this report as agreed with the respective individuals in the different organisations. Case study organisations and information sources have been given code numbers in order to protect the identity of the respective organisations and interviewees and maintain confidentiality. The identity of these code numbers are known only by the author. This has been done out of mutual respect for those organisations and employees who have offered their support for this research. The source codes have been allocated taking into account the type of organisation, interviewees position (i.e. management hierarchy) and the type of role or designation of the interviewee. This is explained in appendix A(2) using tables 2, 3 and 4. The types (designations) of the different employees interviewed is shown in appendix A(3).

2. The Sri Lankan Business Environment

Sri Lanka is considered as one of the faster developing countries in South Asia. The country is geographically situated in the Indian sub continent with India as its closest neighbour. Sri Lanka has a land area of 65,610 square kilometres and its business capital is Colombo. United Nations statistics confirm that Sri Lanka has by far the highest level of education and human development in South Asia. The population is 17.6 million people who's literacy rate of 89.1 % is among the highest in the world (UNDP 1994). According to government surveys Sri Lanka has one of the best educated and most productive resources of skilled and semi-skilled labour in the region (OrgSIM 1995). There are over one thousand technical colleges in the country and the students graduating from these colleges are trained to meet the needs of different sectors in industry. There are also a number of universities offering undergraduate and postgraduate level degree courses in science, engineering, medicine, law, agriculture, commerce and management studies (OrgSIM 1995).

Sri Lanka is renowned to many as being an agriculturally rich country with tea, rubber and coconut as the most popular commodities. In the past decade Sri Lanka's economic progress has been quite spectacular. Many experts believe that this is a direct result of the shift from an agriculture based economy to an industrial one, as well as the policy of successive governments to encourage foreign participation in the economy. Since the mid 80's and the introduction of a free-market economy and tax incentives, the business environment has expanded hugely, and

now includes the booming textile (garment) industry, engineering, manufacturing and a number of other export oriented industries. More recently Sri Lanka has been attracting a large number of foreign investors in the form of multinational companies and joint ventures. The electronic and the information technology industries are two of the faster growing sectors of the economy (OrgSIM 1995). Sri Lanka also has several outstanding software companies which have gained international recognition with some of the software being exported world-wide.

The IT environment has grown to an extent that would have been unthinkable in the 80's, and some of the international software giants like EDS have already set up regional offices in Sri Lanka. The business computing community is experienced, but lack training and skills in the use of methodologies to carry out quality BPR or BSAD projects to match their western counterparts. Although some private sector organisations have taken the initiative to improve their businesses, many organisations, particularly the state owned ones have to radically restructure their business processes and information systems if they are to be competitive in global terms, and more importantly to compete with the other newly industrialised countries (NIC) in the South East Asian region. In this context, many large and medium size organisations have begun to turn towards internationally accepted application packages as solutions to their business systems problems. During the case studies many organisations expressed a preference to install application packages, and to reengineer their business processes to suit the application package which is already tried and tested. Yet, the debate continues whether these packages are suitable for the local and specialised business environments, even though they may have been designed for most common business processes irrespective of location (MMLMIT01, SFLOIT03, PMLOIT01). However, the business environment in most large and medium size organisations is predominantly IS/IT driven, and many agree that IS/IT has become somewhat of a status symbol for the business community in Sri Lanka.

3. The Case Study Environment

This section explains the general background of the organisations selected for the case studies. It describes the business, information systems, technology, management structure and work environment in the organisations and highlights the similarities between the organisations in the context of the above issues.

The organisations selected covered a wide spectrum of the business and IS/IT environment in Sri Lanka. Of the five case study organisations three are state owned, one private limited and one multinational. All five of the organisations are market leaders in their respective business fields and could considered to be representative of most Sri Lankan organisations and the general business and work environment. Four of the organisations are well established and between them have over 300 years business experience. The fifth organisation although relatively new, is also well established. Four of the five organisations are engaged in business activities which are distinct from each other while two are relatively similar. In this context, it is fair to propose that the organisations selected for the case studies closely represents the general business and IS/IT environment in Sri Lankan organisations.

3.1 The Business & Work Environment

It was discovered during the case studies, and agreed by management and employees in the respective organisations that their business and work environment needs to be improved.

Interviews revealed that management was keen to improve and change, but were handicapped by a lack of time or qualified/skilled human resources in the related areas of IS/IT and BPR, and therefore reluctant to risk the investment of large sums of money and resources. The concept of BPR and process oriented work was unfamiliar to most organisations whose management / employees barely understood what a business process is, except for one company engaged in TQM work. This organisation was planning to introduce a processes oriented work environment under the umbrella of TQM.

• Business Environment

In the Sri Lankan context the business environment in majority of the case study organisations can be considered as highly profitable, and the work environment as prestigious and rewarding. However, the business environment in three of the five organisations concerned, lack any competition in their respective markets, which discourages them from making any changes or improvements to their businesses. In contrast, the other two organisations, OrgSFL and OrgSCM are in relatively competitive markets. In particular OrgSFL has been forced to face fierce competition from foreign multinationals. This competitive environment is expected to intensify with time due to the booming open economic conditions in Sri Lanka. In this context, a number of organisations have been forced to react with various reorganisation, and business and IS/IT improvement projects. For example, some organisations were involved in total quality management (TQM), ISO 9000 and organisation restructuring and reorganisation projects. Yet, interviews at OrgSFL, OrgMML and OrgPML revealed that these improvement projects are inadequate to outperform the competition and attract new customers, or the ones already lost to competition. Although these projects may not be as effective as business process reengineering, it was encouraging to see at least a few organisations embrace the concepts of BP&ISR.

• Work Environment

The organisation and management structure in all the case study organisations were hierarchical and in some cases plagued with red tape, bureaucracy, formalities, rules and regulations. Figure 1 is a model organisation structure which outlines how the management / employee structure is broken down in the organisations. This model is typical of all the case study organisations and may also apply to most of the large and medium size organisations in Sri Lanka (OrgSFL, OrgSCM, OrgSIM, OrgMML & OrgPML organisation charts and interview results). The only minor differences if any are in the designation or title given to a particular role, however the levels of management and their roles are similar in most organisations. The top (strategic) level in figure 1 hardly interacts with operational level employees in an official capacity, except in exceptional circumstances, such as in a time of crisis or celebration. For example, particularly in a state owned organisation when an operational level employee wants to approach the chairman or a director, he generally does so through his manager who in turn has to go through his superior. The bureaucracy and red tape in most of the state organisations is such that it has a huge negative impact on the business, it restricts the flexibility, efficiency and output of the business. It also restrains the employees from taking decisions, discourages them from giving total commitment and fails to explore the true capability of the employees and the business processes. In contrast, the mercantile (private and multinational) organisations have less red tape and the working environment permits more flexibility to encourage quality, profitability and customer satisfaction.

Interviews revealed that the success, failure and in general the business and work environment in all five organisations is influenced by culture, politics, bureaucracies, employee attitude, management style and management/organisation structures. It was evident that many of these aspects are common to all the case study organisations. These factors and the impact they have on the organisations is explained in section six of this report.
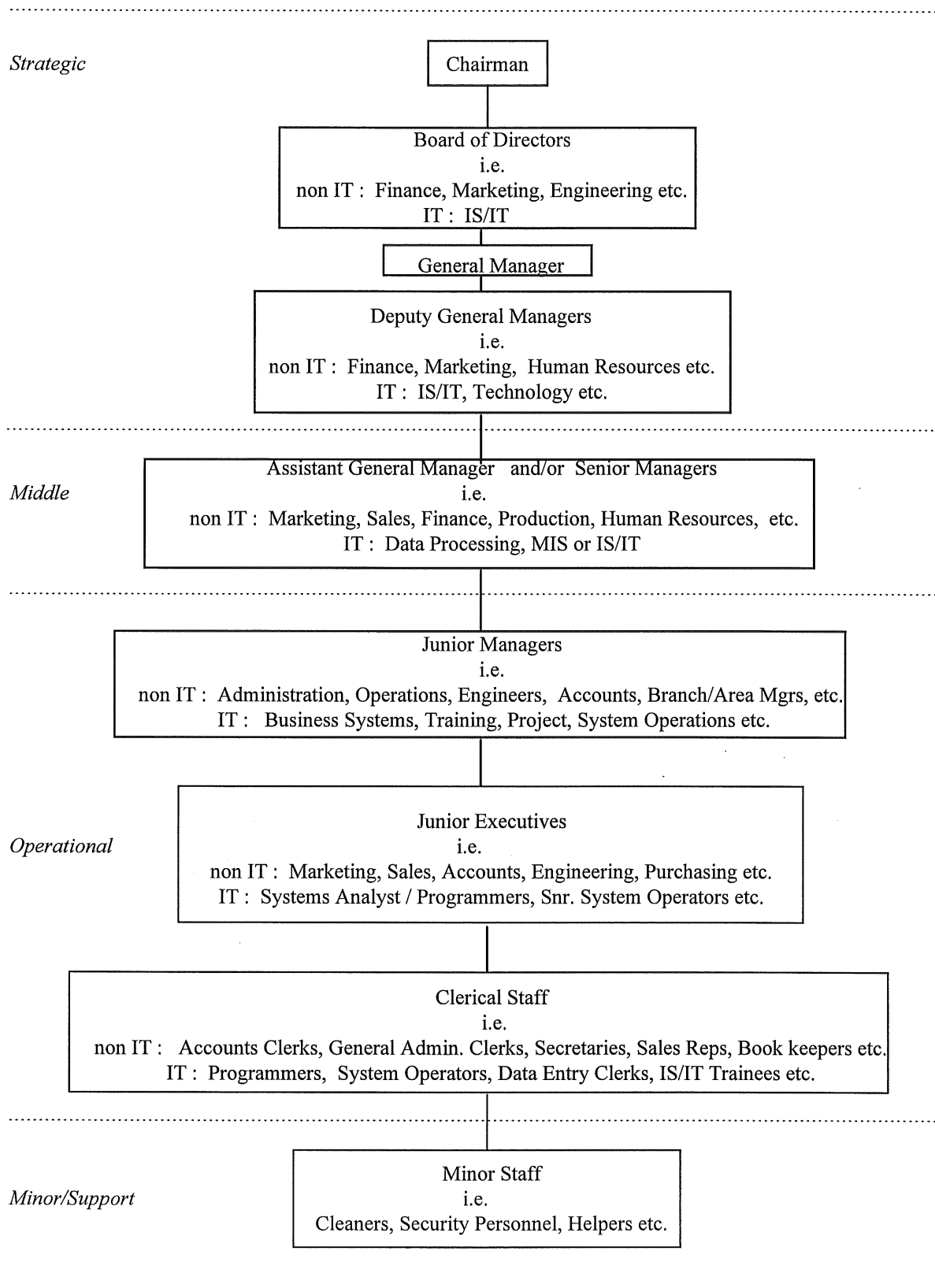
3.2 The IS/IT Environment

After having studied the IS/IT environment and interviewed a number of employees in the case study organisations, and having had informal discussions with a number of professionals in other organisations, the business computing environment in the five case study organisations can be evaluated as follows: In comparison to the general IS/IT environment in Sri Lanka, business computing at OrgSFL, OrgSCM and OrgMML can be classified as 'good', and OrgSIM and OrgPML as 'poor' (i.e. having a lower standard of technology and systems). However, it appeared that in most organisations the available technology (hardware) was under utilised due to the poor standard of its information systems. In this environment it was common for both the users and the IS/IT people to blame the hardware when the systems failed to meet user requirements. Evidence suggests that the information systems environment in all the case study organisations were not up to user / management expectations and clearly had the potential for more improvements. Most systems appeared to be developed hastily and the organisations had the habit of adding new modules and programs on top of the core system on a regular basis. This practice has left nearly all the in-house developed software in the organisations with problems, which may explain why nearly half of the total information systems in these companies are in a mess and cause concern to management (MMLMIT01, SFLSIT01, SFLMIT02, SIMSDR01, SIMMIT05, PMLOIT01).

With the exception of one organisation, the others still relied to some extent on centralised computing and batch data processing. IT management was reluctant to delegate IS/IT related tasks, for instance data entry and on-line updating of files etc., to the user departments. The most common excuses given by the IS/IT people regarding this problem were - "the users make too many mistakes" (SFLMIT02), and "we'd rather do it by ourselves, when we give too much of authority to the users they demand for miracles, for instance they want the impossible to happen when you press the enter key or a function key" (SIMSDR01). However, it was learnt during the case studies that these user reactions were mostly due to poor quality information systems which either had design problems, functional problems, poor user interfaces, missing controls and checks, and in the worse scenarios the system not meeting user requirements. In most of these cases it is fare to state that the systems analysts concerned have failed to design proper systems.

The skill levels of the IS/IT people varied between the organisations. While the state owned organisations preferred and were obliged to recruit local university graduates, the mercantile organisations opt for professionally qualified experienced people or foreign graduates. Interview results suggest that the latter are more exposed to new business concepts, IS/IT techniques and are more open minded and flexible. It was also evident that IS/IT was more efficiently utilised in the mercantile sector. However, as a whole, although IS/IT tends to dominate the business and work environment in most of these organisations, sadly it appeared that the existing IS/IT resources (i.e. hardware, software and people) were largely under-utilised.

Figure 1.   **A Model Organisation Chart**

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Strategic

| Chairman |

| Board of Directors |
| i.e. |
| non IT : Finance, Marketing, Engineering etc. |
| IT : IS/IT |

| General Manager |

| Deputy General Managers |
| i.e. |
| non IT : Finance, Marketing, Human Resources etc. |
| IT : IS/IT, Technology etc. |

....

Middle

| Assistant General Manager   and/or Senior Managers |
| i.e. |
| non IT : Marketing, Sales, Finance, Production, Human Resources, etc. |
| IT : Data Processing, MIS or IS/IT |

....

| Junior Managers |
| i.e. |
| non IT : Administration, Operations, Engineers, Accounts, Branch/Area Mgrs, etc. |
| IT :   Business Systems, Training, Project, System Operations etc. |

Operational

| Junior Executives |
| i.e. |
| non IT : Marketing, Sales, Accounts, Engineering, Purchasing etc. |
| IT : Systems Analyst / Programmers, Snr. System Operators etc. |

| Clerical Staff |
| i.e. |
| non IT :   Accounts Clerks, General Admin. Clerks, Secretaries, Sales Reps, Book keepers etc. |
| IT : Programmers, System Operators, Data Entry Clerks, IS/IT Trainees etc. |

....

Minor/Support

| Minor Staff |
| i.e. |
| Cleaners, Security Personnel, Helpers etc. |

....

NOTE: IS/IT is represented at board level only at OrgSCM and OrgSIM.

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- **The Software Development Procedure**

Case studies revealed that none of the organisations conducted formal BSAD exercises or used any of the established BSAD methodologies. In some of the worse cases the systems analyst were not even conversant with the term 'business systems analysis and design (BSAD)'. In this context, it was difficult to see that there was any IS related activity in these organisations that would merit being classified as proper BSAD. System development is in general a procedure or process which is centred around programming rather than BSAD. OrgSFL, OrgSIM, OrgMML and OrgPML use similar but slightly different procedures for systems and software development which are mostly focused on writing programs. (see sections 4.1, 4.2, 4.4 & 4.5) The dangers of this practice are highlighted time and again by a number of authors. Downs, Clare & Coe (1992), Checkland & Scholes (1990) and Jayaratna (1994) all stress the importance of using methodologies for business systems understanding, analysis and design. Other authors such as Daniels & Yeates (1988) points out the importance of basis systems analysis and design. West (1996) states that modern systems development and process improvement is more about understanding the problem and how the problem will be tackled, before starting on design and development. However, IS/IT employees in one organisation were adamant that using a specific methodology for systems design would restrict their flexibility and would prevent them from making revolutionary changes. Yet, these employees agreed that a methodology would help to make them more disciplined and guide them in the correct direction.

Out of the IS people who's designations were either *systems analyst, systems analyst / programmer* or *analyst programmer*, who were interviewed, none had any formal training or practical experience of using any recognised BSAD methodology. Although many knew what SSADM was, very few knew of rapid application development (RAD), information engineering (IE), soft systems methodology (SSM) or object orientation (OO). This showed that the systems analyst in these organisations may lack the methodological training and expertise needed to analyse and design an appropriate IS solution to a business problem. It appears that, in some organisations the systems analysts were simply automating manual systems. Here, the analysts version of the solution may not always be accurate, particularly when developing systems without the aid of a formal method to analyse the problem and design the business system. This practice encourages computerisation of completely inefficient business processes and activities rather than finding business system solutions through computerisation. Hammer (1993), would argue that automating an inefficient process not only ensures that we can do a bad job every time, but we can do it faster with less effort than before.

The above scenario is often made worse by a 'self imposed' high pressure work environment, lack of management awareness and knowledge of the benefits of BSAD, and lack of skilled systems analysts in most organisations. The self imposed pressure of work is often brought about through lack of proper business processes or procedures, poor organising, and lack of standards, guidelines and methodologies.

4. The Case Study Organisations

This section describes the nature of the five organisations selected for the case studies. For each organisation, it explains in detail the business, work and the IS/IT environments. The IS/IT

organisation structure and the different software development practices and procedures are also outlined in this section.

4.1 OrgSFL

In its business sector, OrgSFL is the largest in terms of size and business volume with the widest national and international business operations. OrgSFL's business operation covers all of Sri Lanka through provincial offices and a branch network of over 300 offices, and controls approximately one third of the national market. OrgSFL has also diversified it's business activities resulting in five associate and five subsidiary companies and is expected to grow further. In this context its international business operations are also expanding very rapidly with branches in Europe, USA and South Asia. OrgSFL's clients vary from large corporate customers - usually business enterprises and leading businessman, through middle level customers who are the general middle class public, to small customers, for instance, a farmer in a more remote part of the country. In addition, OrgSFL makes a notable contribution to the Sri Lankan economy by providing assistance to all forms of organisations, particularly the export earning industrial sector in the country. In this capacity OrgSFL's mission and goals are centred around providing a wide range of domestic and international services and products, contributing to the rapid growth and development of the country, and finally striving for growth, profitability, professionalism and excellence (OrgSFL Annual Report, 1994/95).

The organisation structure in keeping with Sri Lankan traditions is very hierarchical with a very high degree of bureaucracy and red tape. Of the five case study organisations, OrgSFL appeared to have the highest level of bureaucracy, red tape and formalities. The basic (core) organisation structure at OrgSFL is identical to the model outlined in figure 1. Similarly the IS/IT organisation structure outlined in figure 2 is a traditional data processing departmental structure with a few changes to suit the modern business computing environment.

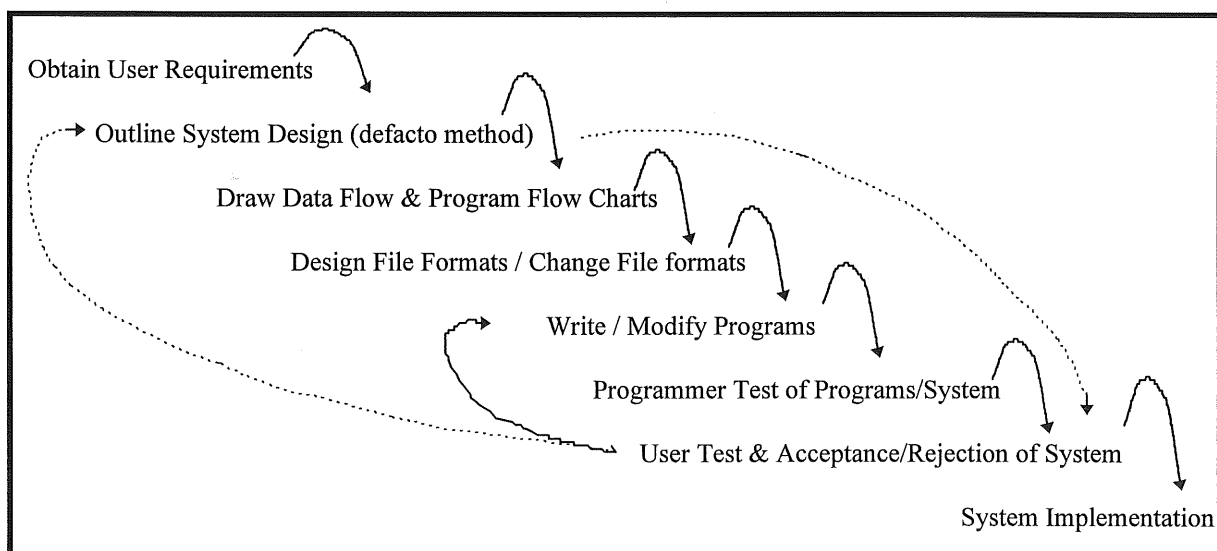**Figure 2.**   **OrgSFL IS/IT Organisation Structure**
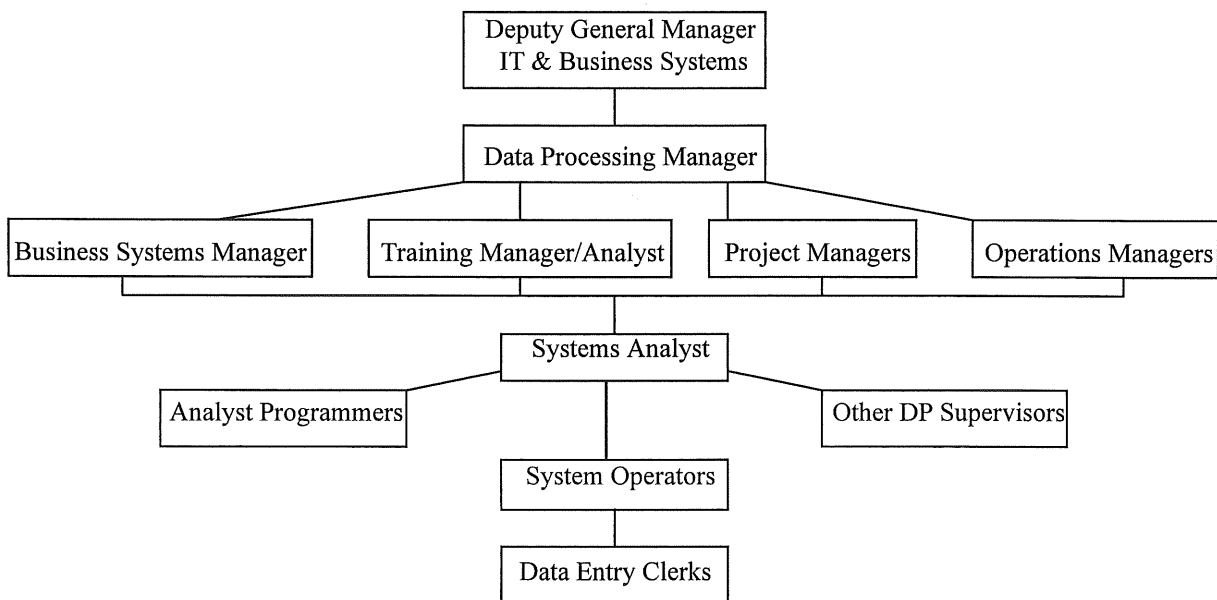
- **IS/IT Environment**

At the time of the case studies majority of OrgSFL's operations were computerised and the IS/IT environment was supported by IBM mainframes, minis and UNIX based computer systems. Most of the software was being developed in-house using a *'defacto'* software development method and life cycle as shown in figure 3. The analyst obtains the user requirements (in figure 3) through discussions with key representatives from user departments. Data flow diagrams (DFD's) are used mainly to understand modifications to file structures and programs from a programming viewpoint and not from a business systems analysis and design perspective. Some systems analyst claimed that an outline system design was done (showing system inputs and outputs) before the actual software development, yet some claimed otherwise. A mixture of third and fourth generation languages were being used for programming, for instance COBOL, CICS, PL1, RPG, BASIC, DBASE and C language were some of the most widely used ones. There were well over 50 systems analysts, analyst programmers and programmers working in the main information technology division apart from a number of others performing IS/IT related work in user departments. The overall computing environment covered approximately ten district offices and six other small offices, which were directly linked to the head office computer systems via a wide area network (WAN).

According to OrgSFL's chairman, the organisation must rise to the challenges presented by a world in rapid evolution in an age of fast changing technology. In keeping with this goal the board of management has proposed a 3 year corporate plan for IS/IT improvement. This includes the introduction of a number of internationally accepted application systems to computerise a large number of district offices in 9 different provinces. At the time of the case studies parts of the proposed IS environment was being developed by a software vendor. When completed the IS environment will be supported by a combination of stand alone PC's in small district offices linked to the head office mainframe via a central hub in each province.

Figure 3.   OrgSFL IS Development Procedure

Obtain User Requirements

Outline System Design (defacto method)

Draw Data Flow & Program Flow Charts

Design File Formats / Change File formats

Write / Modify Programs

Programmer Test of Programs/System

User Test & Acceptance/Rejection of System

System Implementation

Note: Activities in Figure 3 are focused more on individual program requirements and development rather than BSAD.

4.2 OrgSIM

OrgSIM is the only statutory institute of its type charged with the responsibility of promoting and facilitating its business sector in Sri Lanka. The organisation has facilitated over 3000 projects since its inception and currently employs over a quarter of a million people (OrgSIM 1995). OrgSIM acts as a one-stop service centre to assist its clients and its principle task is to promote its market through business promotion conventions in western countries. These conventions are organised in collaboration with the respective foreign missions and they enable representatives of foreign organisations to meet with corporate decision makers and a variety of other officials from Sri Lanka. This sets the scene for discussions concerning new opportunities for business. OrgSIM is responsible for pursuing such opportunities and providing a host of other follow up services to their prospective clients.

Once a prospective client decides to its services, OrgSIM is responsible for providing necessary information, guidelines and support to the client. OrgSIM is also charged with the responsibility of appraising new clients, signing agreements, providing fixed assets, skilled labour, and monitoring the progress of on going projects.

The organisation chart outlined in figure 1 closely represents the organisation structure of OrgSIM. In contrast the IS/IT department organisation structure although hierarchical, has a very much different layout to the rest of the case study organisations as shown in figure 4.

• IS/IT Environment

The computing department at OrgSIM is known as the '*information systems division*' and is managed by a director at board level. During the case studies the organisation was in the process of improving (i.e. upgrading) its overall business computing environment. The hardware included a PC network of mainly IBM compatible 486 machines, a few host file servers and a WANG VS mini computer. Most of the computing operations were executed centrally in the information systems department using traditional batch processing methods. However attempts were being made to decentralise some of these operations which were being met with fierce resistance by the users. The IS environment was lacking proper plans and there is room for huge improvements. Although the organisation has been using IT for over ten years the initiative to prepare a proper IS/IT strategic plan was taken only in late 1995.

The IS environment includes standard applications, payroll, inventory control, accounting and six other business specific systems. The system development staff followed a software development procedure similar to 'prototyping' as explained in figure 5, and did not follow any formal BSAD method or system development life cycle. The data modelling described in figure 5 was perceived from a programming view point rather than in the overall context of BSAD. Often the data modelling was limited to individual programs and the overall entity relationship and entity life history models of the business system were ignored. PC based fourth generation languages such as DBASE and FOXPRO are being used for programming. However, plans are underway to start using structured query language (SQL) with the introduction of a new oracle software package.

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Figure 4.   **OrgSIM IS/IT Organisation Structure**

Director IS

Manager Operations   Manager IS   Manager Statistics

Analyst Programmers (AM)   Assistant Manager (AM)

Executive Assistant   Programmers (EA)   Executive Assistant
(EA)

Operators

Figure 5.   **OrgSIM IS Development Process**

Obtain program / system
requirements from users
(changes + new systems)

program / system
development or modification

build a data model &
entity relationship model

obtain user agreement
(verbal)
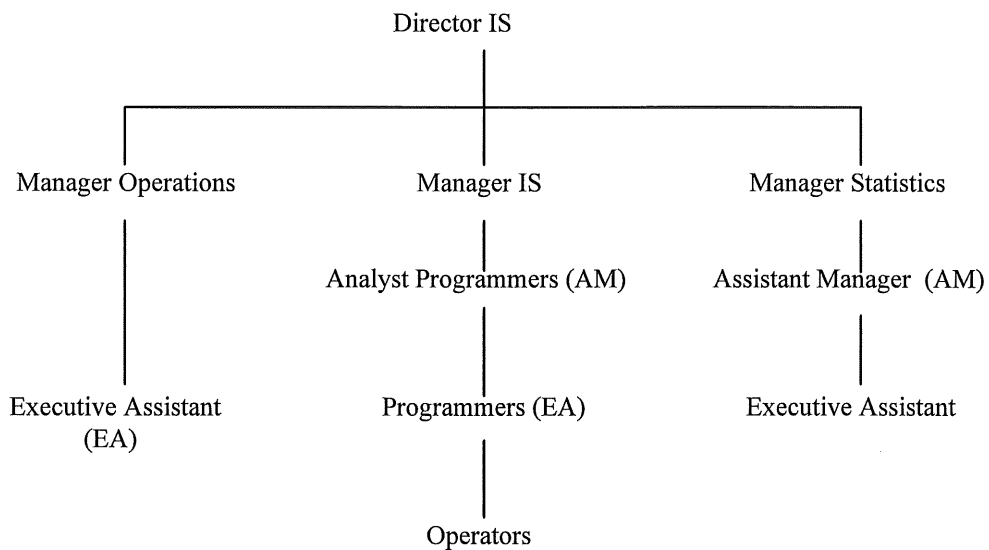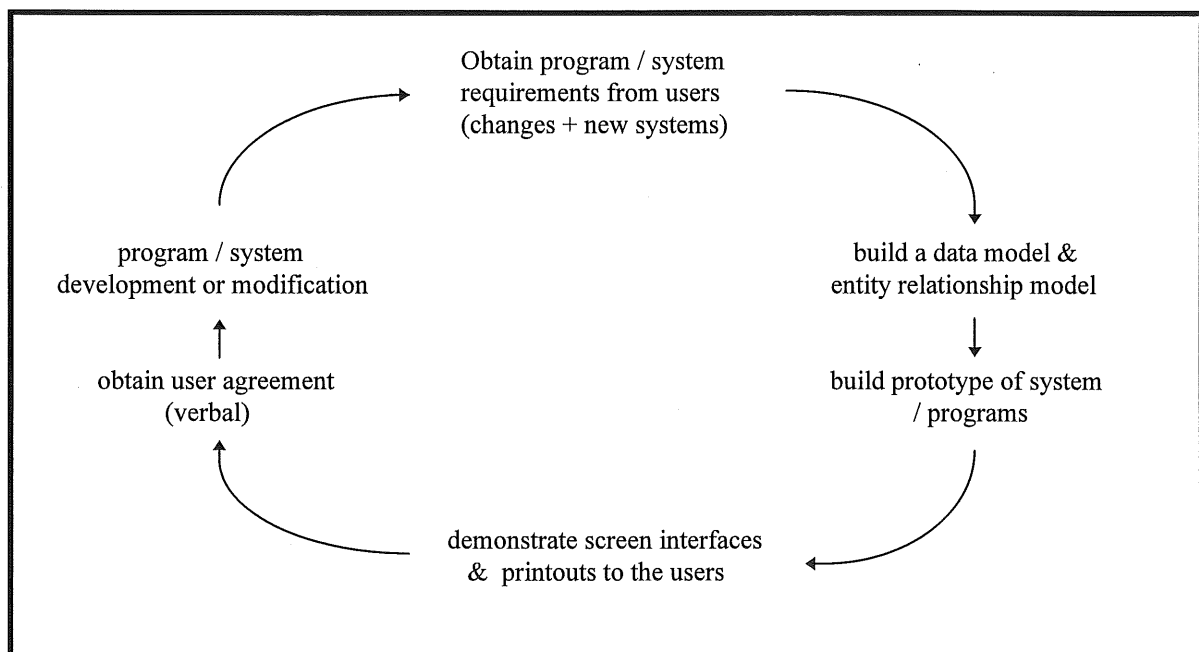
build prototype of system
/ programs

demonstrate screen interfaces
& printouts to the users

Note: The activities in figure 5, including data modelling revolves more around program development rather than BSAD.

4.3 OrgSCM

OrgSCM is one of the leading and oldest establishments in its field of business and is easily the most prestigious in its business sector. The main activities in the organisation revolve around information technology, management consultancy, training and education. Over half of OrgSCM's activities are being performed in teams or groups and nearly two thirds of it involved IS/IT and activities that are closely related to Business Process Reengineering (SCMMCN02). OrgSCM also contributes immensely towards increasing industry awareness concerning new developments in the field of IT and business, and the advancement of IS/IT knowledge among various levels of management and professionals in Sri Lanka. Many of the strategic and middle management level employees at OrgSCM are highly skilled and experienced professionals in their field. The experience of some of the individuals in comparison to professionals in other organisations in the same trade, was of a very much wider spectrum which stood out from the rest.

As shown in figure 1 the organisation structure was similar to rest of the case study organisations.

- **IS/IT Environment**

As information technology and systems are a major part of OrgSCM's business, its IS/IT environment is generally up to date in both hardware, software and IS skills in comparison to similar organisations in the country. The computing environment consists of a range of hardware including mainframes, minis, UNIX based systems and PC's, while some of the most commonly used software included COBOL, BASIC, RPG, SQL, PASCAL, DBASE, and C language. Due to IS/IT dominating its business environment, OrgSCM's technical infrastructure changes frequently with the introduction of new computer technology, application systems and programming languages. However the time taken for OrgSCM to acquire their new technologies from the time of actual market availability was depressingly long, particularly for a leading organisation of its nature.

4.4 OrgPML

OrgPML is a manufacturing, export and distribution based company and is one of the leading organisations in its market. The Colombo stock exchange in Sri Lanka ranks OrgPML's parent company (hereafter referred to as OrgP), among the five most profitable and successful organisations in the country. OrgP manufactures, markets or provides services for over 40 different products including a range of raw materials, consumer products and machinery, many of which are market leaders. OrgP is highly diversified with over 40 subsidiary and 10 associate companies of which OrgPML is one of its largest and most profitable subsidiaries.

The organisation has a number of long term goals and a mission statement which includes, 'to strive for excellence as providers of high quality, reliable, value added products and services by mainly utilising local resources' (OrgP annual report 1995). Some of the more important long term goals are to: improve the company's management structure on an ongoing basis in order to keep abreast of changes in the environment; enhance productivity and value of assets; optimise use of resources by eliminating unproductive activities; be amongst the top five international producers / suppliers in each field of the company's products; and achieve front runner status in customer satisfaction, sales volume and profitability in each area of supply of

goods and services (interview results and OrgP and OrgPML annual reports, 1994 & 1995). In addition to the long term goals, both, OrgP and OrgPML have also set a number of medium term goals.

OrgPML's organisation structure is a typical hierarchical model (figure 1) similar to the other four case study organisations. However in comparison to majority of other Sri Lankan organisations, OrgPML is less bureaucratic, and profit and customer satisfaction tend to override red tape. In contrast, OrgPML's IS/IT organisation chart is less impressive as shown in figure 6 and needs more skilled personnel and resources if the company intends to realise substantial benefits from IS/IT.

- **IS/IT Environment**

At the time of the case studies OrgPML's IT/IS environment supported only the basic functions of accounting and the manufacturing process. Interviews revealed that the company's existing IS/IT infrastructure supported only half (50%) of the organisations day to day business activities, and had very little bearing on its goals and objectives. OrgPML uses a UNIX based operating system with file servers and workstations at key locations. The company may need to radically reengineer its IS/IT infrastructure and restructure the IT department if they are to achieve any substantial benefits from IS/IT. The few IT related activities in place were mostly batch oriented with very few on-line applications being used. The IS development activities in the company shown in figure 7 do not involve systems analysis and design and have evolved around software development and programming. In comparison the parent company, OrgP, is more advanced in technology and systems and uses better IS development procedures, yet is some way behind in comparison to similar organisations in Sri Lanka.

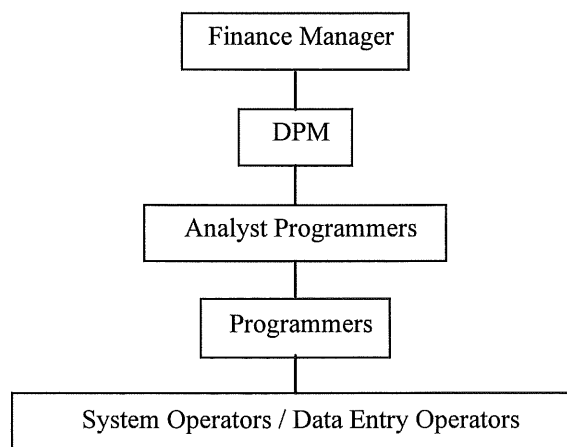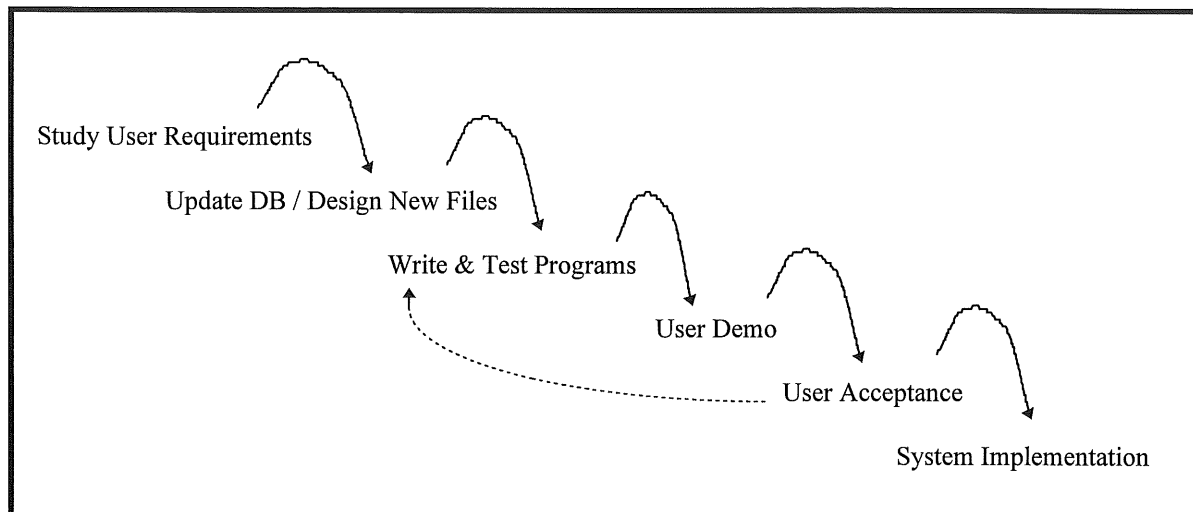**Figure 6.**   **OrgPML IS/IT Organisation Structure**

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Figure 7.　　　　　**OrgPML's IS Development Procedure**

Study User Requirements

Update DB / Design New Files

Write & Test Programs

User Demo

User Acceptance

System Implementation

4.5 OrgMML

OrgMML is one of the largest organisations in its market sector in Sri Lanka with strong multinational links, particularly British. The main business activities in the company are centred around manufacturing, marketing, sales and distribution of consumable and non consumable household products, nearly all of which are market leaders. In this context OrgMML dominates and controls its market sector, and many employees in Sri Lanka would consider OrgMML as one of the more prestigious and rewarding companies to work for.

During the case studies OrgMML was in the midst of a Total Quality Management (TQM) project which the company had started during the third quarter of 1994. The TQM project was initiated after a series of surveys by LMRB (Lanka Market Research Bureau) revealed negative customer reactions towards OrgMML. OrgMML hopes that TQM will help to improve customer satisfaction, customer relationships, the quality of their products and most importantly, minimise the risk of losing their position as market leaders. According to company sources the TQM project is also a result of new competition and cheaper products coming into the market (MMLMIT01, MMLMPR01). Initial interviews with employees suggested that the organisation had adapted well to the new TQM environment. OrgMML's strategic and middle management were convinced that TQM or any other form of reengineering, reorganisation or change in the Sri Lankan context should initially centre around 'attitude change' of employees. As such, training and education were considered as key success factors and OrgMML's TQM training program will involve training of around 1500 employees.

The TQM improvement sub projects were managed at individual departmental levels as outlined in the TQM project structure in figure 8. As part of the TQM initiative OrgMML has tried to flatten its overall management structure, but evidence suggests that in practice this is impossible, in the Sri Lankan context. OrgMML's organisation model is hierarchical and is similar to that of figure 1. However the business environment is less bureaucratic and the work environment is more informal due to TQM, particularly when compared with the other case study organisations. Defining the relationship between BPR and TQM, one senior IS/IT

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manager had the following explanation: "We define BPR under the umbrella of TQM. BPR has one great weakness, it does not promote attitude change or the concept of customer focus, that is where BPR fails. We will first introduce attitude change and a customer focused environment and then concentrate on process orientation. We feel that TQM will set the foundation for us to later focus on process improvement" (MMLMIT01).

- **IS/IT Environment**

All IS/IT related activities at OrgMML were carried out in the business systems department. The main tasks involved identifying, assessing and fulfilling all user requirements. This included identifying areas that need computerisation, reengineering existing systems, developing new systems, system maintenance, purchasing world class packages, hardware maintenance and upgrades, network support, and services to all user departments. The objectives and goals of the business systems department was to satisfy internal and external customers, provide quality outputs and to reduce operational costs by using IT (MMLMIT01, MMLOIT03, MMLOIT04). In order to achieve these objectives the IS/IT organisation has been structured accordingly as highlighted in figure 9.

The IS/IT infrastructure is based on standard internationally accepted, integrated application packages running on IBM AS/400, RISC6000 and PC based platforms. During the case studies plans were underway to purchase a new internationally accepted RDB (relational data base) based system which is to be tailored to suit OrgMML's requirements. This confirms that the organisation is moving away from in-house software developments to purchasing standard international packages. The main objective is to minimise in-house software development and modifications to existing applications, and instead reengineer the business environment to suit the new packages. According to OrgMML's IS/IT manager this policy is more effective given the performance levels and the number of problems associated with the in-house legacy systems. He points out, "In the new package environment there will be hardly any system problems and very few users will want modification, even if they request any changes it is very unlikely that it will be granted. The company has decided to go for package solutions in order to avoid the problem of having to employ skilled staff for developing in-house software, which results in high overheads and is a strain on existing resources. We are going in for relational data base packages with good controls. As long as the data is there, the company is not bothered about a few customised reports that are missing. These can be generated by the IS staff " (MMLMIT01). Fortunately a large company like OrgMML will have easy access to standard international packages used by similar businesses in other parts of the world, and it will be relatively easy to convince the software supplier to customise certain aspects of the package to suit the local environment.

During the case studies a senior computing person at OrgMML stated, "In the past IT was seen as a support service, but since of late, particularly after TQM the company is seeing it more as a competitive tool and as a part of the business" (MMLMIT01). This was a very encouraging statement with regards to IS/IT. For example, as this manager explained, the sales process has been made efficient by introducing IT. The company's salesman have been given lap top computers for the purpose of recording customer orders. These machines are linked to the H/O central computer and when the salesman keys in an order the stock files are automatically updated and a printout is generated at the warehouse. This reduces the cycle time of manual order taking, batch data entry, end of day file updates, stock preparation, warehouse space

allocation and distribution - thereby helping to reduce the total cycle time of the entire sales process by 50% and increasing the productivity of the salesman using lap tops by 35% (MMLMIT01).

OrgMML's systems analysis and design procedure was similar to OrgSFL, OrgPML, OrgSIM. The systems analyst concentrates mainly on automating existing manual procedures or modifying existing programs. For instance according to the IS/IT manager, the user explains his requirements to the analyst, which is in most cases what he does on a day to day basis, and the analyst automates it. In this context the analyst may be automating a totally inefficient process that the user has been doing over the years. "The systems analysts also spends on average at least 90% of his time programming, and only 10% of the time is spent analysing the system" (MMLMIT01). However the IT management expectation is that a proper systems analysis and design procedure should be followed for IS development. The procedure highlighted in figure 10 closely describes the minimum management expectations for IS development.

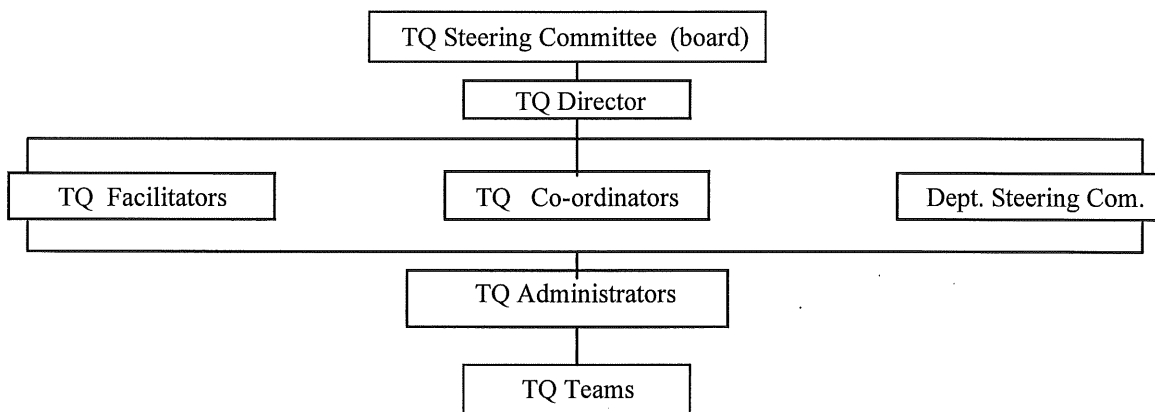**Figure 8.**   **TQM Project Structure**

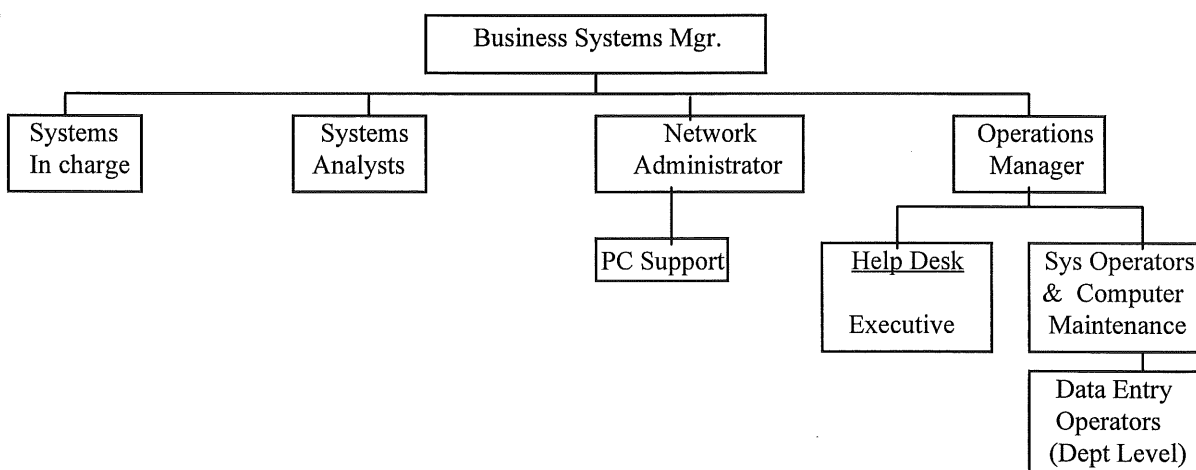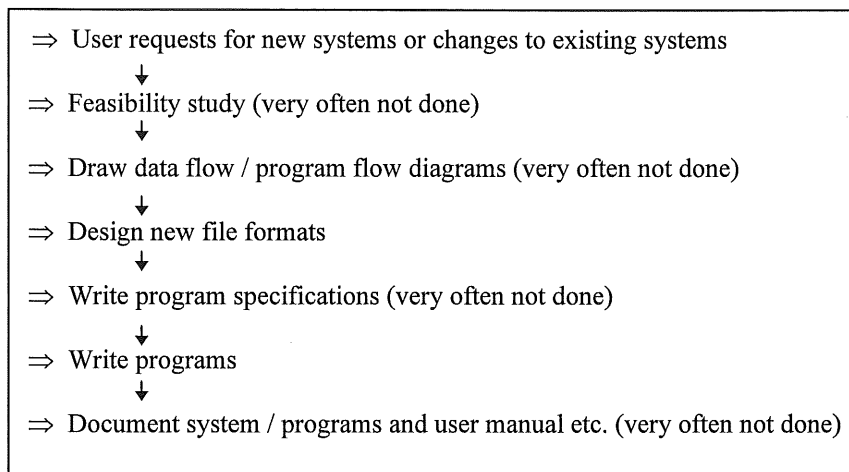**Figure 9.**   **OrgMML IT Departmental Structure**

Figure 10.   OrgMML's IS Development Procedure

```
⇒  User requests for new systems or changes to existing systems
            ↓
⇒  Feasibility study (very often not done)
            ↓
⇒  Draw data flow / program flow diagrams (very often not done)
            ↓
⇒  Design new file formats
            ↓
⇒  Write program specifications (very often not done)
            ↓
⇒  Write programs
            ↓
⇒  Document system / programs and user manual etc. (very often not done)
```

The work and IS/IT environment in the case study organisations can be summarised using a rich picture. Figure 11 in page 26 is an illustration of a work environment in a typical Sri Lankan organisation, and it shows some of the more common factors that would influence the implementation of BP&ISR in a Sri Lankan organisation.

5. BP&ISR in the Sri Lankan Context

This section describes the BP&ISR related work presently taking place in some of the case study organisations, and analyses the similarities and differences between these projects and BPR by highlighting some of the case study findings in the organisations.

Many in the business community believe that Sri Lankan organisations are reluctant to change. Interviews with senior people in the business community revealed a number of reasons for this. For example the risk associated with change, the financial and other resources involved, lack of competition, lack of time and the general resistance to change are common excuses used by organisations. However, the Sri Lankan business environment has become more competitive than it was in the 1980's. Many experts believe this to be the influence of open economic conditions and tax free trade facilities in Sri Lanka and other countries in the region. Most organisations have been forced to reduce operational costs and waste and thereby compelled to change the traditional work patterns. Since the early 1990's a number of organisations in Sri Lanka have been implementing various programmes of organisational change, transformation or restructuring. In the Sri Lankan context many of these projects are compared and referred to as business process reengineering. Although many of these projects may not 'fundamentally rethink' or achieve 'radical redesign' as Hammer & Champy (1993) would suggest, they are expected to achieve small incremental changes over a longer period of time as suggested by Carr & Johanson (1995). However, a major drawback as revealed from the case studies was, although these projects had a start date, many projects did not have any clearly defined deadlines and they tend to proceed for ever losing sight of the initial goals and objectives with time.

5.1 The Scope For BPR or Related Projects

Over two thirds of strategic, middle and operational level managers in all the case study organisations agreed that they would like to see BPR or a similar initiative introduced to their organisations. They overwhelmingly agreed that their organisations need new or improved information systems and many agreed that a BP&ISR initiative would help them to improve their business. In contrast, there was mix reactions from the lower level employees who were divided in their opinion for and against BP&ISR. Interestingly some organisations thought that BP&ISR may not help them to increase their profits. A senior manager in one organisation stated, "BPR, in terms of profitability is not critical for our organisation" (PMLSRD01).

It is encouraging to note that three of the five case study organisations were engaged in projects which revolve around change and improvement. However, it appears that these projects although helpful in the context of improvement, quality and customer satisfaction, may not achieve dramatic improvements in critical contemporary measures of performance. Where as BPR is undoubtedly one of the most notable phenomenon's as regards contemporary initiatives of organisational change, in the Sri Lankan context many believe that similar quality and reorganisation programmes will have a substantial influence on organisations.

A senior manager (PCMSBP01) in one of the few organisations providing BPR related consultancy services is convinced that BPR in the Sri Lankan context is most effective and easy to manage at a cross functional level. According to this manager the main barriers preventing an organisation improving its inefficient business processes exist at a functional level. Over the years different functions / departments in many organisations have inherited or developed their own culture, work ethics and management style. More over, different functions appeared to have their own goals and objectives and work towards achieving these ignoring the goals and objectives of the organisation as a whole. This results in lack of co-operation and friction between business functions and encourages inefficient, inconsistent, contradicting, business processes resulting in longer cycle times. This effects the overall business in the organisation as a whole (PCMSBP01, and case study results).

• TQM

Total quality management, a concept more popular in the 1980's is used by some organisations in Sri Lanka including OrgMML who were in the midst of a TQM project during the case studies. This project was centred around continuous improvement and its main objective was to meet Customer requirements at optimum (competitive) cost by harnessing everyone's commitment. Therefore, the main objective was a collective continuous effort to achieve customer satisfaction and quality, where as in a BPR project one would expect process improvement, cost saving, efficiency and speed of service and performance measurements etc., in addition to improved quality and customer satisfaction. Another difference is that BPR is often practised as a top down approach, while TQM is more of a bottom up or collective effort involving a cross section of employees in an organisation. However, in comparison both BPR and TQM help the organisation to change and improve its business and IS/IT environment, although reengineering information systems may be more difficult using a continuous or incremental approach.

The TQM project researched at OrgMML is centred around the continuous improvement principle and employees at all levels had the opportunity to initiate or participate in

improvement projects. If an employee has a suggestion for improvement he can approach his immediate manager with the suggestion, who will evaluate the suggestion and if the manager feels that it is an opportunity for improvement he/she will submit the suggestion to the board of management for approval. Upon the board's approval a team will be formed, called an OFI (opportunity for improvement) team. This team will typically be made up of 4 to 6 people including a facilitator and the employee suggesting the improvement. The team will then initiate a project to carry out the suggested improvement. In this environment there are a number of active OFI teams implementing improvements at a given time, some of which can be argued as very similar to process improvements in a BPR project. One of the main differences is that, the concept of OFI teams is a small effort (combination of small projects) in the context of a big organisation - spread out against a longer period of time, where as BPR ideally (theoretically) would involve a single or phased out larger project having fixed goals to be achieved in a much shorter period of time. Nevertheless, senior sources in the organisation concerned claim that TQM and the concept of OFI's suits their organisation, and are convinced that this approach is better suited than BPR for the Sri Lankan business and IS/IT environment in general. (also refer section six)

- **Reorganisation**

Some people compare 'reorganisation' to BPR. This is reasonable in the context of the confusion surrounding the definition of BPR. Similarly many organisations, authors and researchers have associated BPR with various initiatives of this nature. Although Hammer & Champy (1993) may not agree, this may be reasonable especially if the particular initiative helps to achieve some sort of organisational change in the context of improvement, quality or profit.

During the case studies OrgSFL was engaged in a project which they refer to as 'reorganisation'. According to OrgSFL's sources the project is expected to improve the efficiency of customer services, reduce the cycle time of business processes and information systems, and introduce standards and guidelines for conducting day to day business. However, in practical terms the project involves mostly re-arranging the physical layout of parts of the organisation with less BPR work than one would have liked to see. One significant improvement in this organisation in relation to BPR was, reducing the number of activities in a key customer related business process by half.

The reorganisation project was initially recommended and started by a UK based consultancy firm in the early 1990's. However, by early 1996 the organisation was still unable to complete the project independently despite creating a new department and appointing teams solely for the purpose of working on the reorganisation project. In the meantime, the competition influenced by foreign multinationals have capitalised on the situation and managed to increase their market share, make more profit and attract new customers by copying more advanced western methods and processes. Interview results during the case studies confirm this and point out that reorganisation alone is inadequate to achieve quantum leaps in competitive advantage or performance, as often associated with BPR.

5.2 BP&ISR Approach

Most people interviewed agreed that a radical business process reengineering approach as Hammer & Champy (1993) would suggest is not possible in the Sri Lankan context. They stressed that an incremental or continuous approach as suggested by Davenport (1993), Harrington (1991) and Carr & Johansson (1995), spread out over a period of time would be best suited for their organisations (SCMMCN01, SCMMCN02, MMLMIT01, PMLMIT02, PMLSMD01). However, a few managers also believed the best approach to change their organisations was to introduce a radical approach and start with a clean sheet of paper as most of their business practices and information systems were inefficient and out dated (PMLOIT01, SFLOIT07). These managers stressed that they needed a fresh approach to conduct their business and compete in the modern market. While managers at OrgMML who were involved in TQM work believed, the ideal approach for BPR related work was to introduce change by combining quantum leap changes with step by step changes, while allowing for a period of stabilisation (MMLMIT01, MMLOAC01, MMLOAD01).

Opinions were also divided as to whether BPR and IS reengineering (BP&ISR) should be treated as simultaneous or separate exercises. However, most interviewees felt that BP&ISR should be an integrated effort while only a few felt otherwise. One consultant stated, "reengineer the process and get the process in order first, then reengineer the system, use what ever methodology you like to do this. This should then be followed with continuous improvements to the processes and systems" (SCMMCN02).

Many managers believed that education is the most important ingredient if BP&ISR is to succeed in their organisations. One manager points out, "The success of BPR will depends on the approach and the education strategy used to educate the people. If a systematic, methodological approach is used it will not be impossible to introduce BP and IS Reengineering to our organisation" (PMLMAC03). Most of OrgMML's employees having experienced change through their TQM project believe that education and training are the key success factors in any reengineering or reorganisation initiative linked to change. They stated that a well organised education program needs to be conducted before the actual BPR work begins. This education program has to start at least six months prior to the actual project and needs to continue for a further period of six to twelve months throughout and after the actual project ends. Due to the cultural and economic background of the operational level (mainly machine operator and labourers) employees, the education program should be especially tailor made to facilitate grass root level training. In this environment, many believe that a participative style of approach is best suited for BP&ISR. Employees should be made aware of the benefits of BPR and made to feel that it is for there own benefit and progress that BPR is introduced. Various remuneration and reward systems can also be introduced to encourage more user participation (MMLMIT01, MMLMHR01, MMLMPR01, PMLMSRD01).

Team work was also considered as one of the most important aspects of BPR, and according to consultant (SCMMCN02) and IS/IT manager MMLMIT01, BP&ISR teams should consist of a cross section of people from the organisation. In the TQM project at OrgMML employees at all levels have the opportunity to initiate or participate in improvement projects through OFI teams. (refer section 4.5) Prospective BPR teams should be able to sell the idea of BPR to the bottom levels of the organisation. One IS/IT manager stressed, "The best approach to introduce BPR is not to mention the word BPR. The first thing is to educate the people at grass

root levels, tell them why we should change, who our customers are, what a process is, how BPR will remove functional barriers etc. Tell this over and over again if you have to, until they understand" (MMLMIT01).
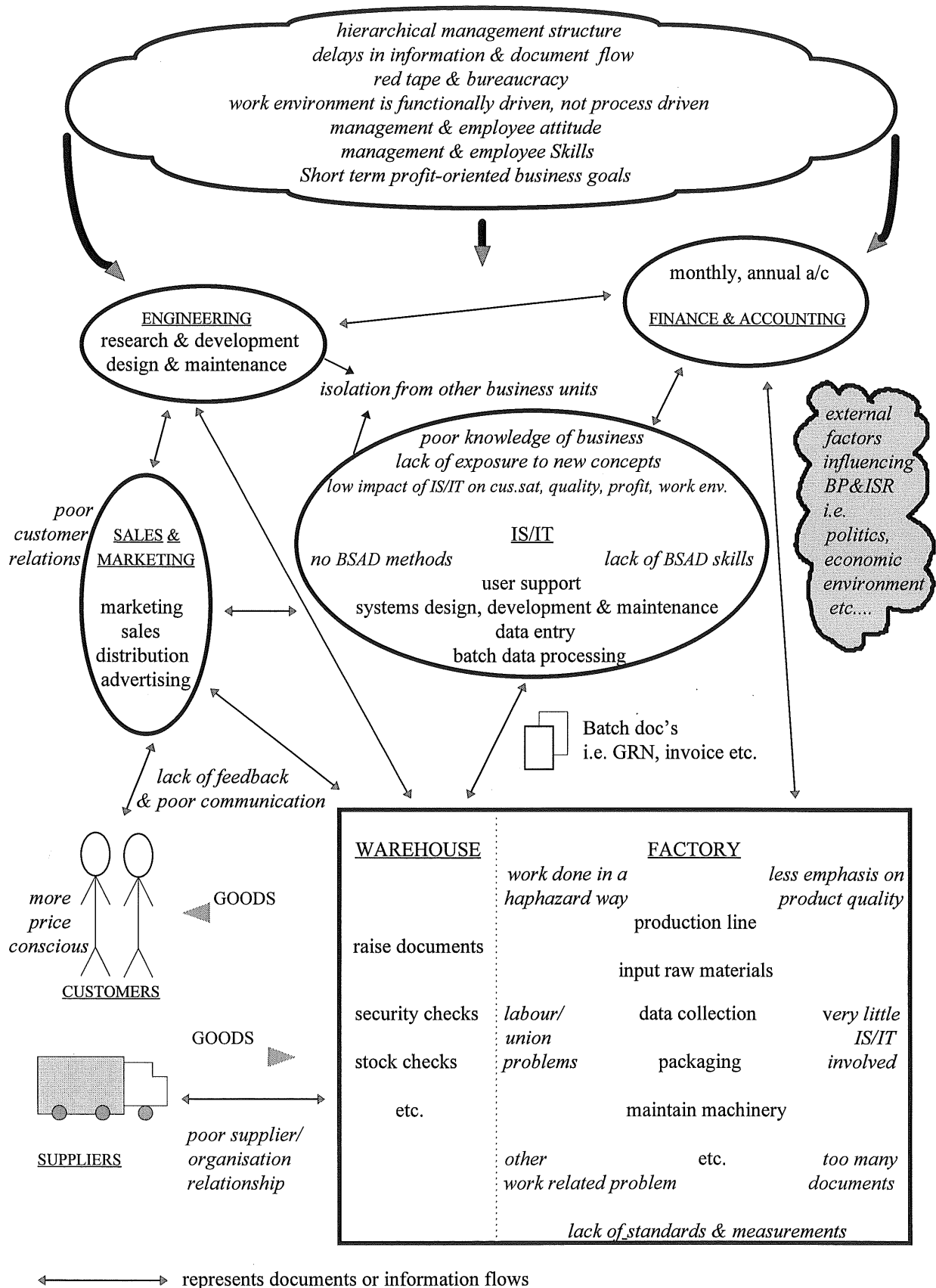
5.3 The Role of IS/IT

Although it is often acknowledged (e.g. Hammer & Champy 1993), that IS/IT is not necessarily an element of BPR type projects of organisational change, Demay & King (1996) believe that the reality of modern business infrastructure is such that for most practical purposes IT is generally seen to occupy a central role. Harrington (1991), addressing this issue states that process improvement should be combined with process automation. A BPR research team based at the Plymouth University have discovered that the initiative to move towards BPR frequently originates in the IS/IT department (Childe & Maull 1994). Similarly Earl's (1994) view on the BPR/IS relationship is that, both systems analysis and design and BPR shares common methods and he states that process thinking is the same as systems thinking. Another research team based at Manchester University is developing a framework for BP&ISR called PADM - process analysis and design method, which is strongly influenced by soft systems methodology and sociotechnical design (Wastell, White & Kawalek 1994).

In the Sri Lankan context, from the author's own industry experience of IS/IT and as discovered during the case studies, most of the organisations rely on IS/IT to conduct their day to business activities and operational procedures. However, many revealed that IS/IT is predominantly used as a support service, particularly in the state sector and is rarely considered as part of the business like in most successful organisations in the West. In some organisations IS/IT had little or no bearing on the organisation's mission or vision statements or long term goals and objectives. It appeared that this was primarily due to top management's lack of exposure to modern IS/IT. In contrast, most of the successful organisations in the UK would treat IS/IT as a part of the business that helps to increase the efficiency and effectiveness of business processes, gain competitive advantage and increase customer satisfaction.

Many professionals across a wide spectrum of the business field believe that IS/IT has to play a major role for BPR to be successfully implemented in the Sri Lankan context. According to one IS/IT manager, BPR and IS reengineering should be a simultaneous exercise. He points out, "BPR has a lot to do with the IS people. It is important how the IS/IT people gear themselves to a BPR project. You can reengineer the process and use a RAD approach if you like for IS reengineering, or do a simultaneous life cycle approach to reengineer the system together with the processes" (MMPMIT01). In addition, every consultant, manager and employee interviewed believed that at least a few IS/IT people should be in any team that is formed to undertake BPR related work.

In the Sri Lankan context all the case study organisations being either medium or large ones, BPR would involve to a large extent reengineering or replacing a number of existing mainframe and mini based legacy systems. Although IS/IT is used largely as a support service for daily operations, obtaining the benefits of BPR, for instance reducing cycle time or increasing speed of service and response times etc., will depend largely on reengineering the information systems and improving or replacing the software that support the business processes. Therefore, the role of IS/IT may need to be treated as a integral part of business process reengineering if BP&ISR is to be successfully introduced to organisations in Sri Lanka.

Figure 11 - A rich picture of the work and IS/IT environment and factors influencing BP&ISR in the context of a typical Sri Lankan organisation.

hierarchical management structure
delays in information & document flow
red tape & bureaucracy
work environment is functionally driven, not process driven
management & employee attitude
management & employee Skills
Short term profit-oriented business goals

monthly, annual a/c

FINANCE & ACCOUNTING

ENGINEERING
research & development
design & maintenance

isolation from other business units

external factors influencing BP&ISR i.e. politics, economic environment etc....

poor knowledge of business
lack of exposure to new concepts
low impact of IS/IT on cus.sat, quality, profit, work env.

poor customer relations

SALES & MARKETING

marketing
sales
distribution
advertising

IS/IT
no BSAD methods   *lack of BSAD skills*
user support
systems design, development & maintenance
data entry
batch data processing

Batch doc's
i.e. GRN, invoice etc.

lack of feedback
& poor communication

more price conscious

CUSTOMERS

GOODS

GOODS

SUPPLIERS

poor supplier/ organisation relationship

WAREHOUSE		FACTORY	
	work done in a		*less emphasis on*
	haphazard way		*product quality*
		production line	
raise documents			
		input raw materials	
security checks	*labour/*	data collection	*very little*
	union		*IS/IT*
stock checks	*problems*	packaging	*involved*
etc.		maintain machinery	
	other	etc.	*too many*
	work related problem		*documents*
		lack of standards & measurements	

←——————→ represents documents or information flows

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6. Factors Influencing the Implementation of BP&ISR in Sri Lanka

This section describes the various factors that would ultimately influence the implementation of business process and information systems reengineering in an organisation. These factors have been collated from interview results in the case study organisations. While some factors may be specific to a particular organisation, most are common to nearly all the case study organisations and may represent in general the disadvantages and advantages in the context of BP&ISR in Sri Lanka.

- **Obstacles to BPR**

Case studies revealed that the following factors may significantly hinder the implementation of BP&ISR in organisations. These factors are also highlighted in figure 12, page 41.

(1) Work Environment

Some of the most significant factors that may influence BP&ISR in the context of Sri Lankan organisations are, the work culture, practices and procedures and the apparent lack of professionalism in some organisations. Most organisations appeared to conduct their business in a haphazard manner, while only a few followed standard procedures similar to the process concept in BPR. To quote one senior consultant, "We are not looking at the *process*, if we get our managers to look at the process then they will see the benefits of doing it differently" (SCMMCN02). Another consultant cited the following examples of work scenarios in two leading organisations in Sri Lanka, which confirms the theory of management inability to look into business as a set of process. "In one organisation the customer walks up the stairs to the showroom selects his items, walks down the stairs to the cashier, pays for the goods purchased and climbs the stairs to collect the items. In this case the management rejected a suggestion made by one of the sales reps to move the showroom down stairs to avoid the inconvenience caused to the customer. Or for instance, in one Sri Lankan factory you can observe people walking up and down simply to move things from one location to the other, in either of these case there is no focus on processes and things are done in a haphazard way" (SCMMCN01). One director summed up his feelings on the same by stating, "some of our managers try to manage the organisation like running a corner shop" (PMLSMD01). In this environment introducing measurements which is a basic requirement in BPR environments may be a difficult task in most of the case study organisations, especially given that their present work scenario is not process oriented. Several management consultants confirmed that this may be the case with majority of other Sri Lankan organisations too (SCMMCN01, SCMCN02, SCMCN06).

Case studies also revealed that there is a need to find alternative methods and cheaper sources of raw materials for businesses in order to compete with the smaller organisations encroaching into the same markets. In this aspect some organisations have improved their day to day operations, yet none have identified and reengineered key business activities in their organisations.

Another complaint was that the work environment deprived some employees of gaining an overall knowledge of the business due to the isolation of some business units and its employees from the mainstream business. This was true particularly in the context of specialised operations such as IS/IT, engineering, technical, and research and development etc. Therefore,

introducing BP&ISR to these particular business units would be a more difficult task, than for instance in a customer service oriented business unit.

(2) IS/IT Environment

Many professionals believe that Sri Lanka is some years behind developed countries in the area of modern business computing (SCMMCN02, SCMMCN07, SIMSDR01, PMLSRD01, SFLMIT02). Two case study organisations are still relying on traditional 1980's style data processing operations with batch processing, data entry operators, and manual transportation of diskettes, tapes and backups from one location to another. The information systems in these organisations appear to be of a low standard which results in the lack of timely and quality management information. In some organisations the state of hardware and software was a cause for concern. Two of the case study organisations had leading edge technology in the context of hardware but lacked quality systems to explore the full potential of the hardware. The opposite was also true, for instance, when an organisation wants to introduce a quality application package, often the available hardware platform did not support the new software. Besides, some organisations appeared to have a number of software applications operating in isolation from each other, while the hardware consisted of different makes and models purchased over a period of time from different vendors. In this context, some organisations are faced with a number of compatibility problems that will be an additional burden to any proposed BP&ISR effort.

Case studies revealed that some organisations may need major changes to their IS/IT departments, the IS/IT organisation structure and the overall IS/IT strategy if they are to achieve any substantial benefits from IS/IT. It is important that the IS/IT departments are treated as part of the business and not as a service centre, as is the case with most organisations in Sri Lanka. Many IS/IT professionals complained that their units are isolated from the mainstream business and hoped that a some degree of freedom will be delegated to IS/IT management, which will encourage them to take decisions in the context of new developments (SCMMCN01, SCMMCN02, MMLMIT01, SFLMIT02). Many IS/IT staff also complained that they are not appropriately recognised and paid as professionals in comparison to other discipline (PMLOIT01, MMLOIT04, MMLOIT05, MMLMIT01). These issues all contribute to the low morale and frustration in the IS/IT department, which may not help any IS reengineering efforts in the organisation.

According to sources at OrgMML, IS/IT meets only 60% of the management information requirements, and is under utilised in their organisation (MMLOIT03, MMLOIT04 & MMLOIT05). However, the IS/IT manager in the same organisation stressed that although IT does not have a major impact on competitive advantage and profitability, it contributes largely towards cost savings, helps to reduce cycle time and makes the overall business operations more efficient. In another organisation IS/IT staff claim that over half of the management information reports generated by their systems were under utilised while some were even left unused (PMLOIT01, PMLOAC02, PMLOAC04). It appeared that some reports are generated simply as a formality for a particular manager to put his seal (signature) on. Therefore, some managers have effectively become 'post boxes' where reports arrive at the 'in tray' and leave via the 'out tray'.

In the context of BP&ISR, many argue that a package solution would boost their organisations IS/IT environment. However, some disagree stating that due to the specialised nature of some businesses, a package concept may not be effective as there are certain areas that will need to

be changed. They argue that the flexibility of business will be lost if the company is restricted to using a package solution. Some large companies like OrgSFL, OrgPML and OrgMML have been conducting business for over a century in Sri Lanka and have diversified into various business ventures. As a result these organisations have a number of legacy systems fragmented across the organisation and running on different hardware platforms. These organisations are still in the process of expanding and as a result new systems are being added on top of the legacy systems. The end result is duplication of information and resources and complicated systems. This scenario may become a major disadvantage in the event of a BP&ISR initiative.

When analysing the typical day to day IS/IT work environment in OrgMML, many of the systems analysts complain of over work. It was revealed that some programmers and analyst disregard any software development standards and guidelines set by their organisations due to tight deadlines and work pressure, while some also disregard them through negligence. For example, one organisation was using four different but similar programs to perform a particular operation, where the same results could have been achieved using a single program with four subroutines. Typically a systems analyst is expected to handle at least two or more systems (i.e. stocks, payroll, GL etc.), and many of the systems analyst interviewed revealed that the number of user requests and system modifications is usually too much for a days work. OrgMML's system analysts fear that this will be made worse in a BP&ISR environment as is the case with TQM where users are treated as internal customers, and the IS/IT staff expected to meet all their requirements. In contrast, one IS/IT manager in a state organisation complained, "only 10% of our analysts and programmers are committed workers, the rest are all time servers" (SFLMIT02).

(3) Management
In the context of BP&ISR top management should be committed, lead by example, show strong leadership qualities and be able to encourage employees at all levels, particularly key players in business units (Harrington 1991, Hammer & Champy 1993). One senior Sri Lankan manager describes his style of management as 'management by walking', where he moves from one location to the other and actively participates in the day to day work in his business unit by attending to employees and customers needs. This manager points out that it is important to develop a personal relationship with his employees by being aware of even their domestic and social problems (SFLMXX01). A director in another organisation stated, "in order to successfully introduce BPR in our organisation, our top executives will have to win our supervisors commitment, show that no men will be lost, and recognise employee's performance" (PMLSDR04). However, some junior executives and operational level employees claim that top managers in their organisations lack vision, leadership qualities, skills and the initiative to change (SFLOIT03, SFLMIIT02, PMLOIT01, SIMSDR01). Many attribute this to the average age of most strategic managers which is thought to be between the range of 50 to 60. Some believe that these managers would prefer to retire with a secure pension in a few years rather than risking the failure of a BPR project, which would tarnish their good name. IS/IT manager (SFLOIT06) points out, "most middle managers are not given authority and their hands are tied up, while on the other hand top managers have to play a safe game as most of them are at the point of retirement where they don't want to take a risk" (SFLOIT06).

According to a number of management and IS/IT consultants, one of the basic aspects lacking in some Sri Lankan managers is an innovative approach and the ability to look at things from a

new point of view. One IT consultant stated, "given the option most of our managers would prefer to stick to the already treaded, chartered or accepted way" (SCMMCN02). In this context, managing IS/IT is another critical issue that needs to be addressed in the Sri Lankan businesses. Another consultant points out, "IT is a new tool and in my view can not be managed in the same old way, we need to manage it differently. For instance, it is like using a automatic saw to manually saw a piece of wood in the same way as a traditional saw, instead of using the power" (SCMMCN01).

A management consultant (SCMMCN04) who has conducted a fair amount of research in the area of management behaviour in Sri Lanka points out that there are two types of Sri Lankan managers. One type is the highly qualified and skilled managers and the other is unqualified, non-skilled managers who have become managers through influence. According to this consultant in most cases the skilled manager usually leaves the organisation for better prospects, while the influence of the non-skilled one helps him to remains in the same organisation. In this context it is likely that the influence of the latter will decrease the standard of his organisation and the prospect for BPR related work may also diminish.

(4) Attitude

Although many agreed that they need to change and welcomed the idea of BP&ISR, a few employees including senior and middle managers in some organisations appeared content with their existing business and work environments. These managers are reluctant to change the present work scenario as long as the organisation continues to make profit. As one director stressed, "We have no time or the resources to waste on fancy ideas like BPR, we would rather deploy our resources to make more profit and further consolidate our market dominance" (PMLSMD01). One consultant points out, "the attitude of Sri Lankan managers in terms of change is very bad, they may think that BPR is not suitable for the Sri Lankan culture" (SCMMCN07). Some employees at OrgSFL, OrgMML and OrgPML believe that BPR or any other initiative linked with change depends on the attitude of the chairman or chief executive officer (CEO) and the board of directors. They believe a CEO with a good understanding of business and IS/IT, dynamic leadership qualities and positive attitude could largely influence the initiative to introduce change. BP&ISR will mean doing new things and doing it differently. In many organisations, particularly in state owned ones the attitude of managers and employees is to continue with the existing organisation structures and business procedures. The reason for this attitude according to consultant SCMMCN01 is mainly due to the fact that many Sri Lankans have most of their basic needs in abundance. For example, the attitude of a typical public servant would be, "I have my Jack tree and my coconut tree and even if I loose my job I can survive, why do something extra ordinary and jeopardise my job, I would rather continue with the present system. The attitude of most managers would be, if the present system works properly why change it? his attitude is, instead of trying to *do it* he always thinks *can we do it*" (SCMMCN01). This scenario was confirmed at OrgMML where some managers did not want to take part or get involved in their TQM project. As one senior manager explained, "this is simply due to personal attitude problems and personal beliefs" (MMLMPR01). Another side of the attitude problem which applies mostly to junior managers and executives is the desire to out-shine his/her subordinates (PMLSRD01, PLMOIT01, PMLOAC02, MMLMIT01, SFLOIT03). One senior manager explained, "On average our executives spend 60% of their time improving themselves rather than working to improve the company, and their intention is to shine by cutting off the others" (PMLSRD01).

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On the other hand the attitude of the Sri Lankan customer is such that if he is dissatisfied with a product or service he will complain once and at the most twice. If the marketer fails to respond, the customer will buy a new product, as a result the marketer makes a number of mistakes and gets away with it. The consumers are not selective or quality conscious, but are price conscious and if they can buy a product at a low price they are usually satisfied. This is also directly related to the purchasing power of majority of the consumers (SCMMCN01).

Taking into account the above, culture and the attitude of the people are the main constraints when introducing change or BPR related programmes. It was understood that the Sri Lankan people have an attitude problem which seems to be unique only to them. Most professionals believe that this problem is caused by a combination of factors such as, a persons education, family background, economic situation, goals in life and personal beliefs and problems. Many believe the most effective way to overcome the negative attitudes of employees, is education. Most public sector employees are local university graduates who have had little or no exposure to modern business developments or IS/IT methodologies and techniques used in the industrialised countries. This situation can be changed via a firm education and training policy at local school, university and organisational levels to educate people on the need and benefits of new business and IS/IT concepts. This would help to change the thinking process of many people and to overcome the attitude problems gradually. However, some revealed that streamlining the business and the introduction of a process based management structure would be hard to achieve, yet they are optimistic and believe that it is still not impossible (PMLSRD01, SCMMCN01).

Some experts believe that the attitude problem is related to Sri Lanka traditional being a agricultural based country. Director PMLSMD01 believes that most young people still tend to follow their parents foot steps, for instance if the father was a farmer or a government servant the son tends to be the same. Therefore, he inherits similar qualities and the same way of life continues without change or improvement. Another director points out, "an individuals attitude is something personal, no institution can change the personal qualities of a man" (SIMSDR02).

(5) Education, Skills and Experience
The success of many business organisations depends on its employees. The contribution and performance of these employees will depend largely on their education, exposure and professional experience. Many in the business field agree that the Sri Lankan graduates filling over two thirds of the specialised roles in state organisations lack proper exposure to the real business world and modern IS/IT concepts. Consultant SCMMCN01 points out, "Our graduates who come out of university have no idea of what is happening in the real world. Once they get in to the real world they are forced to follow the stereotype system and carry on doing the things the way they have been done for the past 20 years" (SCMMCN01). Case studies revealed that the average age of a government sector functional / divisional manager (i.e. finance, marketing, engineering etc.) is between 45 and 60, and a senior manager or director (i.e. DGM, GM, Director, chairman) is between 50 and 60. A number of consultant agree that this category of people are in most cases found to be inefficient individuals who lack exposure to global business competition, modern technology or business concepts and are resistant to change. These are the same people who train and influence the young graduate employees. Therefore, there is a chain reaction and the inefficiency cycle may continue for a considerable

time at least, in the state sector, which would be a major draw back in the context of BP&ISR (SCMMCN01, SCMMCN02, SCMMCN07, SCMSDR01).

According to consultant SCMMCN02 who has to interact with senior managers and executives in a number of organisations in the context of his work, many of the older employees have not been exposed to the latest computer technology or quality software packages and are computer illiterate. "In some organisations the top management is not exposed to IS/IT, only the middle managers and junior executives are exposed to it" (SCMMCN02). Therefore, it is virtually impossible to convince the senior management level employees who fall into this category, that reengineering their information systems and business processes can benefit the organisation. To overcome this problem, senior managers, IS/IT managers, systems analyst, programmers and the operations people need regular training and have to be exposed to the latest developments in the IS/IT industry. It was understood that majority of IS/IT personnel lack formal qualifications and training in the use of methodologies, tools or techniques. Systems analyst in some organisations claimed that they used 'defacto' methods and each analyst had their own documentation methods and standards. However, according to IS/IT sources documentation depends on individuals and is done only if the analyst has extra time depending on the IS project targets and deadlines (SFLOIT03, SFLOIT05, SIMSDR01, SIMMIT05, SIMOIT01, MMLOIT04). This is a major weakness in many organisations, yet management seems not concerned as long as the organisation continues to make profit and are content with whatever information the IS/IT department provides.

Many of the academically qualified IS/IT, MIS or business computing people, are more technically oriented people, or as consultants SCMMCN01, SCMMCN02 and manager MMLMIT01 calls them, 'technologist'. "They lack management and business exposure and tend to always think in terms of technical solutions for management problems" (SCMMCN01). An example according to consultant SCMMCN01 is the scenario which involves a systems analyst attempting to computerise an inventory control system in one of the Sri Lankan organisations. "The system analysts is a 'technologist' here, and he tries his best to convert the same manual system into a computerised system using his limited knowledge. In this scenario many of the problems in the manual inventory system are converted into the computer based system, thereby automating the problems. If the manual systems has 10 files the systems analyst will on many occasions have the same file structures in his system. Our systems analyst lack the exposure and qualifications to think in terms of management problem solving" (SCMMCN01).

Case studies revealed that some of the systems analysts in a number of large mercantile firms in Sri Lanka have followed the traditional and familiar root of starting their IS/IT career as a systems operator, becoming a trainee programmer, programmer, then analyst programmer and finally a systems analyst. This may be one reason for the lack of methodological skills in the Sri Lankan systems analyst. Many join firms as raw A/level students or directly after following one of a number of diploma or certificate courses in computing and thereafter get caught in the typical day to day IS/IT work environment in organisations. They very rarely get the opportunity to further their education. As consultant SCMMCN02 points out, "Systems analyst in our organisations are A/L students, the designation is just a label". One IS/IT manager stated, "companies need business oriented IT people rather that IT oriented business people. Our systems analyst lack the business knowledge to design a proper business system, they are simply IT people" (MMLMIT01). Nearly everybody interviewed agreed that in order to design proper information systems the IT people need to have at least a basic knowledge of the

business environment in the organisation. This appears to be lacking in most of the systems analysts and software developers in Sri Lankan organisations. Most IS/IT managers revealed that they have excellent programmers but lack quality systems analysts (SFLMIT02, SIMSDR01, SIMMIT05, PMLOIT01, MMLMIT01).

(6) Risk of BP&ISR

Interviews with senior managers and directors revealed that, many organisations both in the private and government sector fear risk. All three layers of management are reluctant to take the initiative regarding new technologies, IT related or otherwise, due to the high level of risk associated with it. Consultant SCMMCN01 stressed, "the common scenario in most organisations is, middle management is tied up with day to day work while top management have their own, built up, stereo type ways of thinking". One IS/IT manager described, "Very often the top does not encourage the middle manager to take risks, and although the opportunity for improvement is visible the initiative is suppressed" (SFLOIT06).

(7) Culture

Many professionals agree that if a new concept such as BPR is to be introduced to an organisation the prospective project team has to first understand the organisational culture, the business, work and IS/IT environments. Many management and IS/IT consultants believe that BPR will have to be tailored to suit the local environment if it is to be a success (SCMMCN05, SCMMCN02, SCMMCN07, SCMMCN08, SCMSDR01).

Day to day work culture in most organisations is such that employees still rely on, and are most comfortable with registers, forms and signatures. Most employees preferred information on hard copy to electronic information (i.e. on screen etc.). Management culture is such that it was understood some managers take pleasure in placing his/her signature on documents. Consultant SCMMCN06 explained, "the legal system and culture also encourages the use of paper." Some employees claim that managers have PC's on their desk as a status symbol and are often incompetent in using them (SFLOIT03, SFLOAC01, PMLOIT01). It also appeared that most managers find it uncomfortable to introduce measurements, impose standards and guidelines, turn down a request of a subordinate or lower level employee and find it unpleasant to warn or take disciplinary action against employees.

Although many Sri Lankan employees are thought to be hardworking particularly in the mercantile sector, some academics and business experts believe that Sri Lankan employees spend nearly half the working year off work than actually working. This is due to the number of annual holidays enjoyed by most employees in Sri Lanka. This includes 30 days bank and 'full moon day' holidays (i.e. for being a predominantly Buddhist country), 52 weekends, as well as 14 days general vacation, 21 days sick leave and 7 days annual leave entitlement for each employee. The IS/IT manager at OrgSFL complained, "On top of this some employees try to use office time to attend to their personal work" (SFLMIT02). He explained one of the most common scenarios happening in Sri Lankan organisations, which is attending funerals during office hours. For instance, when an employee or a family member of an employee expires, most of the staff expect to attend the funeral during office hours and also expects the organisation to arrange transport at the organisations expense. Several managers and

consultants confirmed this and attribute it to the cultural environment in Sri Lanka (SFLMAD01, PMLSRD01, MMLOIT02, SCMMCN02, SCMMCN06).

(8) Organisational Structure

In majority of Sri Lankan organisations the management structure was a hierarchical one as outlined in figure 1. One senior manager at OrgPML points out, "Sri Lanka and OrgPML are not ready yet for a flat organisational structure, I think it will take a very long time for that to happen. For example, if I allow one of my machine operators to address me by my first name, the next day he will be seated on my chair and ask me to operate the machine" (PMLSRD01).

One of the most common problems faced by almost all the case study organisations was functional barriers preventing the organisation achieving its final objective. With most organisations having a departmental structure more focus is on the function rather that the business process or the final product. For instance, in a typical buying and selling organisation the sub process involved with payment to a supplier in the event of goods received, will have to face a number of functional obstacles. First, the supplier will have to pass the security check at the main entrance to the warehouse. Second, he will have to pass the various checks at the warehouse and wait till the store keeper raises the relevant documents (i.e. Purchase order, GRN etc.). Third, the documents will usually go to the purchasing department. Next, the documents go to accounts department for the accountant to authorise payment, and finally part of the documents come back to the warehouse with the payment details (PMLMAC01). In this scenario there are a number of functional barriers delaying the processing of these documents and the documents usually travel back and forth from department to department for clarification of details etc.

With the introduction of TQM, OrgMML have taken the initiative to flatten the hierarchical management structure in their organisation. In this context, the communication barriers are broken, i.e. lower level employees have the freedom to approach higher levels of management, yet some employees revealed that the hierarchical management structure still exist. With TQM, OrgMML have tried to give some of the operational level employees the opportunity to take leadership and responsibility, but this has resulted in a lapse of discipline. The IS/IT manager at OrgMML points out the reason, "The typical Sri Lankan employee mentality is that we need somebody to be our boss and tell us what to do" (MMLMIT01). Some employees at OrgMML expressed concern that TQM may result in friction between the operational level employees and management. This is mainly caused due to the influence of various trade unions within the organisation (MMLMPR01, MMLOAD01, MMLOIT03, MMLOIT05). One manager confirmed this by stating, "When the production staff want to prove a point to management or when they disagree with management they refuse to obey the TQM standards and guidelines" (MMLMPR01).

(9) Organisation Size and Business Environment

It appeared that convincing management to introduce BP&ISR would be more difficult when the organisation is making a profit. Instead, as manager (PMLMAC03) points out, "Many people in the organisation will want to change only if they are put against the wall (i.e. are in some form of trouble, for example when the organisation is making a loss), until then most organisations will not be prepared to change" (PMLMAC03).

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Managing an organisation may become increasingly difficult when it becomes overly diversified and the number of subsidiaries increase. Many also expressed concern that the corporate identity is lost in the case of large organisations where subsidiaries begin to operate on their own with their own information systems etc. These sources are concerned that this discourages information and resource sharing within the group due to internal competition, and promotes a great deal of duplication and low quality information systems (PMLMAC01, PMLMMK01, PMLMAC03). According to some IS/IT managers an integrated package of international standards may be the easiest solution to this problem. They claim that this would help to maximise the utilisation of resources, provide up to date management information and preserve the corporate identity of the organisation (PMLMAC03, PMLMIT02, MMLMIT01).

Most people agree that any BP&ISR effort would be more effective when introduced to a smaller audience. For instance, many of OrgMML's employees agree that if their organisation was smaller, TQM and BPR would be more effective, and easier to implement and manage. They agreed that in a larger organisation like theirs any BPR work will have to build up continuously over a longer period of time.

(10) Goals and Objectives

It was evident that corporate goals and objectives of most organisations were short term. Some managers attribute this to the prevailing situation in the country (i.e. internal wars etc.), and the fact that most top managers in particularly the state organisations prefer short term goals, especially if they are about to retire in a few years (PMMMAC01, PMLSRD01, PMLSMD01). Nevertheless, long term corporate planning at a strategic level may need to take into account where the organisation is heading and where it will be, for instance in another ten years time. Export oriented organisations need to also re-think it's domestic business policy in order to introduce some of the export oriented products to the local market (PMLSMD01, PMLSRD01, MMLMIT01).

In addition IS/IT has to be taken into account when designing corporate plans. One director does not think that IS/IT is important enough to be classified among his first five priority goals for the organisation, but considers it to be among his first 10 priority goals.

(11) Human Resource & Ethical Issues

It was understood during the case studies that many people associate IS/IT, BPR and similar initiatives with redundancies. As revealed at OrgMML, in the TQM environment many operational level employees feel threatened and are afraid of loosing their jobs. This is made worse with the introduction of performance measurements. According to manager MMLMPR01 performance measurements are introduced to monitor the performance of machine operators and other line operators. "If any of the operators are not performing according to expectations we warn them, if there are 50 operators 30 will improve after the warning and maybe 20 will leave, but labour is freely available so we need not worry about the 20 that leave" (MMLMPR01). However, although this may be possible with particularly the lower level employees, hiring and firing skilled employees may not be practically possible and would not help in the context of BP&ISR.

Another issue which may have a negative influence on BP&ISR is the fact that most organisations failed to provide appropriate training to their employees, thereby neglecting the development of skills and quality of their human resources (SIMSCS01). This results in the lack of skills and usually leaves a few employees who are skilled and efficient to bear the burden of majority of the work. It was understood that this category of people usually leave for better prospects when the work pressure is too high. In a BP&ISR environment the work pressure is expected to further increase, thereby making the situation worse for these employees. Many IS/IT staff in one organisation engaged in BPR related work complained of too many projects and tight deadlines (MMLOIT04, MMLOIT05, MMLOIT06). In the event of introducing BP&ISR, it may be important for prospective organisations to relieve some of these employees from part of their work so that ideally they can be absorbed into BPR teams.

On the other hand some mercantile organisations employ a percentage of IS/IT professionals on a contract basis with the option of renewing the contract annually. In this context the contract employees are usually denied the opportunity of training, promotions and increments. Therefore, obtaining a commitment from these employees for BP&ISR related work would be a additional burden for prospective BPR teams.

Trade union actions and strikes are another common problem faced by the manufacturing and production based companies. The success of most of these companies depend on the quality of their products, which depends on the lower operational level staff such as machine operators and technicians. Therefore, extreme precaution may be needed when introducing BP&ISR into these sectors. Many managers feel the most effective way to prevent lower level employee sabotage is to get them to actively participate in the BP&ISR work, and to introduce a reward system to encourage them (MMLMPR01, PMLSDR03, PMLMPR01).

(12) Team Work
One essential requirement for any project oriented work is a capable team. Building a team to conduct a BP&ISR project may be a difficult task in some of the organisations when taking into account the work environment, human resource issues, personal attitudes and skill factors etc. Therefore, co-ordination, co-operation, communication and most importantly keeping a team together from the start to end of a BPR project will be an uphill task. Employees in one organisation involved in BPR related work claimed that a number of sub projects failed to produce the planned results and some were abandoned half way. Some employees attribute this to the poor quality of project teams and lack of good project leaders (MMLOIT05). Some employees believe that most team members are skilled and capable but find it difficult to combine team work with their day to work load. In this context, management may need to relieve the team members of some of their day to day responsibilities which will enable the team members to dedicate more time towards the BPR project work.

According to one systems analyst the attitude of employees will also have an impact on team work. Some team members may want to shine above the rest, which would result in competition within the team (SIMOIT03). Professional jealousy may also prevent team members from sharing knowledge and information, which may have a negative impact on team work. This scenario appears to be true in the case of IS/IT project teams in one organisation which may seriously affect any prospect of BP&ISR there.

(13) Communication

A number of employees particularly in the state organisations complained regarding the lack of communication and the loss of information in the process of vertical information transfers. Some operational level employees revealed that they had to rely on colleagues or the 'grapevine' to receive information even regarding important policy decisions effecting the lower level staff and their work. Many relate this issue to the hierarchical management structure (SIMMIT05, SFLOIT03, SFLOAC01). This could be a problem in a BP&ISR environment as it may cause confusion and misinformation to be spread through the 'grapevine'.

The introduction of any BPR projects or initiative will depend on the ability of the prospective BPR team to demonstrate substantial and convincing results to management and employees. This can be achieved by successfully conducting a small scale pilot project. It is also important to outline the benefits of the proposed BPR work and to inform the employees of the impact these benefits will have on them. This will encourage them to contribute to the project (SCMMCN01, SCMMCN04, PMLSRD01, SIMSDR01).

(14) Economic Environment

Many consultants and senior managers expressed concern regarding the introduction of BPR in the context of the present economic climate in Sri Lanka. At Present Sri Lanka is going through a large scale privatisation process. In this context, there is a high possibility that employees will misunderstand the BPR concept as another trick or label associated with privatisation which will result in the employees loosing their jobs (SCMMCN01, SCMMCN03, SCMMCN06, SCMMCN04, SFLMAD01, SIMSDR01).

Other external factors which are beyond the control of organisations such as over valuing of the rupee, climatic conditions and internal wars in the country can also influence an organisations plans to start new projects such as BPR. A senior IS/IT manager summarised the prospects for BP&ISR in the Sri Lankan context as, "The concept of change (i.e. culture and attitude etc.) will be directly proportional to the economic development rate in the country. If there is no competition in the Sri Lankan business environment, the lethargy will continue and it will take another generation at least to change. But if the competition increases and businesses become globalised the situation will change rapidly" (MMLMIT01). It was evident that some Sri Lankan organisations lacked strong competition. IS/IT manager PMLMIT02 points out, "the only competition we face is from small time businesses".

Since the early 1990's trading between SAARC (South Asian Association for Regional Co-operation) countries have increased. However, the regional business environment is still not as competitive as the business environment in NIC countries (newly industrialised countries) in the South East Asian region. A number of management and IS/IT consultants believe that a healthy competition in the region would boost the chances of BP&ISR to a large extent (SCMMCN01, SCMMCN02, SCMMCN05). If not, although BP&ISR may help Sri Lankan organisations to further increase their profits most managers may not be encouraged enough to dedicate time and resources for BP&ISR.

The economic environment can also be applied in the context of individuals. For instance, it is widely accepted that most operational and clerical level employees in Sri Lanka have to face a number of difficulties including financial and transport problems. The gap between the

strategic or middle managers and the operational level employees is thought to be very wide, and many believe it has been the case for decades with no signs of improvement (SFLOIT03, MMLOIT08, PMLOIT01, SIMMIT05). Evidence suggest that the basic expenditure of most clerical and lover level employees is much higher than their wages. The typical situation of these lower level employees can be compared to Lucey's (1991) description of Maslow's hierarchy of needs not being satisfied. In this context it is very unlikely that a certain percentage of lower level employees would willingly participate in proposed BP&ISR work.

(15) Government Regulations, Organisation Policy & Politics

Politics may also have a major influence on the overall business policies and decisions of the organisation, and on many occasions has an impact on the organisations profit as revealed during the case studies. Some leading mercantile organisations in Sri Lanka are obliged to provide employment to a certain number of people in keeping with government policy to minimise unemployment in the country (PMLSMD01). However, manager (PMLSRD01) stated that his organisation is not unduly effected by this policy. He points out, "Labour is cheap so we don't mind being a bit over staffed, in any case this is cheaper than investing large sums of money on automation" (PMLSDR04). Besides, organisations are also effected by the policies of different governments who may influence the cost of labour, raw materials, export and import duties etc. The value of the local currency may also fluctuate with the political climate in the country which is bound to have a negative impact on businesses.

According to IS/IT sources at OrgSFL, OrgSIM and OrgSCM political influence is one of the main obstacles faced particularly by many of the state organisations. For instance, when a state organisation requires to develop or install a major software application or hardware, they have to first call for tenders for the service required. In keeping with government expectations the organisation then has to award the tender to the lowest bidder. Many of the existing systems and hardware that have been provided or developed by these low bidders have ended up with problems or have been of no use to the organisations concerned (SFLSIT01, SFLMIT02, SFLOIT03). In this environment it is inevitable that a large number of legacy systems will have to be reengineered or replaced in the event of a BPR project, and BPR teams may have to face a number of problems particularly in the event of having to work with vendors.

(16) Academic Environment

It is essential that the relevant institutes and universities introduce management related subjects and systems design methodologies to IS/IT related academic courses, both at undergraduate and post graduate levels. In this context, leading academics should work with organisations to promote new concepts like BPR through seminars and conferences (PALSDR01, SCMMCN01, SCMMCN02, SCMSDR01). It was clear during the case studies that there was no communication and co-ordination between the universities and the leading mercantile organisations in the country. These organisations are usually the pioneers in introducing new business and IS/IT concepts, and appear to be more advanced than most of the courses conducted in some of the academic establishments. Therefore appropriate action may be needed to bridge the gap between industry and universities. This may help graduates to be better prepared to handle new concepts such as BPR.

(17) Consultancy

According to consultants SCMMCN01, SCMMCN02 & SCMMCN07, in the Sri Lankan environment some consultants are obliged to do things inefficiently simply to please their clients. For example, consultant SCMMCN01 explained the scenario of a consultant trying to develop a transport system for the local council. He explained, "The consultant concerned looks into the requirements and wants to designs a proper system. According to the consultant's system the bus should be routed from location 'A' to 'B' via 'C'. However the local council chairman's mother lives in location 'Q', therefore the chairman insists that the bus should travel via 'Q' and not 'C'. In this scenario the consultant is forced to produce an inefficient system in order to please the chairman. From the consultants point of view the local government is his next client and he can not afford to disappoint the chairman, as he is hoping that the next contract will come from him (the chairman)" (SCMMCN01).

It was also evident that most consultants lacked exposure to modern business and IS/IT developments that are taking place in the west, and were relying on primitive methodologies, tools and techniques to carry out consultancy work. In this environment it is no surprise that some organisations rarely get the opportunity to experience the benefits of modern concepts such as BPR.

- **Factors Facilitating BPR**

Some organisations, particularly the mercantile and multinationals have begun to take the initiative to improve their businesses due to growing national and international competition. This has enabled BPR related concepts to become established in some organisations, which has resulted in cultural and attitude change amongst top management and employees. Described below are a few encouraging factors discovered during the case studies which may have a positive impact on proposed BP&ISR efforts in Sri Lanka.

(1) IS Environment

Interviewees in a number of organisations claimed that most of the management information required by different levels of employees is input to systems at various stages and was already available in different data bases (PMLMAC01, PMLOAC02, PMLOIT01, MMLOAD01, MMLOIT04, MMLOAC01). It appeared that these organisations only lacked proper information systems (i.e. reporting, on-line inquiry etc.) that were capable of utilising this information. In this case, the IS reengineering part of BP&ISR would involve less work.

It was also encouraging to note that some top managers were strong IS/IT supporters and consider IS/IT as part of the business to some extent, than as a support service. These managers claim that IS/IT has helped to reduce their work load considerably (SFLMXX01, MMLMIT01, SIMSDR01).

The IS/IT work culture particularly in the mercantile sector was friendly and informal. Although the IS/IT organisation structures were hierarchical as illustrated in figures 2,4,6 & 9, most IS/IT staff felt that this was not a problem in the context of their day to day work (MMLOIT03, MMLOIT05, MMLOIT06, PMLOIT01).

(2) Business and Work Environment

Many managers and other operational staff in a number of organisations revealed that they need to change their present work environment and would like to see BP&ISR introduced to their functions. They agreed that their present work environment was inefficient and were much optimistic that BP&ISR would help them to improve this situation (SFLOIT03, SFLOIT05, SFLOOP01, SIMMIT05, SIMSCS01, MMLMIT01, MMLOIT03, PMLSRD01, PMLOIT01).

(3) BPR Related Initiatives
Case studies revealed that some organisations are already engaged in business improvement initiatives similar to BPR. For instance, some companies are engaged in TQM and reorganisation projects which are more closely related to BPR, while others are engaged in quality initiatives linked to ISO9000 which are more of an elementary nature. Interviews revealed that nearly two thirds of the employees interviewed in five different organisations were 'for' these initiatives rather that 'against' them (MMLMIT01, MMLMHR01, MMLOIT03, SFLMHR01, SFLMIT02, PMLSDR04). This provides the ideal platform for future BP&ISR initiatives in these organisations as the employees will already be familiar with team work, quality, standards, guidelines, methods and documentation etc.

(4) Management & Leadership
In most mercantile organisations the majority of strategic and some middle managers appeared to lead by example by being hard working and dedicated to their task. Key operational level employees in these organisations indicated that good leadership and encouragement by top management, and an impartial reward scheme may influence most operational level employees to willingly participate in any BPR efforts introduced by management.

(5) Human Resource & Ethical Issues
Most BPR projects in the west have relied on staff redundancies as one aspect of cost saving. In the context of Sri Lankan organisations this may cause concern among top managers. However, it is encouraging to note that many organisations are still in the process of expanding with the growing economic environment in the country. Therefore, in the event of having to reduce head count with the introduction of BPR, redundant employees can be transferred to new or existing subsidiaries (PMLSMD01, SFLMIT02). According to one senior manager, his organisation managed to reduce the number of employees in one branch office from 98 to 48 by transferring 50 employees to different subsidiaries and branch offices (SFLMXX01).

(6) Benefits of BP&ISR
One organisation has introduced a scheme where employees annual increments will be based on the contribution to BPR related work and their participation in project teams. Interviews in this organisation revealed that most employees were encouraged by this policy except for a few senior employees (MMLMIT01, MMLMHR01, MMLOAD01). This increment policy when combined with other criteria such as seniority and qualifications may help to satisfy the needs of most employees, and thereby encourage a majority to contribute towards any BPR related work.

(7) Attitude
Most managers and consultants believe that younger employees are more willing to change and have the ability to easily adapt to new technologies and business concepts. Therefore the organisations with a larger number of young employees may have a better chance of successfully introducing BP&ISR (SFLMIT02, MMLMIT01, MMLMHR01, PMLSMD01, PMLSDR02, SIMSDR01, SCMMCN05, SCMMCN07).

Figure 12   -   The Significant Direct and Indirect Influences on BP&ISR
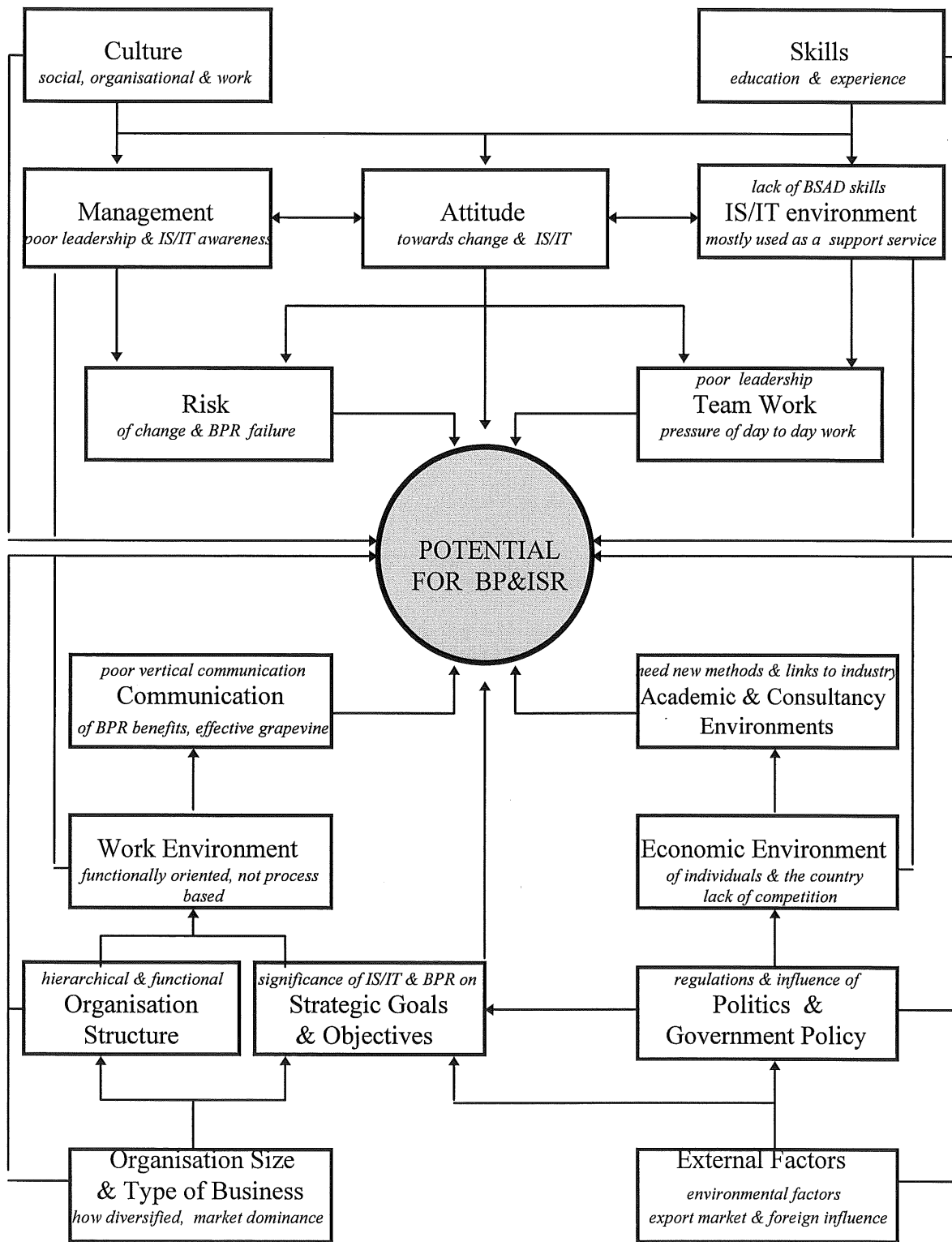
7. Conclusion

The overall scope of the case studies was fairly broad and covered five leading organisations in Sri Lanka, however due to time constraints it was possible to interview only a limited number of employees from each organisation. The main objectives of the case studies, which were achieved, were to understand the business and IS/IT environments and identify factors which may influence the implementation of business process and information systems reengineering in Sri Lanka. A semi-structured interview method was used for gathering information and most interviewees openly and critically discussed their organisations, particularly in the context of IS/IT and BPR.

The analysis of interview results identified a range of factors which may influence the implementation of BP&ISR in Sri Lanka. These can be classified into seventeen different areas. While a few factors as described in section six are encouraging signs, most of the factors discussed in this report will act as obstacles to BP&ISR. The most significant of these factors are,

- work environment
- IS/IT environment
- management and leadership
- employee attitude
- education, skills and experience
- risk
- culture
- and organisation structure.

The other factors that may influence BP&ISR are, organisation size and business environment, goals and objectives of the organisation, human resource and ethical issues, team work, communication, economic environment, politics/government regulations and organisation policy, and the academic and consultancy environments in the country.

Therefore, to successfully implement BP&ISR in this environment, any BPR effort will have to revolve around these factors and prospective BPR teams will have to work tactfully to overcome them. This was evident in more than one organisation involved in change related projects. In this regard, the views of employees were also similar. Many thought that the success of any BP&ISR effort will depend largely on the impact it will have on the employees and how the BPR approach will tackle the factors identified in section six. Many middle managers and operational level staff welcomed the idea of BP&ISR and believed that it can help their organisations to reduce waste, improve profits and efficiency of services. In contrast, some strategic managers thought that BPR would not have a direct impact on their organisations profits, however agreed that it will help to reduce cost and improve efficiency of services.

During the case studies some organisations were engaged in BPR related initiatives such as total quality management and 'reorganisation' which were centred mostly around continuous improvements. Interviews in these organisations revealed a moderate change of culture, some improved business processes and an increase in customer satisfaction. Almost all the

interviewees in these organisations rejected the concept of radical BPR and instead favoured an incremental or continuous reengineering approach. However, as Hammer & Champy (1993) points out, continuous improvements may not have the same effect on an organisation as a radical approach. Besides, It was evident that in any case these organisations carry out basic improvements to their businesses on a continuous basis, as is the case with most organisation irrespective of size, type of business or location. Moreover, continuous or incremental 'information systems' reengineering may mean constant changes to an organisations IS/IT infrastructure, which may not be a feasible option in a day to day business environment. Therefore, it is the authors view that in order to achieve any substantial benefits from BP&ISR, an approach which combines radical and incremental improvements is more suited in the context of Sri Lankan organisations. A radical approach may be helpful particularly in the case of an organisation which needs fundamental changes if they are to compete in global markets. However, many agreed that any BPR approach, whether radical or incremental should be a 'participative' effort and should involve a cross section of employees both IS/IT and non IS/IT.

Some organisations lacked competition while some are faced with an increased threat of competition from foreign multinationals. The business environment in all the case study organisations were similar with hierarchical management structures and functionally driven business procedures. The work environment, particularly in the state sector was laden with inefficiencies, bureaucracies, red tape and paperwork. The IS/IT environment often failed to deliver satisfactory management information. This can be attributed to the lack of proper BSAD work in organisations and the dearth of expertise in the use of BSAD methodologies. Besides, the knowledge and awareness of IS/IT was highly insufficient at strategic and middle management levels, while IS/IT professionals lacked knowledge of the business which made it difficult for them to design proper business systems. One other significant threat to any BP&ISR effort is the attitudes of both management and employees. Most individuals resisted change or any form of work or activity that did not benefit them. Education was cited by many as the most effective way of overcoming this problem, and many believed that grass root level education is a must for prospective BPR organisations and that it will help to make the task of introducing BP&ISR much easier.

Many of factors identified in this report are significant not only to the case study organisations, but may also apply to most other Sri Lankan organisations. This is evident when analysing the interview results with a number of management and IS/IT consultants whose combined experience covers a wide range of mercantile and most of the state organisations in Sri Lanka. Therefore, it is reasonable to assume that the contents of this report may represent the general business and IS/IT environment, and the factors that may influence BP&ISR in the context of most Sri Lankan organisations.

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Appendices

Appendix A

Table 1 below shows the relationship between the factors identified in section six and its source. Part 2 of this appendix explains how the source codes have been allocated for each interviewee using tables 2, 3 and 4. The different types (designations) of the employees interviewed is given in part 3 of the appendix.

1. Table 1 - Factor Influencing BP&ISR and the Information Source

Source	Factor (Number)																	Advantages						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	1	2	3	4	5	6	7
OrgSFL																								
SFLSCE00	*						*													*				
SFLSGM00	*						*					*								*				
SFLSIT01							*	*											*	*		*		
SFLMIT02	*	*	*	*			*			*				*	*	*			*	*		*		*
SFLMHR01	*						*				*									*	*			
SFLMRO01							*											*	*	*		*		
SFLMRO02	*			*							*								*	*		*	*	
SFLMAD01	*	*					*					*								*				
SFLMXX01		*						*							*					*		*		*
SFLOOP01							*							*	*				*					
SFLOIT03		*	*	*	*		*		*		*	*	*	*	*	*			*	*				*
SFLOIT04		*		*							*							*						
SFLOIT05		*		*														*						
SFLOIT06		*	*							*	*									*				
SFLOIT07	*	*								*		*								*	*			
SFLOAC01	*	*		*					*		*	*	*		*	*				*				*

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Table 1   -   Factor Influencing BP&ISR and the Information Source (Cont..)

	Factor (Number)1																		Advantages					
Source	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17		1	2	3	4	5	6	7
OrgSIM																									
SIMSDR01	*	*		*	*					*		*	*	*					*	*				*	*
SIMSDR02	*			*			*														*		*		
SIMSCS01		*								*	*									*	*				
SIMMIT05		*		*			*			*	*	*	*	*						*	*	*			
SIMOIT01		*			*							*	*			*									
SIMOIT02		*									*	*							*			*			
SIMOIT03		*			*							*							*		*				
SIMOIT04		*		*						*	*					*					*				
SIMOAD01	*						*													*					
OrgSCM																									
SCMSDR01	*			*			*						*		*										
SCMMCN01	*	*	*	*	*	*	*			*			*	*		*	*				*			*	
SCMMCN02	*	*	*	*	*	*	*	*		*		*		*	*	*	*				*			*	
SCMMCN03	*		*											*		*					*		*		
SCMMCN04	*		*	*									*	*								*		*	
SCMMCN05	*						*	*						*							*				*
SCMMCN06	*	*	*				*							*		*									*
SCMMCN07	*	*		*	*			*	*	*						*			*						
SCMMCN08	*						*	*	*										*		*				
OrgPML																									
PMLSMD01	*			*			*			*				*								*		*	
PMLSDR02				*						*											*			*	
PMLSDR03		*					*				*			*							*	*			
PMLSDR04	*	*					*							*							*	*			
PMLSRD01	*	*		*			*	*	*	*	*	*	*		*				*	*	*	*			
PMLMAC01	*			*				*	*				*						*	*					

Table 1 - Factors Influencing BP&ISR and Information Source (Cont..)

Source	Factor (Number)																		Advantages						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17		1	2	3	4	5	6	7
OrgPML																									
PMLMIT02		*				*			*				*							*					
PMLMMK01	*	*					*	*				*								*				*	
PMLMPR01							*				*		*								*	*			
PMLMAC03	*						*	*	*											*					
PMLOAC02		*	*	*									*	*					*			*		*	*
PMLOIT01	*	*	*	*	*		*	*				*		*					*	*					
PMLOAC04	*	*									*								*		*				
OrgMML																									
MMLSDR01	*																			*	*		*		
MMLMIT01	*	*		*	*	*		*	*	*	*	*	*	*					*	*	*	*		*	*
MMLMPR01	*			*			*	*	*		*									*	*			*	
MMLMHR01	*			*							*										*		*	*	*
MMLOIT02	*		*			*	*	*												*					
MMLOIT03	*	*						*					*			*			*	*	*				
MMLOIT04		*			*						*		*			*			*			*			
MMLOIT05		*					*	*			*	*	*			*			*	*		*			
MMLOIT06	*	*									*					*			*						
MMLOIT07	*	*	*									*	*							*					
MMLOIT08		*	*	*								*	*							*		*			
MMLOAC01	*					*													*	*	*				
MMLOMK01		*	*	*					*												*			*	*
MMLOAD01	*					*	*	*											*		*			*	
Others																									
PCMSCN01		*		*	*	*			*				*	*	*	*				*			*		
PCMSBP01	*		*					*						*		*			*	*	*		*	*	*
PALSDR01			*			*	*	*							*					*	*		*		
PMMMAC01	*		*	*			*	*		*			*	*						*				*	*

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2. The following tables explain the meaning of the source codes. Each Source code can be divided into 4 parts.

Table 2 - Type of Organisation

The first three characters, for instance, SIM as in SIMMIT05 or OrgSIM represents part 1 which identifies the type of organisation. This can be further divided into three parts as shown in table 2.

Character	Type of Organisation (Description)
1st character	
S	State
P	Private
M	Multinational
2nd character	
A	Academic
C	Consultancy
F	Finance
I	Investments
M	Multi-discipline
3rd character	
L	Large
M	Medium
S	Small

Table 3 - Management Hierarchy (Level)

The fourth character (SIMMIT05) represent part 2 of the code and identifies the interviewees management hierarchy level or position in the organisation chart.

4th character	Description
S	Strategic
M	Middle
O	Operational

Table 4 - Interviewees Role and Designation

The fifth and sixth characters (SIMM<u>IT</u>05) represents part 3 of the source code and identifies the interviewees role and designation.

5th & 6th character	Description
IT	Information Technology
AC	Accounting & Finance
AD	Administration
MK	Marketing & Sales
PR	Production & Manufacturing
EN	Engineering
CS	Customer Services
HR	Human Resources
OP	Operations
XX	Subsidiary or Branch Manager
RO	Reorganisation
CE	Chief Executive / Chairman
MD	Managing Director
DR	Director
GM	General Manager
CN	Consultant

Note : The seventh and eighth digits represent the fourth part of the source code and identifies the number of interviewees interviewed from the same discipline. (i.e. SFLMIT<u>02</u> identifies the second IT person interviewed, or SCMMCN<u>06</u> identifies the sixth consultant interviewed).

3. The different types (designations) of Interviewees

Designation (IT)	OrgSFL	OrgSIM	OrgSCM	OrgPML	OrgMML	Total
IS/IT Director		1	1			2
IS/IT Managers	1	1		1	1	4
Training Manager IS/IT	1					1
Business Systems Manager	1			1		2
Systems Development Manager		1				1
Project Manager	1			1		2
Systems Analyst	1				3	4
Analyst Programmer		3		1		3
Programmer		1		1		2
System Operations					2	2
						23

Column header row: Number of Interviewees

Designation (Non IT)	Number of Interviewees						Total
	OrgSFL	OrgSIM	OrgSCM	OrgPML	OrgMML	other	
Chairman	1						1
Managing Director	1						1
Director		1		3	1		5
General Manager	1						1
Deputy General Manager	1			1			2
Assistant General Manager	1						1
Finance Manager	1					1	2
Planning Mgr. (Budgets & Finance)				1			1
Human Resource Manager	1				1		2
Marketing Manager				1			1
Maintenance Manager				1			1
Chief Managers (admin., finance etc)	2						2
Senior Manager (Customer Services)		1					1
Branch / Subsidiary Manager	1						1
Operations Manager	1						1
Plant Manager	1						1
Sales Executive					1		1
Accountant (mgnt, financial etc.)				2	1		3
Junior Executive		1			2		3
Audit Analyst	1						1
Management Consultant (general)			3			1	4
Mgt. Consultant (corporate planning)			1				1
Mgt. Consultant (organisation & methods)			1				1
Mgt. Consultant (culture & human issues)			1				1
Mgt. Consultant (IS/IT)			2				2
Mgt. Consultant (BPR)						1	1
Academics						2	2
							44
							67
							==

Appendix B

Glossary of Term

DFD	Data Flow Diagramming
IE	Information Engineering
ISR	Information Systems Reengineering
OO	Object Oriented Analysis/Programming
OFI	Opportunity for Improvement
PADM	Process Analysis & Design Methodology
RAD	Rapid Application Development
RDBS	Relational Data Base systems
SSADM	Structured Systems Analysis & Design
SSM	Soft Systems Methodology
TQM	Total Quality Management
WAN	Wide Area Network