

**THE IMPACT OF IT INFRASTRUCTURE  
ON  
BUSINESS PERFORMANCE  
IN TRADE AND SERVICES ENTERPRISES**

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**MASTER OF BUSINESS ADMINISTRATION  
IN  
INFORMATION TECHNOLOGY**

H. G. Uditha

Department of Computer Science & Engineering

University of Moratuwa

December 2007

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By

H. G. Uditha



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The Dissertation was submitted to the Department of Computer Science & Engineering of the University of Moratuwa in partial fulfillment of the requirement for the Degree of Master of Business Administration.

Department of Computer Science & Engineering  
University of Moratuwa  
December 2007

## DECLARATION

“I certify that this thesis does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any university to the best of my knowledge and belief and it does not contain any material previously published, written or orally communicated by another person or myself except where due reference is made in the text. I also hereby give consent for my dissertation, if accepted, to be made available for photocopying and for interlibrary loans, and for the title and summary to be made available to outside organizations”

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## **ABSTRACT**

This study attempts to present current utilization of IT infrastructure in the Trade and Services sector enterprises to achieve business objectives and to observe the relationship between IT infrastructure and business performance with the same services sector. After a comprehensive review of relevant literature to find definitions and the characteristics of IT infrastructure available, a sample comprising fifty one-companies was selected in a way to cover four major service sector categories representing Wholesale, retail trade and hotels, Transport and communication, Financial and business services and Education, health, cultural and recreational services. Data from these organizations was collected on the basis of a questionnaire developed for the purpose. Data collected for each of the research constructs was then statistically analyzed through linear regression and Pearson correlation techniques.

The findings strongly indicate a significant impact of IT infrastructure practices in the business performances of these organizations. This outcome confirms the results of earlier findings related to work on IT infrastructure. In instances where the service sector organizations heavily utilize IT infrastructure related practices, such as IT component related practices, Shared IT services related practices, and IT personnel related practices and Shared IT application related practices, it was found that these organizations are able to achieve higher business performance.

It was also observed that above listed sector categories have shown different levels of IT infrastructure practices. The financial services sector and communicational services sector organizations are currently adopting their IT infrastructure practices significantly whereas the Wholesale, retail and hotels sector and Educational, health and recreational services sector are currently utilizing practices at a level below. Hence, a utilization model could be developed to represent the level of IT deployment services sectorially.

**Keywords—IT Infrastructure, Business Performance, Practices, IT Utilization**



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## ABBREVIATIONS

IT	-	Information Technology
GDP	-	Gross Domestic Product
ISIC	-	International Standard Industrial Classifications
ERP	-	Enterprise Resource Planning
CIO	-	Chief Information officer
USA	-	United States of America
WLAN	-	Wireless Local Area Networks
ITIL	-	Information Technology Infrastructure Library
CCTA	-	Central Computer and Telecommunications Agency
UK	-	United Kingdom
OGC	-	Office of Government Commerce, UK
ICT	-	Information and Communication Technology
SLA	-	Service Level Agreement
ISO	-	International Standards Organization
IEC	-	International Electrotechnical Commission
V3	-	Version 3
MOF	-	Microsoft Operations Framework
IOM	-	Infrastructure Optimization Model
BECTA	-	British Educational Communications and Technology Agency
FITS	-	Framework for ICT Technical Support
ROI	-	Return on Investment
EVA	-	Earning Value Analysis
MD	-	Managing Director
SPSS	-	Statistical Package for Social Scientists
WAN	-	Wide Area Network
VOIP	-	Voice over IP
INIFR	-	Main IT Infrastructure practices
STRATPLAN	-	Strategic Planning

# 1. INTRODUCTION

“The business-related services sector is also the most dynamic in the European Union (EU) in creating new companies. More than two-thirds of all new enterprises start up within business-related services. As you can see, business-related services are therefore the dominant part of the European market economy and the sector is important in its own right. However, there is an even more important aspect: business-related services are an indispensable contributor to the performance of the rest of the economy.” J-P Mingasson[1], Commission Workshop: European Standardization for Services, March 2004.

In the current global economy, businesses demand efficient applications to facilitate communication between employees, customers, prospects and business partners to stay ahead in an increasingly competitive atmosphere witnessing evolving technology. Fast-moving opportunities are snapped up by today's enterprises with high-performance network infrastructure, services and processes that perform, scale and adapt for advantage. Executives are alive to the tremendous benefits that can be achieved with today's innovative business applications. In such a scenario, IT infrastructure in any organization can be considered as one of the valuable and strategic assets, which help these companies deliver services and applications to stakeholders. IT infrastructure comprises technical infrastructure components like networks, databases, storage systems and human infrastructure components like skills and capabilities of IT personnel. Successful adaptation of IT infrastructure optimization would support changing business needs, improve the organization's efficiency and help save on investment and expenditure towards achieving a higher level of innovation within the company.

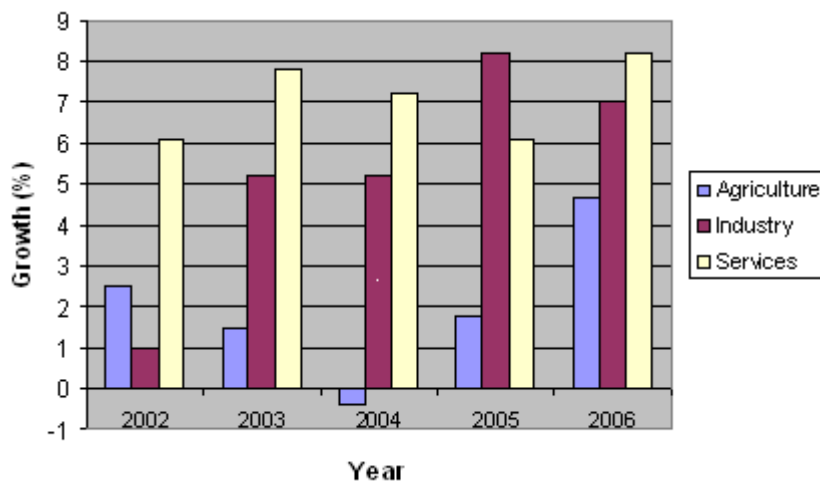
The value of investment on IT infrastructure demands more than 50% of the organization's IT budget. Willium Barna has indicated that IT infrastructure expenditures account for an average of over 54 percent of organizational IT budgets [2]. However, Broadbent and Weill [3] noted 10 years back that the same expenditures account for an



average of over 58 percent of organizational IT budgets, and they further stated that the percentage has grown at about 11 percent per year.

Interestingly, when the business organization wants to adopt change and align itself to business requirements, IT infrastructure sometimes also poses a bottleneck. This may be due to several constraints like: Software and hardware incompatibility, Best effort service delivery log-time to market and high costs. Cost is a major concern with IT infrastructure. It is noted that a scientific approach has been rarely applied to cost minimization. However, a methodological support to cost issues of infrastructure design is still lacking [4].

Trade & services enterprises have been becoming an integral part of Sri Lankan economy. According to the Central Bank report 2006, [5], the contribution to economic growth from the Services sector was the highest at 62.6 percent as the sector grew by 8.3 percent during the year, whereas the agriculture sector grew by 4.7 per cent contributing 11.1 per cent to the overall growth and the Industry sector grew by 7.2 per cent contributing to 27 per cent to the overall growth. The same report also indicates that the services sector contributed 56.2 per cent of the Gross Domestic Product (GDP) while the rest contribution is by the other major sectors like industry and agriculture.



**Figure 01: Main Economic Sectors Growth Distribution**  
(Source: Central Bank report-2006 of Sri Lanka)

The trade and Services sector has been categorized in to 4 major Sectors based on ISIC categorizations. (International Standard Industrial Classifications). ISIC, with its industry classifications for all the sectors, is the commonly accepted classification by the International Labor Organization. The Department of Census Sri Lanka also follows the same classification. After a discussion with officials of department of Census Sri Lanka and extracting the data collected from them, it was decided to study trade and services enterprises in Colombo district. The identified sub sectors under trade and services Sector are as follows.

- I. Wholesale & Retail Trade, Hotel & Restaurant
- II. Transport, Storage & Communications
- III. Finance, Real Estates & Business Services
- IV. Social and Personal Services Activities

The services sector in any country can be considered as a major information technology intensive sector. Most of the sub sectors use IT frequently and, therefore, they invest heavily in IT enhancement of their organizations. This research study focuses on the services sector and its utilization of IT to achieve business performance.

Accordingly, the research concentrates on the questions below.

- a. Have trade and service enterprises utilized IT infrastructure in order to achieve business performance?
- b. If yes, which IT infrastructure level/s that they are currently utilizing?
- c. What sector-wise differences could be observed?

The objective of the research is:

- a1. To understand the present level of IT infrastructure in trade and services enterprises in Colombo district

- a2. To identify the relationship between IT infrastructure and business performance in such enterprises and to find out the best suitable level
- a3. To find out the differences of infrastructure in the industrial sector within the trade and services enterprises in Colombo district.

The data collection from selected organizations was analyzed to find out the level of IT infrastructure utilization of selected organizations and the benefits to their businesses.



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## **2. LITERATURE REVIEW**

### **2.1 Introduction**

Information Technology (IT) is now a common tool towards growth and competitive advantage of today's organizations. Therefore, firms invest heavily on IT infrastructure. These investments prove to be meaningful if the firms utilize the IT resources well. The proper use of IT infrastructure possibly allows for higher business performance. Therefore, in this research, the main topics under review are related practices of major components of IT infrastructure achieving business performance.

### **2.2 Concepts and Empirical Literature of IT Infrastructure**

IT infrastructure has been defined by different researches in the past for their different research projects. Broadbent and Weill [3] noted that IT infrastructure can be broadly identified as a collection of IT components, human IT infrastructure and shared IT services on which the business processes are running. They have discussed how business maxims form a base which business and IT executives can work together to identify IT maxims. Categories of business Maxim were cost focus, flexibility and agility, growth, human resources and management orientation. IT maxim describes how a firm needs to connect, share and structure information and deploy IT across the firm. They have further described the two routes that firms can take in developing firm wide infrastructure as Management by Maxim where the IT management look at the company as whole and management by deals where IT managers discuss with business units and make infrastructure decisions. They have concluded that creating appropriate IT infrastructure services involves decisions based on understanding the firm's strategic contexts related to where the business is going.

Broadbent and Weill[6] have further considered shared IT services as another component in IT infrastructure in their research on leveraging the new infrastructure: How market leaders capitalize on information technology. The shared services were defined as applications, which change less regularly over a reasonable time period.

P. Weil and S.Aral,[7] in their research on IT savvy pays off, IT infrastructure has been defined as the shared IT services such as the network, customer databases, PCs,laptops, helpdesk, data center, servers, security, middleware excluding applications. They have found that business leaders with heavy IT Savvy, had following characteristics. These characteristics were broadly indicated as practices related to IT use and competencies needed for high IT Savvy.

### **Practices related to IT Use:**

#### **IT for Communication**

High usage of electronic media such as e-mails, intranet, wireless devices for internal and external communications and work practices

#### **Digital Transactions**

High degree of digitalization of firm's repetitive transactions, particularly sales, customer interaction and purchasing



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#### **Internet Use**

More uses of Internet architectures for key processes such as sales force management, employee performance measurement, training and post sale customer support

### **Competencies needed for high IT Savvy:**

#### **Firm wide IT Skills**

Defined as the capabilities of all employees to use IT effectively. The IT skills that the business people possess and business skills that the IT personnel possess have been considered.

#### **Business Management Involvement**

Heavy IT Savvy organizations must show good commitment from senior management towards IT initiatives. There is also strong business unit Involvement in IT decisions

resulting in a partnership between IT staff and business units to generate value from IT investments.

Even though the above research has not covered sufficient area under IT infrastructure, they have broadly focused on connectivity including intranet, extranet and Internet and skills of IT personnel.

W. Xia and W. R. King [8] defined IT infrastructure as a set of IT resources and organizational capabilities that are shared across the organization and that provide the foundation on which IT applications are developed and business processes are supported. In their study, they have examined how organizational factors including internal and external factors link with IT infrastructure capabilities and investment requirements. They have concluded that, among all the organizational factors, only internal factors like IT-business alignment, the perceived role of IT, and business synergy were the most significant predictors of an organization's IT infrastructure capabilities. The characteristics of an organization's external environment, however, were not directly related to an organization's IT infrastructure capabilities, which enhance the effectiveness of total IS function of the organization.

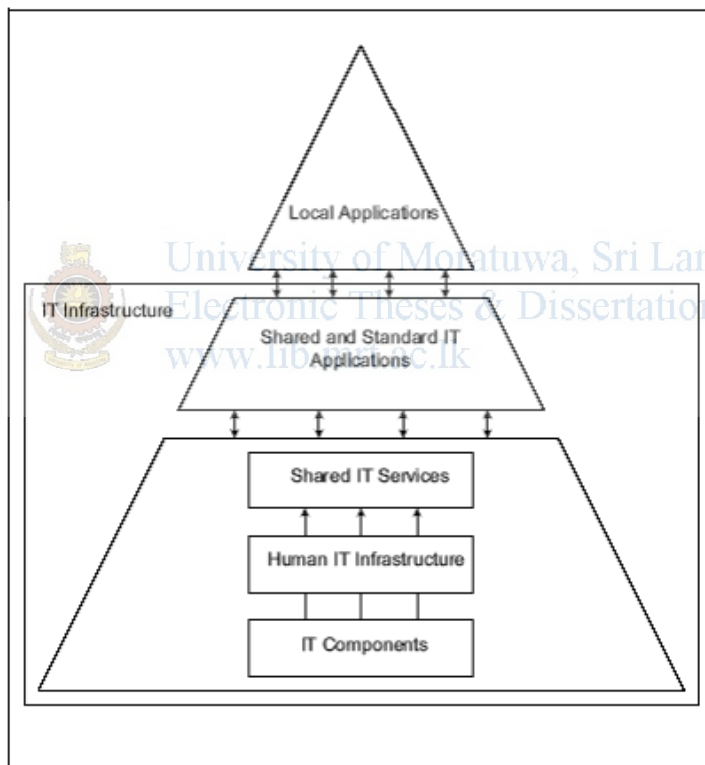
S. H. Chung, T. A. Byrd, B. R. Lewis and F. N. Ford [9] in their empirical study of IT infrastructure flexibility research, have taken the components of an organizational IT infrastructure as networks, databases, and applications, storage systems and skills and capabilities of IT personnel.

A. Chanopas, D. Krairit and D. B. Khang [10] have recently in year 2006 defined the IT infrastructure as a set of shared IT resources, which is a foundation for both communication across the organization and the implementation of present/future business applications. Further, they have mentioned that IT infrastructure comprised two broadly defined infrastructures: technical and human. Technical infrastructure includes hardware, software, the network, telecommunications, shared IT applications and tangible IT

resources. Human infrastructure refers to the knowledge and skills required to manage IT resources within an organization.

The above review has shown that the definition for IT infrastructure is quite consistent in the available literature.

Therefore, considering the above definitions including Broadbent, Weill[3],[6] and A. A. Chanopas, D. Krairit and D. B. Khang[10] views, a comprehensive picture of IT infrastructure can be shown as illustrated below.



**Figure 02: IT Infrastructure**

(Source: A. Chanopas, D. Krairit and D. B. Khang[9] )

### **Technical IT Infrastructure:**

#### **Shared/Standard IT Applications**

This layer consists of applications, which change less regularly and are similar to data base related, Enterprise Resource Planning (ERP) related applications.

#### **Shared IT Services:**

This is a set of services that users can understand and use in businesses; they are services, which are stable over time such as shared customer databases, support services PC/LAN access or intranet.

#### **IT Components**

At the base of infrastructure are IT components such as computers, printers, routers, operating systems and other devices.

#### **Human IT Infrastructure:**

This layer consists of knowledge, skills and experiences of IT personnel to bind IT components into services.

### **2.3 Trends, Challenges and Concerns of IT Utilization**

The business organizations always take initiatives to align information technology to major business requirements. Hence the identification of trends and challenges of utilizing of IT is very important. The key trends [11] indicated below indicates the urgency for IT organizations to shift from their traditional technical focus, to one that delivers services optimally to its business customers.

1. Increased scrutiny of IT value, as business executives focus on IT as a budget area for company financial savings
2. Heightened visibility of external IT service alternatives
3. Increased scope of responsibility, as the business's cost per each hour of IT downtime increases



A 2006 study by Chief Information Officer (CIO) research surveying 500 heads of IT in United States of America (USA) concluded that CIOs see reducing costs and enabling business innovation as the two most important ways in which they impact the enterprise [12]. Therefore, CIOs must keep their organizations running smoothly and they must achieve uninterrupted operations even as they develop and implement new strategies to enable business goals as noted [13]. IBM [13] noted, specific challenges facing IT today and ways to meet those challenges as suggested below:

1. Controlling costs
2. Integrating disparate systems to simplify the infrastructure
3. Appropriately allocating resources to address long-term enterprise-wide needs
4. Performing the same amount of work — or more — with fewer resources
5. Focusing on IT governance and strategic planning in order to manage priorities.

Ways to meet these challenges include the following initiatives:

- a. Automation of IT management
- b. Standardization of operating systems, applications and system software
- c. Automation of service level agreements to meet set business policies

According to Forester's Survey F [14] on North American and European Enterprise infrastructure and data center, the major concerns about IT infrastructure include:

- i. Disaster recovery, security, and compliance as top IT themes for the next 12 months.
- ii. Hardware spending to have a higher proportion of new investment as against operations and maintenance than the overall IT budget.
- iii. Server vendor choices to be stable even as firms rapidly grow their adoption of server virtualization.

- iv. Storage priorities to center on data retention and archiving. Firms show strong adoption and interest in systems management technologies such as automated server patch management and data center automation.
- v. 40% of firms report that they plan to deploy Windows Vista within one year of its release.

## **2.4 Different Frameworks of practices of IT Infrastructure**

There are various ways to organize an infrastructure. However, there is no such structure that applies optimally to all situations. This is due to factors such as size, maturity, and orientation of a firm [15].

The development of these frameworks is very helpful for CIOs as well as other strategies to use them as the benchmark for technical capability and business value. Further, any organization can use the same to measure the sophistication of their current IT processes and technology investments and prioritize future IT investments.



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### **2.4.1 Framework of best practices: IT Infrastructure Library**

The Information Technology Infrastructure Library (ITIL) developed by the United Kingdom(UK) Government's Central Computer and Telecommunications Agency (CCTA), and ITIL is a registered trademark of the UK Government's Office of Government Commerce (usually known as the OGC).ITIL is a framework of best practice approaches intended to facilitate the delivery of high quality Information Technology services. These procedures are supplier-independent and have been developed to provide guidance across the breadth of IT infrastructure, development, and operations. In 1980, IBM documented the first version and the details of core areas of Best Practices related to IT Infrastructure described by ITIL Version 2 are indicated below as per the ITIL organization.[16].[17]

## **Service Support**

With regard to services support, the primary concern is to ensure that users have access to the appropriate services to support business functions. Availability of help desk as a single point of contact point for the customer to record problems is a major concern of service support. This will lead to a chain of processes if there is no solution. These processes include Incident Management, Problem Management, Change Management, Release Management and Configuration Management. The ultimate objective fulfilling all the management processes is to ensure appropriate support to stakeholders.

## **Service Delivery**

As per ITIL, the service delivery discipline is primarily concerned with the proactive and forward-looking services that the business requires of its Information and Communication Technology (ICT) provider in order to provide adequate support to the business users. These processes are supported in three levels of services management such as strategic level, tactical level and operational level as providing full support for IT services.

Major concerns of delivering a quality service include Service Level Agreement (SLA) management for critical IT components and services, optimum and cost effective provision of IT services to organisations to match their IT resources to the business demands, practices for availability and rapid restoration of IT services in the event of a disaster and sustenance of IT service availability in order to support the business at a justifiable cost.

## **Security Management**

The ITIL security management has concerns about structured fitting of information security in the enterprise. These practices are also based on a code of practices for information security by International Standards Organizations/International

Electrotechnical Commission (ISO / IEC) 17799. One of the major concerns is the use of better policy for security.

### **ICT Infrastructure Management**

ICT Infrastructure Management addresses the best practices for requirements analysis, planning, design, deployment and ongoing operations management and technical support of an ICT infrastructure. These practices are directly related to practices of the IT equipment and software deployment and operation in serving Customers as well as internal Employees. The ICT Infrastructure Management comprises of 4 areas such as ICT Design and Planning, ICT Deployment, ICT Operations and ICT Technical Support. ICT Design and Planning provides a framework and approach for the Strategic and Technical Design and Planning of ICT infrastructures. ICT deployment provides a framework for the successful management of design, build, test and deploy projects within an overall ICT programme. ICT operations management provides the day-to-day technical supervision of the ICT infrastructure. The primary work should be concerned with a number of specific sub-processes, such as: Output Management, Job Scheduling, Backup and Restore, Network, System, Database, Storage Monitoring and Management. ICT Technical Support is the specialist technical function for infrastructure within ICT.

ITIL Version 3(V3) mainly addresses following core titles .[18][19]

#### **Service Strategy**

This ITIL V3 provides guideline on design, development, and implementation of service management, not only as an organizational capability, but also as a strategic asset.

#### **Service Design**

This provides guidance on how to design and develop IT services. The continuity of services, conformance to standards and regulations and achievement of service levels are highly considered here.

## **Service Transition**

The service transition provides guidelines to measure whether design and implementation of a Service ensures the delivery of intended strategy.

## **Service Operation**

This provides guidance with the management of a service through its day-to-day production life.

## **Continual Service Improvement**

The measurement of service performance through the service life cycle and the improvements are considered.

### **2.4.2 Microsofts Operations Framework(MOF)**

This Framework is again based on ITIL, but defines a more limited proprietary implementation and this is well suited for organizations which are not able to fully adopt ITIL guidelines.[20]. This framework is more suitable for achieving mission-critical system reliability, availability, supportability, and manageability with Microsoft products and technologies.

The foundation elements of MOF comprise:

- i. The Process Model
- ii. The Team Model
- iii. The Risk Management Model

The MOF Process Model provides the description of processes that operations teams perform in order to manage and maintain IT services. It is organized around four quadrants and twenty service management functions as indicated below.[21]

**a. Changing** The processes in this quadrant address the introduction of new solutions, technologies, systems, applications, hardware, and processes in the environment. This includes:

- a.1 Change Management
- a.2 Configuration Management
- a.3 Release Management

**b. Operating** The processes in this quadrant revolve around effective and efficient execution of day-to-day tasks.

- b1. Systems Administration
- b2. Security Administration
- b3. Directory Services Administration
- b4. Network Administration
- b5. Service Monitoring and Control
- b6. Storage Management
- b7. Job Scheduling

**c. Supporting** The processes in this quadrant revolve around the resolution of incidents, problems, and inquiries.

- c1. Service Desk
- c2. Incident Management
- c3. Problem Management

**d. Optimizing** Focuses on changes to optimize performance or capacity, increase availability, or decrease costs in the delivery of IT services.

- d1. Service Level Management
- d2. Financial Management
- d3. Capacity Management

- d4. Availability Management
- d5. Workforce Management
- d6. Security Management
- d7. Infrastructure Management

The Team Model simplifies the view of team roles and helps management focus on organizing people effectively. It supports the process model by providing guidelines for organizing people into operational teams, or role clusters, and describes the key activities within each role cluster. The MOF risk model helps organizations manage risk while running their business. It is composed of a set of guiding principles and a risk management process.

### **2.4.3 Infrastructure Optimization Model(IOM)**

The Infrastructure Optimization Model[IOM] [22] describes the technologies and key steps that organizations can use to move forward. MOF explains the people and processes required to improve an IT infrastructure. Together, the infrastructure optimization model and MOF provide a complete model and guidance for IT professionals to use in optimization efforts.

By working with Microsoft and using this model as a framework, an enterprise can quickly understand the strategic value and business benefits to the organization in moving from a "basic" level of maturity (where the IT infrastructure is generally considered a cost center) towards a more "dynamic" use, where the business value of the IT infrastructure is clearly understood and the IT infrastructure is viewed as a strategic business asset and business enabler.

<b>Level of IOM</b>	<b>IOM level Description</b>
<b>Basic</b>	<p>Most IT resources are used to keep IT functioning with reactive management.</p> <p>Systems are complex, incompatible, and expensive and do not provide services throughout the organization.</p>
<b>Standardized</b>	<p>Organizations run somewhat effective, centralized IT departments.</p> <p>IT systems remain complex, incompatible, and expensive and are run as standalone operations.</p>
<b>Rationalized</b>	<p>Long-term IT strategy is developed jointly by business and IT groups.</p> <p>IT policies are defined with business criteria and enforced with IT processes and technology.</p> <p>This is the most cost-effective infrastructure optimization state</p>
<b>Dynamic</b>	<p>Cost savings are secondary to maximizing business agility, which is a source of competitive advantage.</p> <p>Some decision-making is decentralized to bring decisions closer to business processes.</p> <p>IT systems are highly automated, flexible, and respond quickly to changing business conditions.</p>

**Table 01: Microsoft IT Infrastructure Optimization Model**

This model defines five capabilities that are required for optimized IT infrastructure such as: Identity and Access Management, Desktop Server and Device Management, Data Protection and Recovery, Security and networking and IT and Security Process [23].

#### **2.4.4 Other Frameworks of IT Infrastructure Management**

In addition to Information Technology Infrastructure Library, other IT service management frameworks are available. Some of them are derived using ITIL and some are for special use depending on the actual requirement.



The British Educational Communications and Technology Agency (BECTA) has developed the Framework for ICT Technical Support (FITS) and is based on ITIL, but it is specially developed for UK primary and secondary schools (which often have very small IT departments)[17]. The visible OPS handbook has been implementing ITIL in practical and auditable steps. The enhanced Telecom Operations Map (eTOM) is an alternative framework for telecommunications service providers.

## **2.5 Business Performance**

Entrepreneurs run businesses expecting good return. If the business produces good return then it reflects better business performance. Towards better business performance organizations have been deploying information technologies to solve business problems. Therefore, it can be concluded somewhat that business performance is a measure of the contribution from business and technology domains to the business objectives of the firm. Several researchers in the past have devoted their attention and concern towards finding ways and means of measuring business performance. Most of them are of the opinion that businesses can no longer measure performance in indirect terms. Only concrete performance metrics such as revenue and profits matter. [24] In expressing results only a comprehensive, detailed and accurate financial reporting is acceptable.

A. Neely [25], observes that at most senior levels of the organization, financial performances are inevitably considered major considerations for measuring business performance even though other non-financial measurement processes are evolving. According to his consideration, there are three major functions for financial performance measurement and they are indicated below:

1. Financial measures of performance as tools of financial management. This concerns about efficient provision and use of financial resources to support organization functions.
2. Financial performance as a major objective of the organization

Measures like Profit, Return on Investment (ROI) or Earning Value Analysis (EVA)

3. Financial measures of performance as mechanism for motivation and control within the organization

S. H. Chung and T. A. Byrd consider ROI, Sales Growth and Market Growth in measuring the business performance of the firms.[9]. A. Chanopas, D. Krairit and D. B. Khang [10] have recently assessed business performance through trends in return on investment, profitability, liquidity, and business growth.

Leadership and Planning have been considered as other top factors in addition to technology, which contribute to business performance.[26]

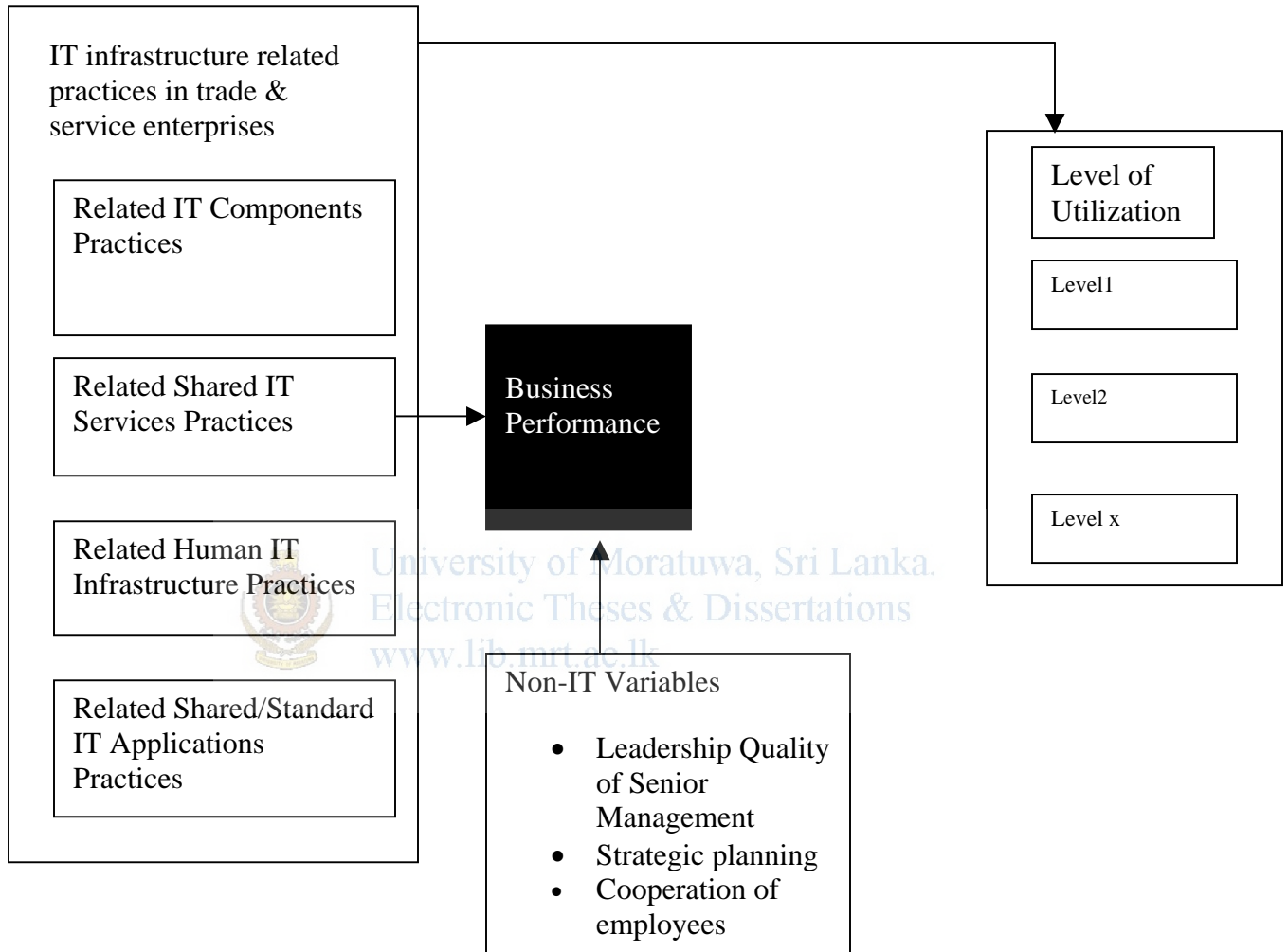
Therefore, considering all assessments of business performance in previous researches, it is evident that the above common variables are used.



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### 3. RESEARCH METHODOLOGY

#### 3.1 Conceptual Model



**Figure 03: Conceptual Model for Research**

This proposed research model describes the principal research question of how IT infrastructure has been utilized in achieving business performance. The major independent variable is IT infrastructure related practices and the dependant variable in this model is the business performance in trade and services enterprises. Since the IT infrastructure comprises four major components, here in this research model those four components are considered as sub-independent variables. Also the researcher has

considered a few major non-IT variables: leadership quality and strategic planning of top management and the cooperation of employees to check the impact on business performance. After observing the relationship of IT infrastructure with business performance, the whole relationship could be observed for the same with the existence of the non-IT variables.

Since this research will consider different practices in organizations, the level of utilization of these practices can be derived. After an analysis of practices adapted, the researcher expects to identify whether a relevant difference of practices could be observed. If any level of difference is observed among sectors, then the level of utilization of IT infrastructure practices will be tabled as described in the models in the literature review. [20], [23]

## **3.2 Hypothesis**

### **3.2.1 Hypothesis: H1**



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**Hypothesis: H1:** The firms with higher levels of IT infrastructure related practices show higher business performance

The IT infrastructure related practices comprise related IT component practices, shared IT services practices, related human IT infrastructure practices and related practices of shared IT applications. The heavy utilization of the above IT infrastructure practices may or may not lead to higher business performance.

### **3.2.2 Sub Hypotheses**

The following sub hypothesis can be derived considering components of IT infrastructure and the relationship with business performance.

H1<sub>a</sub>: The firms with higher levels of IT component practices show higher Business Performance

H1<sub>b</sub>: The firms with higher levels of related shared IT services practices show higher business performance

H1<sub>c</sub>: The firms with higher levels of related Human IT infrastructure practices show higher business performance

H1<sub>d</sub>: The firms with higher levels of related shared IT applications practices show higher business performance

### **3.3 Research Model Operationalization**

Therefore, in the research model, it was decided to consider, to a certain extent, checking practices, which have been deployed to achieve IT maxims considered in previous research. [7], [10], [16-19]

According to the research model, the main concept- the IT infrastructure conceptualized another four sub concepts. Then the variables were chosen in such a way that they measure the sub-concepts, which ultimately measure the major independent variable of IT infrastructure.

To test the model the measurements for variables were selected considering the pre-tested existing scales in previous empirical research as well as the views of industrial expertise and experience of the author.

The definition of IT infrastructure was selected after considering Broadbent, Weill[3] and A. Chanopas, D. Krairit and D. B. Khang[10] views of IT infrastructure which followed consistency with most other previous research.

For the measurements of four concepts in IT infrastructure, the practices described in the literature of IT infrastructure library [16][17], Microsoft Operational Framework [20] and some of the empirical studies [8] were considered as guidelines. The ITIL and MOF,

which basically follows ITIL, describe related practices of IT infrastructure with many other areas. When concepts were operationalized, the major practices described in ITIL and MOF were mainly considered. The related practices of four concepts measure each proposed concept. Some of the features in each concept are also considered since this study is to analyze the IT infrastructure as a whole.

In Forester’s survey [14] for IT infrastructure: Disaster recovery, security, spending a portion of budget, server and desktop operating systems practices were also considered as major guidelines.

This research has considered three non-IT related variables such as leadership quality of top management, strategic planning in the organization and cooperation of employees. The leadership quality indicates how senior leaders guide a business unit through values, directions, and performance expectations and their review of organizational performance [28]. Strategic planning quality refers to the strategic planning process in a business unit, including strategy development and deployment. [28]. Cooperation, which can impact on business performance, can be defined as an orientation towards the collective interest where individuals work together to complete tasks. The non-IT related variables were chosen as per the above definition of those variables. The following Table 02 indicates the operationalization of major concepts.

Concept	Variables
Related Practices of IT Component	Flexibility of IT components
	Nature of monitoring
	Level of matching with standards
	Maintenance of critical components
	Level of disaster recovery
Related shared IT services practices	Reliability of service
	Use of Intranet
	Nature of IT help desk support
	Nature of data center support
	Level of access of shared data bases

	Accuracy of shared data
	Level of connectivity for services
Related Practices of Human IT Infrastructure	Knowledge of IT personnel
	Knowledge update
	Skills of IT personnel
	Experience of IT personnel
	IT Procedures followed
	Ability to teamwork
	Nature of characteristics
Shared/Standard IT Applications practices	Nature of support
	Integration of major business processes
	Flexibility of modification
Business Performance (Before IT Used & After IT was heavily used)	Turn over
	Net profit
	Market share
	Sales growth
	Return on investment
	Liquidity ratio

**Table 02: Operationalization of major concepts**

**Major Non-IT related Variables**

Concept	Variables
Leadership Quality	Communicating values
	Supportiveness
	Level of reviewing Org performance
Strategic planning	Planning for customer and market needs
	Planning for competitive environment
	Level of strategic decision process
Cooperation of employees	Commitment to goals
	Cooperative effort
	Level of mutual trust.

**Table 03: Major Non-IT related Variables**

However, the variables presented in this proposed model are complex, some cannot be directly observed. Therefore, they cannot be directly measured completely. In such cases, most of the literature [9], [27] recommends to use multi-item scales. With multi item scale, the composite score must be taken of each item in order to construct measure to principal concept. The following Table 04 indicates the number of questionnaire Items used for measuring variables.

Variables	Number of Items	Reference
Business Performance	6	[9], [10], [25]
IT Components related practices	5	[10], [7], [14], [16-19], [20]
Related shared IT services practices	7	[10], [7], [14], [16-19], [20]
Related practices of Human IT Infrastructure	7	[6], [8], [14], [18], [26]
Related Shared/Standard IT Applications practices	3	[10], [7], [14], [21-22]
Leadership	5	[26],[28]
Strategic Planning	3	[26],[28]
Cooperation	3	[26],[28]

**Table 04: References for main variables**



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### 3.4 Survey

IT has become an indispensable common tool for any organization today. Accordingly, the investment for IT has increased in a tremendous way. Almost all industry sectors show a keen interest towards use of IT. The services sector can be considered as one of the leading sectors which heavily uses IT and the business applications heavily depend on the level of IT utilization with sophisticated IT infrastructure. However, the deployment or utilization of IT in different services sectors organizations is varied. Therefore, the focus of this study is to identify the utilization of IT in the services sector as a whole and further, to find any difference between sub sectors of the same.

After completing a preliminary study with the support of the officials of the Department of Census Sri Lanka, the population for this research is identified as follows. The total number of large establishments with employees more than hundred of the trade &



services enterprises in Colombo district is: 292 and the numbers are indicated in the Table 05 below.

Employment Group (Large Enterprises)	Wholesale & Retail Trade, Hotel & Restaurant	Transport, Travel & Communications	Financial & Business Services	Social, Health, Education and recreational Services	Total
100 –400+	72	40	80	100	292

**Table 05: Statistics of Service Sector organizations**

The survey research method was considered and 88 numbers of organizations (representing 30% of above total) were selected as the sample using stratified random sampling method. The questionnaire consists of two document sets: To analyze the IT infrastructure and the other one to measure business performance. Sending e-mails after contacting respective personnel over the phone and sending hardcopies were two methods of distributing the questionnaire. The respondents were service sector enterprises located in the Colombo District.

### **3.5 Limitations**

Getting financial related information was somewhat difficult at the initial stage because the questionnaires were distributed to IT managers/senior IT personnel who are responsible for the overall IT operation of the company. Such respondents were asked to forward the business part to a senior finance person. Realizing the difficulty of data collection, remedial action was taken to contact a senior finance person and the questionnaire was sent to him directly. However, additional effort had to be made to follow up and ensure collection of both completed questionnaires.

## **4. ANALYSIS**

### **4.1 Introduction**

As a pilot study, the initial questionnaire was prepared as one document, which comprised both IT infrastructure related questions and business performance questions and it was sent to senior IT personnel. But, it was observed that response rate was very low for a pilot study done for the business performance part, since most of the IT personnel who received questionnaires had only answered to IT section. Therefore, the questionnaire was re-prepared as two major documents to collect data for IT infrastructure characteristics and practices and to collect business performance data. Some questions were also restructured considering the level and the type of answers received. Then, both questionnaires were sent to executives, IT managers or to a higher category requesting them to forward the business performance questionnaire to a senior finance person.

On receiving the answered questionnaire the researcher, coded the answers during the initial phase of the analysis. The general demographics variables were coded as the answer ticked by the respondent. For example, position held by the person who filled the questionnaire was marked as Executive =1, Manager =2, Chief Officer =3, Managing Director (MD)/President =4 other =5.

The IT infrastructure related questionnaire was directed towards measuring types and characteristics of IT infrastructure categories such as IT components, shared IT services, IT personnel and shared IT applications. Most of the answers to the above contribute the descriptive results. The related practices of the four categories of the IT infrastructure mentioned above are used for statistical analysis for hypothesis testing. Further, both raw financial data and Likert scale measures from business performance questionnaire are used for descriptive analysis as well as for statistical analysis.

The measurement of IT infrastructure related practices followed Likert question type and the code values used for analysis are as indicated below.

Practice	Totally Disagree 1	Disagree 2	No Idea 3	Agree 4	Strongly Agree 5
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

It is observed that most of the respondents have marked the answer for these types of questions. However, missing answers were filled using the mean value of the scale defined when analysis was done. The survey questionnaire had many questions to collect service sector data, which has not been fully collected by any other Sri Lankan academic researcher. Major operating system used for desktops and servers, number of different devices Ex: computers, servers and routers and also network security, user management, IT policy use are some of the examples.

These scores: coded values were then entered into a statistical package for Social Scientists (SPSS), in order to be statistically analyzed. Also some of the data fields in the SPSS were entered in to Microsoft Excel spreadsheet during the analysis in order to do further analysis.

Each questionnaire was pre-processed with several options for data validity and integrity. Another person in the organization was used for a random cross checking of some of the answers. Such checks and reference to annual reports were major checkups done for data validity.

Questionnaires were checked for incompleteness and inconsistencies. Incomplete questionnaires and questionnaires filled by the non-relevant sector, ex: manufacturing was removed.

Some of the raw data were used with coded value as well as with average values. Ex: data for numbers of computers, net profit etc. was asked to tick one from given different ranges. Average value has been taken for statistical analysis and the coded value is used for descriptive analysis.

The questionnaires were distributed to eighty-eight organizations and fifty-one valid questionnaires were received providing a response rate of 58%.

## 4.2 Results

The results section comprises outcome of the descriptive analysis done on the IT infrastructure in service organizations and the outcomes of statistical analysis of the collected data.

### 4.2.1 The summary of the details of Respondents

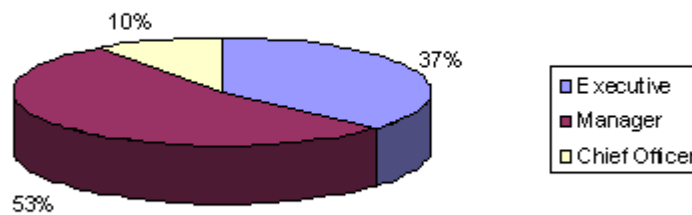
The first section of the results analysis is the respondent's details and the respondent organization details. The following table summarizes the respondent's details.

Characteristics of the Respondent	Sample
Job Title	
Executive	37%
Manager	53%
Chief Officer	10%
Characteristics of the Company	
A. Number of Employees	
Between 100 and 200	27.50%
Between 201 and 300	3.92%
Between 301 to 400	13.70%
Between 401 to 500	7.84%
Between 501 to 1000	9.80%
Over 1000	37.25%
B. Turn Over (in millions)	
100-250	21.57%
251-500	3.92%
501-1000	7.84%
1001-1500	11.76%
1501-2000	19.61%
2001-5000	13.73%
5001-10000	1.96%
10001-15000	7.84%
20001-25000	3.92%
25001-30000	3.92%
Above 30 000	3.92%

C: Service Sector Main Category	
Wholesale, Retail and Hotels Services	19.6%
Wholesale & Retail	17.64%
Hotel & Restaurant	1.96%
Communication, Transport and Travel Services	23.52%
Transport & Travel	9.8%
Communication Services	13.72%
Financial and Business Services	37.24%
Finance Services	19.6%
Insurance	3.92%
Business Services	12.72%
Health, Education and Recreational Services	19.6%
Education	7.84%
Health and Social work	7.84%
Recreational Services	3.92%

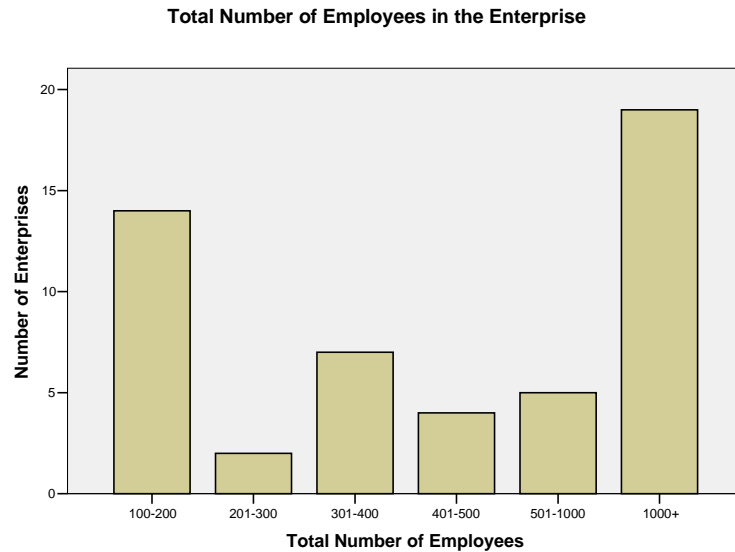
**Table 06: Details of Respondents**

The majority of the respondents (53%) were managers of the service sector organizations. The other titles were executives (37%), chief officers (10%). It was observed that no Managing Director or President had participated in this survey.



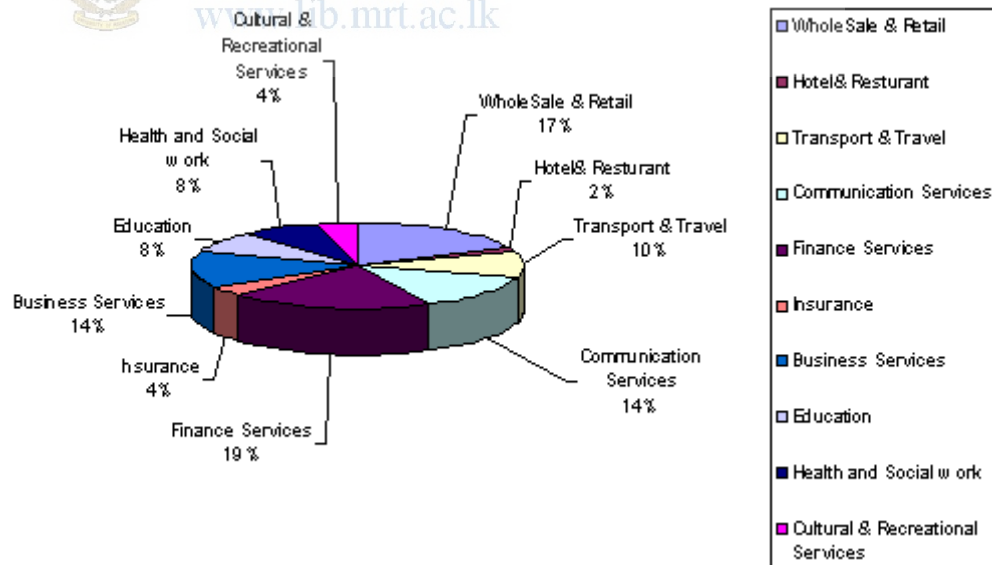
**Figure 04: Title of the Respondents\_IT**

The Figure 05, bar chart below shows that the majority (33.3%) comes from the large-scale enterprises, which have more than a thousand employees employed.



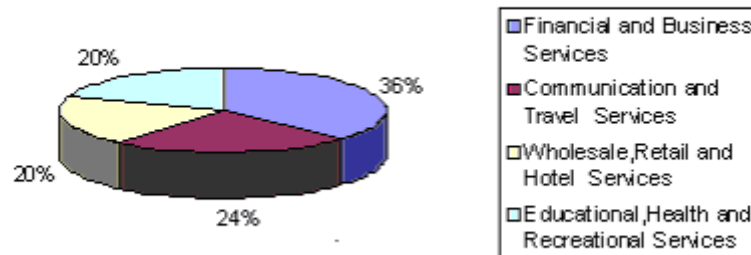
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**Figure 05: Distribution of the employees**



**Figure 06: Whole Service Sector Distribution**

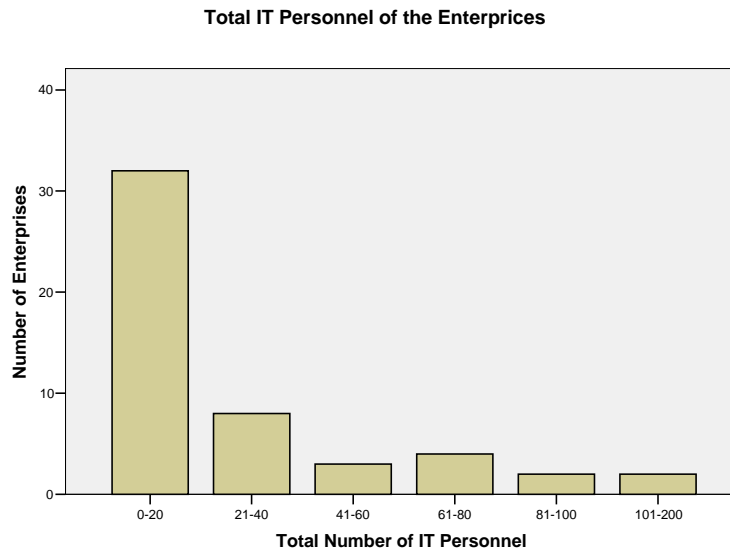
The respondents were from the ten service sector sub categories as indicated above. However, the four major service categories could be derived from the above list as per the ISIC standard classification. According to this classification the survey results from those four major sectors as a percentages are as follows.



**Figure 07: Major Service Sector Distribution**

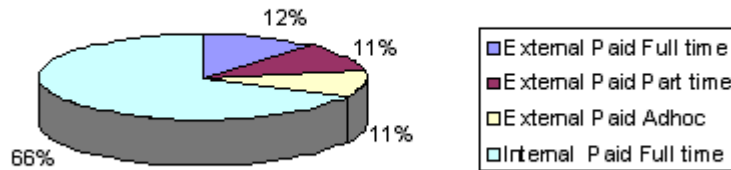
#### 4.2.2 Present Level of IT infrastructure Utilization

Figure 08 shows IT personnel employed in the organization. The majority (60%) of the firms employed one to twenty employees or under and 16% of the firms employed employees between twenty and thirty. The mean number of IT personnel worked is twenty-eight.



**Figure 08: Distribution of the IT personnel**

The following graphs indicate that more number of services sector organizations prefer to have their own internal IT staff. This may be due to difficulties in handling external parties. We can conclude that from this sample selected, outsourcing IT works to others especially in IT infrastructure area is still lacking.

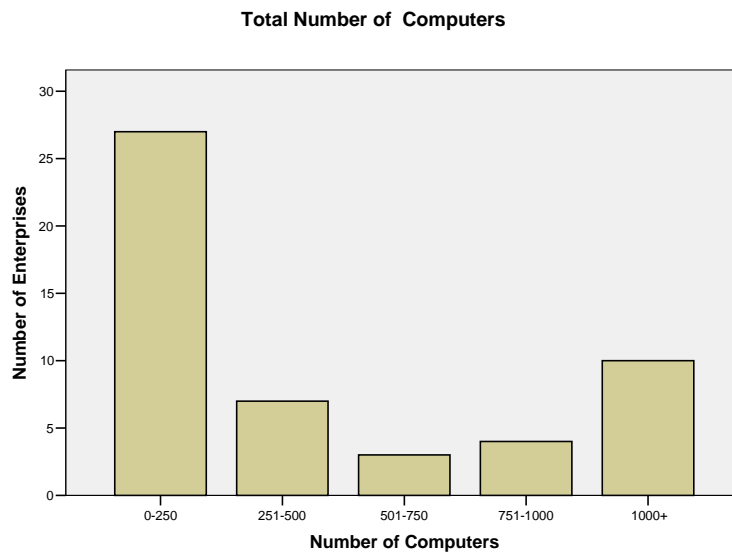


**Figure 09: Distribution of the IT Personnel-Based on Internal or External**

The working computers distribution shows the number of computers available is between 0-250 and it is 52% of the sample. 10% of firms have more than thousand computers.



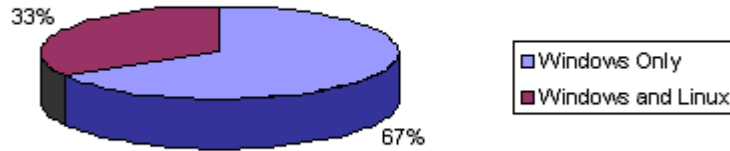
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**Figure 10: Distribution of the personal computers**

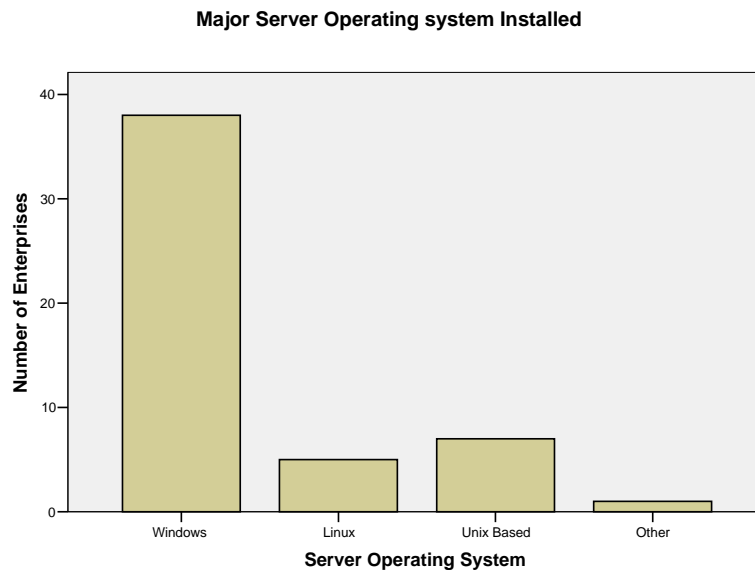


Considering the desktop operating systems in service sector organizations, it is noted that Microsoft Windows plays an important role over others. 62% of the firms have indicated that they used Windows over others.



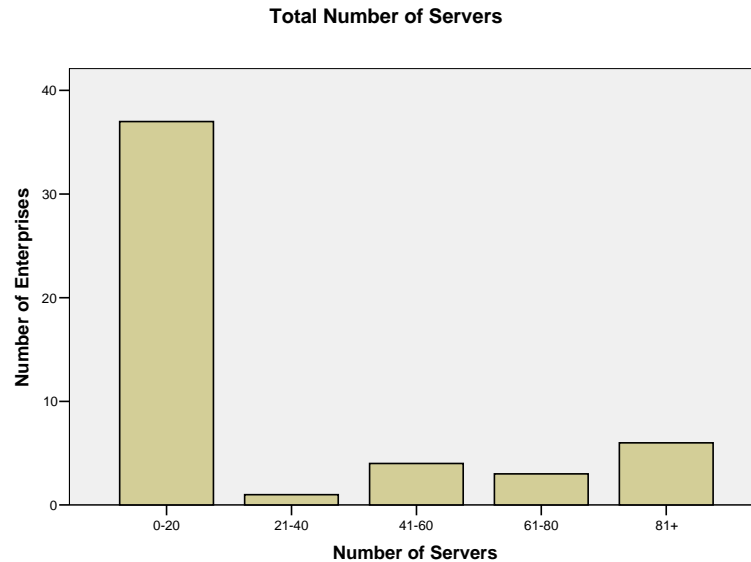
**Figure 11: Distribution of the Desktop operating systems use**

The research also examined the major server operating system installed in these organizations since server operating systems are a major consideration in the heavily IT driven industry segment. That is because they all consider total cost of ownership when purchasing these high-end server operating systems. The results show that again Windows played a remarkable role with server operating systems over others. Especially big players in the banking and telecom sectors used Linux and Unix flavors while Microsoft Windows dominates the rest.



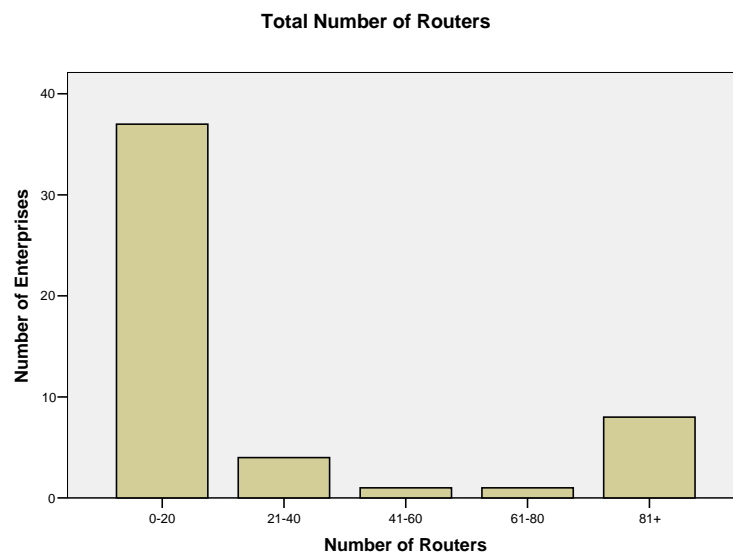
**Figure 12: Distribution of the Major Operating systems use**

The researcher has examined the number of servers used in service sector enterprises and observed that 72% of firms have servers between 0-20 whereas 12% enjoys more than 80 servers.



**Figure 13: Distribution of Number of Servers**

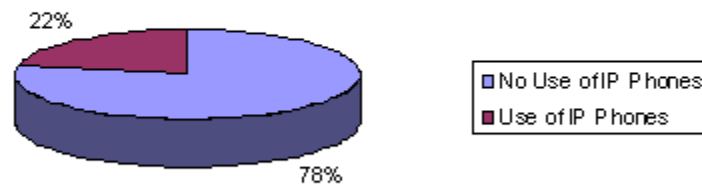
The use of these servers and desktops for running business applications was also examined. A majority of firms are run 6-10 business applications. How far these organizations extend their Infrastructure was examined by getting the number of workable routers.



**Figure 14: Distribution of Number of Routers**

The above results indicated that most of the service sector firms have a sufficient number of Wide Area Network (WAN) Links. This is an indicator of how they have distributed the business ventures through out the country.

Involvement of Voice over IP (VOIP) was also considered. The results show that more than 72% of firms are not currently using IP related phones for voice communication.



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**Figure 15: Use of IP Phones**

The interest shown towards IT by these organizations also indicated a strategic plan as well as investment in IT. It is observed that spending on mode IT infrastructure is between 0-20percent whereas 21%-40% category comes next.

IT Budget as % of Company Budget		
Budget %	Number of Enterprises	Percentage
<20%	33	64.71
20%-40%	10	19.61
41%-60%	7	13.73
61%-80%	1	1.96
	51	100.00

**Table 07: Distribution of IT Budget**

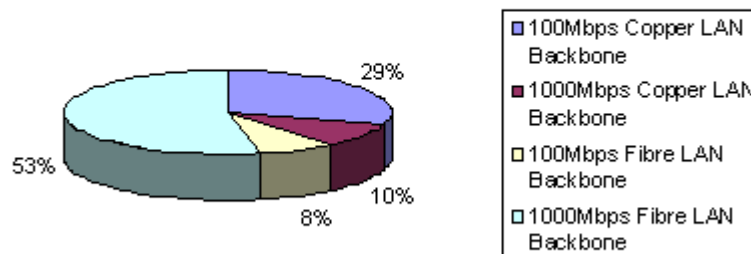
The research examined the utilization of many IT infrastructure good practices.

The following Table 08 shows how firms utilized them. All the practices usage exceeds fifty percent while using pre-prepared software images for installing desktop computers is still lacking.

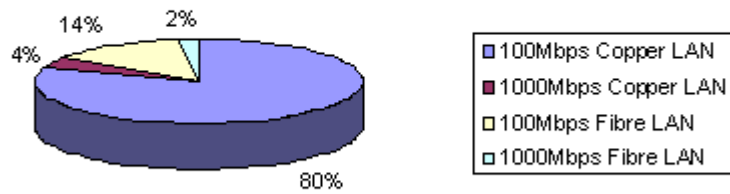
Best Practices	Percentage of those who have this feature
Use Centralized Software distribution for Desktops	56%
Use Anti-Virus Software in almost all Desktops	88%
Use pre-prepared Software Images for Desktops	42%
Use a central firewall	84%
Central tool to manage user accounts	78%
Have active Acceptable Use Policy	68%

**Table 08: Distribution of other practices**

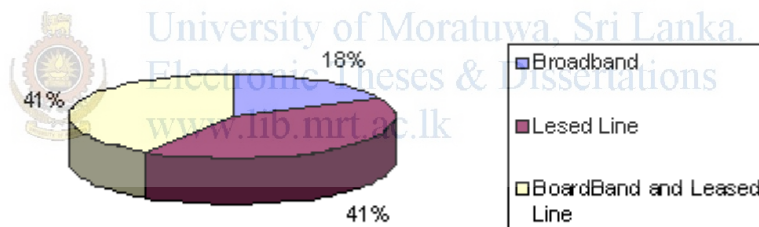
The bandwidth availability of Local Area Network (LAN) and its Backbone was examined since LAN is one of the major components in IT infrastructure on which all the data sharing takes place. The higher the speed, LAN shows better performance in supporting or handling two many concurrent connections. The results showed that fibre cabling now dominates enterprise LAN backbone cabling and LANs still use copper cabling.



**Figure 16: LAN Backbone types**



**Figure 17: LAN Speed Distribution**



**Figure 18: Major Internet Access Types**

The above figures shows the utilization of Broadband and Leased lines Internet connectivity in the service sector, which is heavy.

**Strategic Plan:**

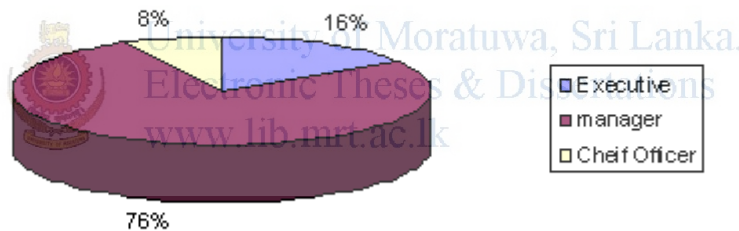
The research also examined whether the sample organizations has a strategic plan for IT or not. Around 30% of the enterprises have not focused on the importance of having a strategic plan for IT. However, the majority of the rest (70%) have a strategic plan for the use of IT. Table 09 indicates the frequency distribution for duration of strategic plans.

	Frequency	Valid Percent
Non Availability of strategic Plan for IT	13	25.5
Availability of strategic Plan for IT	38	74.5
Total	51	100.0

**Table 09: Use of IT strategic Plan**

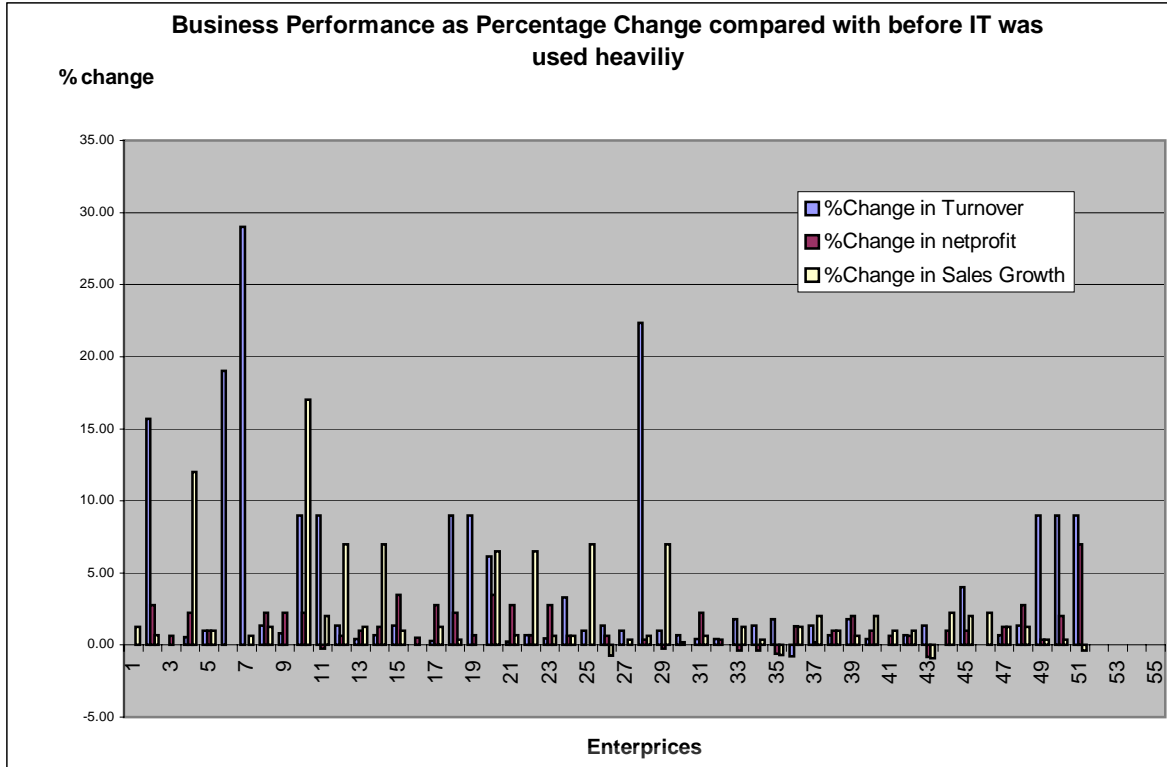
#### 4.2.3 Business Performance variables

The titles of the respondents are shown in Figure 18 below.



**Figure 19: Title of the Respondents \_Business**

The business performance is measured by getting actual data for after tax net profit percentage, turn over and sales growth. The percentage in change of business performance variables was analyzed against before IT was used heavily and after IT was heavily used. The percentage changes of turnover, net profit and sales growth was also analyzed. The following graph indicates that the positive percentage change is observed against the earlier values. Hence, we can confirm that the business performance of service sector organizations experience a positive change with the implementation of IT infrastructure.



**Figure 20: Change in Business Performance**  
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The year of major improvement or major change in IT infrastructure was also examined. Around 74% of the firms have answered the above question in the questionnaire.

Year	Percentage % of Number of Firms
1995	2.63
1999	2.63
2000	26.32
2001	7.89
2002	23.68
2003	5.26
2004	7.89
2005	15.79
2006	5.26
2007	2.63

**Table 10: Major IT Improvements by Year**

The majority of firms have accomplished a major improvement or investment in IT in year 2000. Year 2002 is the next. The table 10 above shows that IT improvement has taken place as an essential task.

All the graphs relevant to financial variables show that the present business performance is higher than the business performance before IT was heavily used.



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## 4.3 Statistical Analysis

### 4.3.1 Reliability of Item measures

The reliability must be measured first before the hypothesis testing is done. The reliability was measured using Cronbach's alpha value for items, which are for testing.

The analysis shows that items have shown sufficient reliability required. The alpha values for major measurements taken from the questionnaire are indicated below.

Variable	<i>Alpha Value</i>
IT Infrastructure Related Practices	0.842
Related Practices of IT Components	0.711
Related Practices of IT Services	0.705
Related Practices of IT Personnel	0.725
Related Practices of Shared IT Applications	0.725
Business Performance	0.710
Leadership of top Management	0.710
Strategic Planning	0.720
Corporation of non IT employees	0.708

Overall Alpha	0.893	38 Items
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**Table 11: Reliability Analysis**

The independent and dependant variables as well as non-IT related variables show alpha value more than 0.69. Also all the items showed normal distribution. Hence, the reliability of the measures is confirmed and these items could be used for statistical analysis.

### 4.3.2 The Descriptive Statistics

The following Table 12 indicates the descriptive statistics for items, which are under main constructs discussed above.

	ITEM	Mean	Standard Deviation	Minimum	Maximum
1	Unused switch ports are sufficient for 10% increase of future connections	3.36	1.20	1.00	5.00
2	There are formal ways of monitoring critical recourses for availability	3.42	1.20	1.00	5.00
3	Current corporate rules and standards for hardware and operating systems support future platform compatibility	3.72	0.80	2.00	5.00
4	Maintain Service Level agreements for critical IT components properly	3.82	1.30	2.00	5.00
5	Taking backups and do restorations for critical Servers at due time.	3.84	1.00	2.00	5.00
6	Service downtime due to failures of WAN Link is very rare	3.94	1.00	2.00	5.00
7	Customer support time has been tremendously reduced due to Higher performance of Intranet	3.56	1.10	2.00	5.00
8	Our IT help desk pays prompt attention to requests	4.08	0.80	2.00	5.00
9	Our data center can provide any service that customer requires	3.04	1.14	1.00	5.00
10	Database oriented Applications are regularly used in daily operations	3.96	0.89	1.00	5.00
11	There are no complaints about the accuracy of shared data in databases	3.68	0.92	2.00	5.00
12	Our users feel happy about easy access of shared data required by them	3.92	0.65	2.00	5.00
13	Our IT personnel are capable of interpreting organizational policies, business problems and environmental constraints and develop technical solutions	4.08	0.70	2.00	5.00
14	The members of the information systems department attend IT conferences regularly	3.06	1.20	2.00	5.00
15	Our IT personnel are skilled in multiple Technologies and tools	4.10	1.10	2.00	5.00
16	Our IT staff is well experienced enough to face new requirements and problems	3.86	0.90	1.00	5.00
17	There are formal procedures to evaluate new technologies	3.42	1.25	1.00	5.00
18	Our IT personnel have the ability to work cooperatively in a project team environment	4.04	1.00	2.00	5.00
19	Our IT personnel are self-directed and proactive	3.80	0.90	1.00	5.00

20	Our ERP type shared applications continuously support day today operations without any delay	3.60	0.82	2.00	5.00
21	Our ERP type shared applications have integrated all the major business process well	3.38	0.97	2.00	5.00
22	Our ERP type shared applications have necessary flexibility for modification and customization	3.42	0.84	2.00	5.00
23	Senior management always communicate about values	3.66	0.82	2.00	5.00
24	There is provision of a supportive environment for innovation, organizational agility and employee learning	3.70	0.85	2.00	5.00
25	Our senior management review org performance and capability to assess org success	3.66	0.80	2.00	5.00
26	Findings from review are translated to priorities for improvement.	3.68	0.90	2.00	5.00
27	Our organization does planned sales promotions	3.74	1.00	2.00	5.00
28	Our organization is keen on developing new services to cater to a competitive environment	4.00	1.00	2.00	5.00
29	The strategic decision process is participative	3.72	0.74	2.00	5.00
30	All individuals are committed to the same project goals	3.66	0.90	2.00	5.00
31	There is a cooperative effort among individuals to carry out difficult tasks.	3.78	0.90	2.00	5.00
32	There is a high level of mutual trust.	3.44	0.80	2.00	5.00
33	Our last year turnover	3.40	0.80	2.00	5.00
34	Our last year after Tax Net profit	3.20	0.80	2.00	4.00
35	Our last year Market Share	3.26	1.20	2.00	5.00
36	Our last year Sales growth	3.40	0.76	2.00	5.00
37	Our last year Return on Corporate investment position	3.41	0.77	2.00	5.00
38	Our last year Financial liquidity position	3.30	0.65	2.00	4.00

**Table 12: Descriptive statistics for Question Items**

The mean, standard deviation, variance minimum and maximum values for main constructs are as follows.

Main Variables	Mean	Std. Deviation	Variance	Minimum	Maximum
IT Infrastructure Related Practices	3.69	0.437	0.192	2.5	4.63
Related Practices of IT Components	3.63	0.7	0.49	1.8	4.8
Related Practices of IT Services	3.72	0.55	0.303	2.43	4.71
Related Practices of IT Personnel	3.76	0.54	0.29	2.43	4.86
Related Practices of Shared IT Applications	3.54	0.673	0.453	2.33	5
Business Performance	3.34	0.456	0.208	2.5	4.33
Leadership of top Management	3.72	0.673	0.391	2.75	5
Strategic Planning of top Management	3.67	0.53	0.280	2	4.67
Corporation of non IT employees	3.65	0.63	0.386	2.33	4.47

**Table 13: Descriptive statistics for Main Variables**

### 4.3.3 Hypothesis testing

#### 4.3.3.1 Hypothesis Testing for Entire Service Sector

The conceptual model used for this research constructs one main hypothesis and four sub hypotheses. The main alternative hypothesis indicated that there is a relationship between IT infrastructure of services enterprises with their business performance. Sub hypothesis link the independent sub variables and the main dependant variable, business performance.

**Hypothesis: H1:** The firms with higher levels of IT infrastructure related practices show higher business performance

H1<sub>a</sub>: The firms with higher levels of IT component practices show higher business performance

H1<sub>b</sub>: The firms with higher levels of related shared IT services practices show higher business performance

H1<sub>c</sub>: The firms with higher levels of related Human IT Infrastructure practices show higher business performance

H1<sub>d</sub>: The firms with higher levels of related shared IT applications practices show higher business performance

To test this hypothesis, the mean values of present business performance variable are constructed using SPSS. Also separate mean values were calculated for main variables under IT infrastructure construct. Hence, mean values for related practices of IT components, related practices of IT services, related practices of IT personnel and related practices of shared IT applications were calculated.

The Pearson correlation test carried out, two-tailed test of significance was examined.

The following Table 14 indicates the correlations between the means described above.

		Business Performance
BusinessPerformance	Pearson Correlation	1
	Sig. (2-tailed)	
	N	51
ITServices	Pearson Correlation	.391**
	Sig. (2-tailed)	.005
	N	51
ITPersonnel	Pearson Correlation	.379**
	Sig. (2-tailed)	.006
	N	51
SharedITApplications	Pearson Correlation	.370**
	Sig. (2-tailed)	.008
	N	51
ITcomponents	Pearson Correlation	.632**
	Sig. (2-tailed)	.000
	N	51

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

**Table 14: Correlation: Sub Independent Variables Vs. Business Performance**

The Table 14 shows that there is a relation ship between IT infrastructure sub constructs (Related practices of IT components, IT services, IT personnel and Shared IT applications) and the business performance of the services enterprises. Therefore, these results confirm all the sub hypotheses H1a, H1b, H1c and H1d.

To construct the main IT infrastructure related practices independent variable, the weights given for four related practices by each respondent organization was used.

Weights were asked to assign as follows.(Sample percentages are shown in the Table 15)

The following equation indicates an example for weights calculation related IT infrastructure practices.

$$ITINFR = .25X ITCOMPONENT + .10X ITSERVICES + 0.30 X ITPERSONNEL + .35 X ITAPPLI$$

	Related IT Infrastructure practices -ITINFR	Contribution to your IT Infrastructure Practices as %
1	Related IT Components Practices (Pc, servers Maintenance, Service Level Agreement) -ITCOMPONENTS	25
2	Related Shared IT Services Practices (Help Desk, Service Availability and Other IT Services)-ITSERVICES	30
3	Related IT Personnel Practices (Skills, Knowledge use, Ability etc)-ITPERSONNEL	30
4	Related Shared IT Application Practices (Service Availability, ERP Type shared applications)- SHAREDITAPPLICATIONS	15
	Total	100%

**Table 15: Sample Weight calculation for Main IT Infrastructure practices Variable**

This calculation was done for each variable mean as above. The result ITINFR means was used to test the main hypothesis.

		Business Performance	ITINFR
BusinessPerformance	Pearson Correlation	1	.723**
	Sig. (2-tailed)		.000
	N	51	51
ITINFR	Pearson Correlation	.723**	1
	Sig. (2-tailed)	.000	
	N	51	51

\*\* . Correlation is significant at the 0.01 level (2-tailed).

**Table 16: Correlation: IT Infrastructure Practices Variable Vs. Business Performance**

The results confirm the main hypostasis with 99% significance. Therefore, as a result, it is obvious that the service sector enterprises show higher business performance with higher levels of IT infrastructure practices.

#### 4.3.3.2 The hypothesis Tests for different Service Sectors

The data collected from four main service sector categories were used for this analysis. Even though the numbers of respondent firms are not sufficient enough to perform hard statistical analysis for different sectors, the same Pearson correlation test was carried out for all four sectors IT infrastructure variable means and respective business performance means after observing the data from sectors following a normal distribution. The relevant weights calculated above were used to construct the main ITINFR variable as discussed above. Therefore, there is provision for future research activity to confirm the results obtained for sector-wise analysis. The following sections indicated the results of the sector-wise study.

##### Financial Services Sector

The results of the correlation analysis are as indicated below.

		Business Performance
BusinessPerformance	Pearson Correlation	1
	Sig. (2-tailed)	
	N	19
ITcomponents	Pearson Correlation	.457*
	Sig. (2-tailed)	.049
	N	19
ITServices	Pearson Correlation	.593**
	Sig. (2-tailed)	.007
	N	19
ITPersonnel	Pearson Correlation	.523*
	Sig. (2-tailed)	.022
	N	19
SharedITApplications	Pearson Correlation	.485*
	Sig. (2-tailed)	.035
	N	19
ITINFR	Pearson Correlation	.712**
	Sig. (2-tailed)	.001
	N	19

\*. Correlation is significant at the 0.05 level (2-tailed).

\*\* Correlation is significant at the 0.01 level (2-tailed).

**Table 17: Correlation: IT Infrastructure variables Vs. Business Performance- Financial Sector**

The above Table 17 confirms the main hypothesis and the entire sub hypotheses tested for the financial Sector. The positive linear relationship between all main IT infrastructure practices on business performance is significant for financial services sector.

### Communications services Sector

		Business Performance
BusinessPerformance	Pearson Correlation	1
	Sig. (2-tailed)	
	N	12
ITcomponents	Pearson Correlation	.659*
	Sig. (2-tailed)	.020
	N	12
ITServices	Pearson Correlation	.583*
	Sig. (2-tailed)	.047
	N	12
ITPersonnel	Pearson Correlation	.579*
	Sig. (2-tailed)	.049
	N	12
SharedITApplications	Pearson Correlation	.579*
	Sig. (2-tailed)	.049
	N	12
ITINFR	Pearson Correlation	.706*
	Sig. (2-tailed)	.010
	N	12

\*. Correlation is significant at the 0.05 level (2-tailed).  
 \*\*. Correlation is significant at the 0.01 level (2-tailed).

**Table 18: Correlation: IT Infrastructure variables Vs. Business Performance-Comm. Sector:**

The communication sector shows the same relationship as the financial sector. Consequently, there is a positive relationship between the entire IT infrastructure related practices and business performance.



## Wholesale, Retail and Hotels Services Sector

		Business Performance
BusinessPerformance	Pearson Correlation	1
	Sig. (2-tailed)	
	N	10
ITcomponents	Pearson Correlation	.772**
	Sig. (2-tailed)	.009
	N	10
ITServices	Pearson Correlation	-.103
	Sig. (2-tailed)	.776
	N	10
ITPersonnel	Pearson Correlation	.136
	Sig. (2-tailed)	.708
	N	10
SharedITApplications	Pearson Correlation	.015
	Sig. (2-tailed)	.968
	N	10
ITINFR	Pearson Correlation	.627
	Sig. (2-tailed)	.052
	N	10

\*\* . Correlation is significant at the 0.01 level (2-tailed).

**Table 19: Correlation: IT Infrastructure variables Vs. Business Performance- Wholesale Sector**

Even though related IT component practices confirm the sub hypothesis, the other sub hypothesis was not confirmed. As a result the main ININFR construct does not have significant relationship with business performance variable for wholesale and retail sector. Since numbers of respondent firms are somewhat low, a future research activity can further confirm this result.

## Health and Educational Services Sector

		Business Performance
BusinessPerformance	Pearson Correlation	1
	Sig. (2-tailed)	
	N	10
ITcomponents	Pearson Correlation	.637*
	Sig. (2-tailed)	.048
	N	10
ITServices	Pearson Correlation	.671*
	Sig. (2-tailed)	.034
	N	10
ITPersonnel	Pearson Correlation	.643*
	Sig. (2-tailed)	.045
	N	10
SharedITApplications	Pearson Correlation	.469
	Sig. (2-tailed)	.171
	N	10
ITINFR	Pearson Correlation	.901**
	Sig. (2-tailed)	.000
	N	10

\*. Correlation is significant at the 0.05 level (2-tailed).

\*\* . Correlation is significant at the 0.01 level (2-tailed).

**Table 20: Correlation: IT Infrastructure variables Vs. Business Performance- Health and Education Sector**

The main and sub-hypotheses were also conformed for education health and recreational services as well. Since numbers of respondent firms are somewhat low, a future research activity can further confirm this result.

**4.3.3.3 Correlation Analysis for Non IT Variables**

The correlation analysis was carried out for non-IT variables selected: leadership, strategic planning and cooperation with business performance. The Table 21 below indicates the results.

		Business Performance
BusinessPerformance	Pearson Correlation	1
	Sig. (2-tailed)	
	N	51
LEADERSHIP	Pearson Correlation	.565**
	Sig. (2-tailed)	.000
	N	51
STRATPLAN	Pearson Correlation	.268
	Sig. (2-tailed)	.058
	N	51
COOPERATION	Pearson Correlation	.342*
	Sig. (2-tailed)	.014
	N	51

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

**Table 21: Correlation: Non- IT variables Vs. Business Performance- Entire Service Sector**

The leadership shows a positive relationship with business performance at 0.01 significance and cooperation shows the same relationship with .05 level of significance. The strategic planning also shows the same relationship but at 0.058 significance. Therefore both leadership and cooperation have strong positive relationship with business performance and strategic planning also show the same to certain extent.

#### 4.3.3.4 Correlation Analysis for individual business variables

The researcher considered the average values for net profit as percentage of turn over and sales growth variables in order to check the same relationship of IT infrastructure practices with business performance variable. The following Table 22 indicates correlation analysis results of that analysis.

		NetProfit	SalesGrowth
NetProfit	Pearson Correlation	1	.674**
	Sig. (2-tailed)		.000
	N	51	51
SalesGrowth	Pearson Correlation	.674**	1
	Sig. (2-tailed)	.000	
	N	51	51
ITServices	Pearson Correlation	.420**	.457**
	Sig. (2-tailed)	.002	.001
	N	51	51
ITPersonnel	Pearson Correlation	.530**	.539**
	Sig. (2-tailed)	.000	.000
	N	51	51
SharedApplications	Pearson Correlation	.531**	.427**
	Sig. (2-tailed)	.000	.002
	N	51	51
ITcomponents	Pearson Correlation	.600**	.485**
	Sig. (2-tailed)	.000	.000
	N	51	51
ITINFR	Pearson Correlation	.652**	.601**
	Sig. (2-tailed)	.000	.000
	N	51	51

\*\* . Correlation is significant at the 0.01 level (2-tailed).

**Table 22: Correlation: Infrastructure Variables Vs. Net profit and Sales Growth**

IT infrastructure practices show significant relationships with business performance. Since net profit and sales growth are considered as good business performance variables this result further confirms the analysis done with major business performance construct. Also the researcher examined the relationship affected to sectors. Most of all the relationships observed in earlier analysis with major business performance construct were confirmed after this analysis. The following section indicates the confirmed results by this second analysis. The researcher has observed that minor differences; hence, second analysis by getting averages of variables and the first analysis by getting the total mean of Likert scale variables. However, both confirm the main hypothesis and sub hypotheses considered for service sector organizations.

## Financial Services Sector

Correlations

		NETProfit	Salesgrowth	ITINFR
NETProfit	Pearson Correlation	1	.659**	.571*
	Sig. (2-tailed)		.002	.011
	N	19	19	19
Salesgrowth	Pearson Correlation	.659**	1	.555*
	Sig. (2-tailed)	.002		.014
	N	19	19	19
ITINFR	Pearson Correlation	.571*	.555*	1
	Sig. (2-tailed)	.011	.014	
	N	19	19	19

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

**Table 23: Correlation: IT Infrastructure Variables Vs. Net profit, Sales Growth- Financial Sector**

There is a positive relationship existing between IT infrastructure related practices and business variables such as net profit and sales growth in financial services sector.

## Communication Services Sector



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Correlations

		NETProfit	Salesgrowth	ITINFR
NETProfit	Pearson Correlation	1	.714**	.849**
	Sig. (2-tailed)		.009	.000
	N	12	12	12
Salesgrowth	Pearson Correlation	.714**	1	.663*
	Sig. (2-tailed)	.009		.019
	N	12	12	12
ITINFR	Pearson Correlation	.849**	.663*	1
	Sig. (2-tailed)	.000	.019	
	N	12	12	12

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

**Table 24: Correlation: IT Infrastructure Variables Vs. Net profit, Sales Growth- Comm. Sector**

There is a positive relationship existing between IT infrastructure related practices and business variables such as net profit and sales growth in travel and communication services sector.

**Whole Sale, Retail and Hotels Services Sector:**

**Correlations**

		NETProfit	Salesgrowth	ITINFR
NETProfit	Pearson Correlation	1	.686*	.561
	Sig. (2-tailed)		.029	.092
	N	10	10	10
Salesgrowth	Pearson Correlation	.686*	1	.528
	Sig. (2-tailed)	.029		.117
	N	10	10	10
ITINFR	Pearson Correlation	.561	.528	1
	Sig. (2-tailed)	.092	.117	
	N	10	10	10

\*. Correlation is significant at the 0.05 level (2-tailed).

**Table 25: Correlation: IT Infrastructure Variables Vs. Net profit, Sales Growth-Whole sale Sector**

There is no such relationship existing between IT infrastructure related practices and business variables such as net profit and sales growth in wholesale, retail and hotels services sector.



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**Education and Health Services Sector**

**Correlations**

		NETProfit	Salesgrowth	ITINFR
NETProfit	Pearson Correlation	1	.530	.650*
	Sig. (2-tailed)		.115	.042
	N	10	10	10
Salesgrowth	Pearson Correlation	.530	1	.709*
	Sig. (2-tailed)	.115		.022
	N	10	10	10
ITINFR	Pearson Correlation	.650*	.709*	1
	Sig. (2-tailed)	.042	.022	
	N	10	10	10

\*. Correlation is significant at the 0.05 level (2-tailed).

**Table 26: Correlation: IT Infrastructure Variables Vs. Net profit, Sales Growth-Health, Education and recreational services Sector**

There is a positive relationship existing between IT infrastructure related practices and business variables such as net profit and sales growth in health, education and recreational services sector.

#### 4.3.4 The Regression Analysis

The linear Regression analysis was carried out for getting any relationship model for IT variables, non IT variables with business performance. The use of non-IT related variables helps to generate a percentage of how related IT infrastructure practices contributes to business performance in the enterprise while other non-IT variables were present. The calculated mean values as above were used for this analysis. The following figure represents the analysis without non-IT related other variables.

**Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.723 <sup>a</sup>	.522	.513	.32793

a. Predictors: (Constant), ITINFR



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**ANOVA<sup>b</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5.764	1	5.764	53.595	.000 <sup>a</sup>
	Residual	5.269	49	.108		
	Total	11.033	50			

a. Predictors: (Constant), ITINFR

b. Dependent Variable: BusinessPerformance

**Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.745	.356		2.092	.042
	ITINFR	.705	.096	.723	7.321	.000

a. Dependent Variable: BusinessPerformance

**Table 27: Regression Analysis: IT Infrastructure Variables and Business Performance**

Hence the regression model for the study can be indicated as below.

$$\text{BUSINESS PERFORMANCE} = 0.745 + 0.705\text{ININFR}$$

**Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.733 <sup>a</sup>	.537	.496	.33327

a. Predictors: (Constant), COOPERATION, STRATPLAN, LEADERSHIP, ITINFR

**ANOVA<sup>b</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5.918	4	1.480	13.321	.000 <sup>a</sup>
	Residual	5.109	46	.111		
	Total	11.027	50			

a. Predictors: (Constant), COOPERATION, STRATPLAN, LEADERSHIP, ITINFR

b. Dependent Variable: BusinessMean



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**Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.502	.452		1.109	.273
	ITINFR	.592	.144	.608	4.106	.000
	LEADERSHIP	.091	.105	.121	.868	.390
	STRATPLAN	.066	.094	.073	.702	.486
	COOPERATION	.021	.084	.027	.246	.807

a. Dependent Variable: BusinessMean

**Table 28: Regression Analysis: Business Performance, IT Infrastructure practices and Non-IT Variables**

Hence the regression model for the study can be indicated as below.

$$\text{BUSINESS PERFORMANCE} = 0.502 + 0.592\text{ITINFR} + 0.091 \text{ LEADERSHIP} + 0.066 \text{ STRATPLAN} + .021\text{COOPERATION}$$

It was observed that R-value is 0.733 and R square value is 0.537

Both models further confirm that IT infrastructure has positive linear relationship with business performance.

It was observed that business performance data and main IT infrastructure practices variable data follow normal distribution pattern for all four major sectors, hence, the regression analysis was carried out to find out if a linear relationship exists.

### Financial Services Sector

**Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.712 <sup>a</sup>	.507	.478	.30184

a. Predictors: (Constant), ITINFR

**Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.150	.518		2.219	.040
	ITINFR	.571	.137	.712	4.183	.001

a. Dependent Variable: BusinessMean

**Table 29: Regression Analysis: IT Infrastructure practices, Business Performance – Financial Sector**

### Communications Services Sector

**Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.706 <sup>a</sup>	.499	.448	.31870

a. Predictors: (Constant), ITINFR

**Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.240	.701		1.770	.107
	ITINFR	.598	.190	.706	3.153	.010

a. Dependent Variable: BusinessMean

**Table 30: Regression Analysis: IT Infrastructure practices, Business Performance – Comm. Sector**



### Wholesale, Retail and Hotels Services Sector

**Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.627 <sup>a</sup>	.393	.317	.47698

a. Predictors: (Constant), ITINFR

**Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-1.594	2.169		-.735	.483
	ITINFR	1.366	.600	.627	2.277	.052

a. Dependent Variable: BusinessMean

**Table 31: Regression Analysis: IT Infrastructure practices, Business Performance – Wholesale Sector**

### Health and Educational Services Sector

**Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.901 <sup>a</sup>	.812	.789	.18943

a. Predictors: (Constant), ITINFR

**Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.582	.479		1.216	.259
	ITINFR	.783	.133	.901	5.879	.000

a. Dependent Variable: BusinessMean

**Table 32: Regression Analysis: Infrastructure practices Business Performance – Health, Education and Recreational Services Sector**

All the sector-wise regression analysis confirms as indicated in tables 29-32 the results of the above correlation analysis and only the wholesale sector shows a comparatively less significant level.

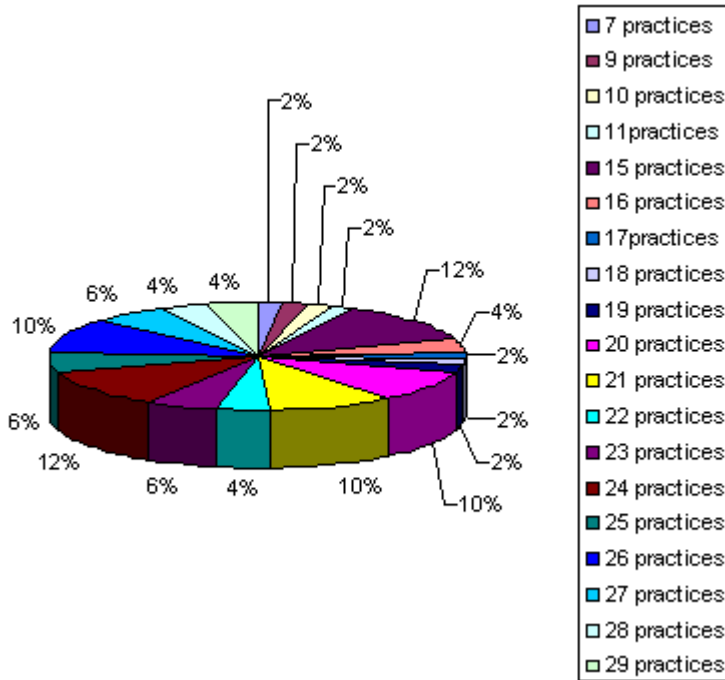
#### 4.4 Analysis of Usage of practices in Service Sector

The questions related to IT infrastructure features, characteristics and related practices were considered for this analysis. In order to analyze how these practices are utilized in these sampled organizations, they are coded using zero and one. Those who have given “strongly disagree”, “disagree” and “no idea” to likert scale type questions regarding practices were coded as zero. “strongly agree” and “agree” answers are considered as ones in this analysis. Dichotomous answers having “yes” were coded and one and “No” coded as zero.

Thereafter mean number of practices was calculated with new scale. The results are indicated in the Table 33 below. The minimum number of practices deployed is seven (07) and the maximum number of practices is twenty nine (29).

Number of Practices	Frequency	Percentage	Mean of practices	21.08
7	1	1.96	Mode number of Practices	15
9	1	1.96	Minimum number of Practices	7
10	1	1.96	Maximum number of Practices	29
11	1	1.96		
15	6	11.76		
16	2	3.92		
17	1	1.96		
18	1	1.96		
19	1	1.96		
20	5	9.80		
21	5	9.80		
22	2	3.92		
23	3	5.88		
24	6	11.76		
25	3	5.88		
26	5	9.80		
27	3	5.88		
28	2	3.92		
29	2	3.92		
Total	51	100		

**Table 33:IT Practices Distribution**



**Figure 21: IT Practices Distribution of the Enterprises**

Practices utilization was analyzed by getting different percentiles along with data from different sectors. In this analysis it is observed that only one or two companies practice some IT infrastructure practices. Therefore, seven such companies were removed from the study and other companies with above number of practices were taken into this analysis. The researcher first labeled companies belonging to different categories as A-D (A-Financial, B- Communication, C-Wholesale and D-Education, Health) representing four major sectors and practices percentage distribution was examined by getting different percentile values. By getting four major percentile portions, three percentile portions and two major percentile portions and the common pattern distribution of practices were examined. Dividing companies into two major divisions resulted after the analysis and A and B major sectors were fit into higher utilization of practices level and C and D major sectors showed that they fall in level below it.

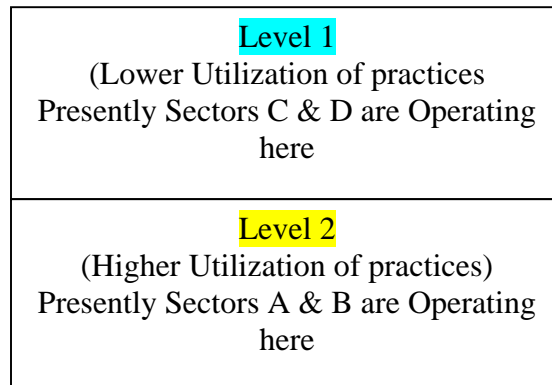
The summary of the finding is indicated below.

Number of different Levels of IT Infrastructure practices usage	2		
Sector	Sector Code	Present Level	% Range of Practices Utilization
Wholesale & Retail Trade, Hotel & Restaurant	C	1	51%-81%
Transport, Travel & Communications	B	2	81%-100%
Finance, Real Estates & Business Services	A	2	81%-100%
Health, Education and recreational Services Activities	D	1	51%-81%

**Table 34: Level of Utilization of IT Practices**

The following indicate the differences of practices observed in the best level of IT infrastructure practices compared to the next best level practices deployment. Level 2 shows the following practices to be major as compared to companies at level 1.

1. They have a lot of opportunities to update their knowledge relevant to technology updates.
2. They critically monitor their critical recourses for service availability
3. These companies practice modern desktop management techniques using images ultimately saving their IT personnel valuable time.
4. Most of their database systems are similar to ERP and could integrate all the necessary modules, which again reduce future cost which ultimately helps enhance business performance.
5. Also these firms practice necessary backup and restoration disaster recovery methods in due time and hence, in return recovery cost is lower.
6. Better data service supports including prompt customer service and use formal ways of evaluating new technologies are another key concern
7. In the end these firms mainly focus for Service Level Agreements for their critical IT components.



**Figure 22: IT Practices Utilization model**

Level 1		
Sector	Frequency	Percentage No. of Enterprises
A	6	33.33%
B	4	40.00%
C	7	77.78%
D	6	75.00%
Total	23	

**Table 35: IT Practices Utilization Level-1**

Level 2		
Sector	Frequency	Percentage No. of Enterprises
A	11	61.11%
B	6	60.00%
C	2	22.22%
D	2	25.00%
Total	21	

**Table 36: IT Practices Utilization Level-2**

The Figure 22 indicates the derived IT practices utilization model and the Table 35 and 36 indicate how the percentage of organizations that fit in each level.

## 5. DISCUSSION OF FINDINGS

The services sector organizations always pay much attention towards provision of key services to consumers in a better way while achieving higher business performance especially in financial terms. Today one of the major facilitators for providing better service is to enable IT as a supporting tool. Hence, making investments on IT infrastructure in these organizations is heavily increasing. The researcher has used a conceptual model of how IT infrastructure contributes to the success of organizations in terms of the related practices in use.

Therefore, this study was to analyze how these firms utilized IT components related practices: IT services related practices, IT personnel related practices and shared IT applications related practices. Further, the research concentrated on four major service sectors namely; wholesale & retail trade, transport, travel & communications, finance, real estates & business service and health, education and recreational services activities in order to measure the utilization of practices achieving business performance.

The results were generated after a proper analysis of collected data. Some answers were coded, some were analyzed after averaging and some were used as they were, in the data-entering phase prior to the analysis. The careful analysis of this data yields the research findings, which are discussed herein. Though most of the results confirmed the initial thought there were very few exceptions observed.

The examination of overall research respondents indicates that the majority of the respondents were managers of the respective organizations. That percentage was 50% while the next level is Executives (36%) and the rest are chief officers. Since almost all respondents are executives and above, it can be concluded that these respondents had better decision power in providing valid information.

## 5.1 General discussion of the findings from Survey

Most of these service sector large enterprises employed 20 or more IT personnel for the management and maintenance of IT Infrastructure. This presents these organizations have paid much attention to IT infrastructure activities however outsourcing of IT work is still lacking.

All of the service sector organizations use computers and servers for their business operations and more than 250 computers and more than 20 servers could be observed within these organizations. This is a good indication of utilizing of IT components.

Windows operating system dominates in the desktop and server operating systems. This is an indication of service sector organizations use well-known IT components.

Service sector firms have a sufficient number of WAN Links for branch connectivity.

Use of IP telephony is still lacking and around 22% of firms enjoy voice over IP telephone facility



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Majority of firms have allocated 20% of the company budget to IT infrastructure. This shows that there are regular annual investments on IT infrastructure in common. Therefore new additions, upgrades and any improvement of IT Infrastructure could be done with this budget allocated.

New user management techniques like centralized software distribution and using pre-prepared software images for desktops are still lacking. These new techniques reduce time delays involve in software and user management. Therefore by utilizing modern practices like above can save time which can be used for another business activity.

Most of the firms have taken necessary measures to implement security. Almost all use Anti-Virus Software in almost all desktops and servers and central firewalls. This is a good indication that most of service sector organizations have taken steps to protect valuable IT assets.

Having an acceptable use policy is also emerging. More than 65 percent of firms in the sample have implemented this policy in their organization. This further helps to protect valuable IT resources in the organization and also help employees to use IT resources in proper manner.

100Mbps copper networks are common in local area networks and 1Gbps Fibers are heavily used in backbones. Leased lines and broadband Internet connection options are commonly operational in services organizations. This shows the strength of the capacity of the network they have. This is again a good indication to prove that they have sufficient data network capacity.

Around 75 percent of the firms have strategic IT plans. Also two levels of practice utilization are observed in the services sector. But most of the organizations in those two categories have an IT strategic plan. Therefore, this shows that applicability of IT strategic plan is considerably low even though companies at two levels of utilization are having plans.



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## **5.2 Hypothesis Testing**

The main hypothesis investigated the relationship between IT infrastructure practices deployed with business performance. The analysis to test this hypothesis was carried out using Pearson correlation test method, which derives the level of significance. Also the testing of the hypothesis was carried out for data from an entire service sector sample and the same test was done for individual major sectors, described above.

The main hypothesis was confirmed and hence, it was observed that firms with better infrastructure show higher business performance. As per the conceptual model, the better infrastructures utilized main IT infrastructure practices. They have better IT components related practices, IT services related practices, IT personnel related practices and shared IT applications related practices. To construct the main variable for IT infrastructure practices the weights given for these sub categories by the respondents were used.



Therefore, the sub hypothesis generated for those practices was also tested separately and the results confirmed all four sub hypotheses.

Hence, the findings show that when firms experience sophisticated IT infrastructure practices they show higher business performance. This finding further confirms the past studies that related IT infrastructure variables with business performance. [9], [27].

The non-IT related variables such as leadership and cooperation confirm a positive relationship with business performance. It is concerned that having better leadership and the cooperation results higher business performance. Also the strategic planning has shown that relationship at 0.058 level of significance with business performance. This finding further confirms past research [28] related to non-it variables with firm performance.

The linear regression used for the same testing also confirmed the main hypothesis. The derived regression model to represent the relationship of IT infrastructure and business performance is as follows.

$$\text{BUSINESS PERFORMANCE} = 0.745 + 0.705 \text{ININFR}$$

Also the researcher tested the same relationship by incorporating some other non-IT related variables. The derived multiple regression models are shown below.

$$\text{BUSINESS PERFORMANCE} = 0.502 + 0.592 \text{ININFR} + 0.091 \text{LEADERSHIP} + 0.066 \text{STRATPLAN} + .0021 \text{COOPERATION}$$

Considering all of the above statistical analyses, the main hypothesis is confirmed.

The findings for majors sectors could be described as below.

### **5.2.1 Financial Services Sector**

The main hypothesis confirmed with significance at the level 0.01. Also all four sub hypotheses were confirmed. The researcher's initial thought was justified and confirms the heavy use of IT in financial sector firms and in return they have achieved higher business performance.

Also these firms are currently utilizing most of all the IT infrastructure practices of level 2(Higher level) of proposed utilization model considered for this analysis. They further can improve proper utilization of IT infrastructure practices, since a positive relationship exists between these practices and business performance.

### **5.2.2 Communications Services Sector**

The main hypothesis was confirmed with significance at the level 0.05. Also all the sub hypotheses were confirmed. This sector also in general depends on IT. Hence, the results further confirm it. The communications services sector organizations are also currently utilizing practices in the Level 2 of proposed utilization model.

As per the financial services, communication services sector organizations further can improve their IT infrastructure to achieve enhanced business performance.

### **5.2.3 Whole Sale, Retail and Hotel Sector**

Most of the hypotheses are not confirmed for this sector. But there is very close significance at level 0.05 as is observed when main IT infrastructure practices are correlated with business performance. This shows that this sector has not fully utilized IT infrastructure as others.

These organizations are at lower level (Level 1-where as Level two can be considered as better). A necessary action can be taken to evaluate the current IT infrastructure and they better check several other options such as finding other ways to enhance business performance or how to utilize existing IT infrastructure as asset which further enhance business performance.

#### **5.2.4 Education and Health Sector**

The main hypothesis was proved for this sector as well. Except the hypothesis tested for shared IT applications, all other sub hypotheses were confirmed. Since the sample selected for this sector comprises large private educational institutes and main private hospitals, the results confirm the sophistication of their IT infrastructure. This also indicates that ERP related shared applications are not highly operational in this sector or they are not getting good business outcome from the existing ones.

These organizations are currently operated in level 1-as wholesale sector organizations, however the correlation analysis results shows that these organizations have properly used IT infrastructure practices achieving business performance. Therefore these organizations could take necessary steps to move to the next level of utilization.

### **5.3 Percentage change of business performance**

The data were gathered to find out the status of organizations before any improvement of IT infrastructure was made or before any IT investment made. By logically examining the means of present and before business performance variables such as turn over, net profit, market share and sales growth, it is shown that there is significant change in business performance after IT was heavily used.

## 6. CONCLUSION

The main objective of this research was to examine the relationship between IT infrastructure and the business performance of the services enterprises in Colombo district. It aimed at understanding the current level of IT sophistication with infrastructure in Trade and Services enterprises in the Colombo district. Going further, the research also needed to ascertain the relationship between IT infrastructure and business performance in the selected sample to determine the level that suits best. It also aimed to find out industrial sector-wise, the differences in levels of IT infrastructure in the selected services organizations.

Two types of questionnaires were used to collect information for the purpose and they were based on two categories such as IT infrastructure and business performance. Senior IT people answered the IT questionnaire and the other related to Business Performance went to senior financial officers in organizations.

### 6.1 Present Level of IT Infrastructure in Services Sector

The following key considerations can be made from the critical analysis of the data collected from the services sector.

Most of these service sector large enterprises have employed reasonable number of internal IT personnel for the management and maintenance of IT infrastructure whereas Outsourcing of IT work is still lacking. Use of relevant IT components such as desktops, servers, routers are common. Windows operating system dominates in the desktop and server operating systems. New user management techniques like centralized software distribution and using pre-prepared software images for desktops are still lacking.

Services sector firms commonly use leased Internet circuits and broadband connections for their Internet access while maintaining a sufficient number of WAN Links for branch

connectivity. Use of voice over IP telephony is still lacking and very few firms enjoy this facility.

Majority of firms have allocated 20% of the company budget to IT infrastructure. Most of the firms have taken necessary measures to implement security. Almost all use Anti-Virus Software in almost all desktops and servers and central firewalls. Having an acceptable use policy is also emerging. 100Mbps copper networks are common in local area networks and 1Gbps Fibers are heavily used in backbones. Even though all most all the firms are having IT strategic plans, the proper use of these plans is still not at a sufficient Level.

The financial services sector and the communication service sector organizations are currently utilizing IT infrastructure practices in higher level (Level 2) compared the same with other two sectors such as wholesale, retail, hotels and health, education and recreational services sector who at Level 1.

The following major practices must be improved by organizations in Level 1.

1. Update IT personnel knowledge relevant to technology updates.
2. Monitor critical recourses for service availability
3. Utilizing modern desktop management techniques using images ultimately saving their IT personnel valuable time.
4. Full integration of all the necessary modules to ERP related applications, which again reduce future cost which ultimately helps enhance business performance.
5. Implementation of backup and restoration disaster recovery methods
6. Better data service supports including prompt customer service and use formal ways of evaluating new technologies
7. In the end these firms mainly focus for Service Level Agreements for their critical IT components.

## **6.2 The relationship Between IT Infrastructure, Non IT factors and Business Performance**

The Pearson correlation analysis and the linear regression analysis show that there is a significant relationship between IT infrastructure of service sectors enterprises with business performance. In conclusion the service sector organizations can enhance their business performance by properly addressing issues related to their Information Technology Infrastructure as well as improving non-IT factors like leadership qualities, strategic planning and cooperation among employees.

## **6.3 The Sector-wise differences observed**

The major service sectors like Financial services sector, Communications services sector and Education and health sector have shown significant relationship between IT infrastructure and business performance. All of these sectors are currently using IT on a massive scale to generate revenues by providing relevant services.

However, the Wholesale, retail and hotel sector slightly deviate from the above three major sectors when the same relationship is considered. Even though this sector uses IT in a similar way to others' it is believed their business performance is affected by other factors as well. Therefore, this observation provides an opportunity for a future researcher to study the topic in detail with selecting higher number of organizations.

The communicational services sector and financial services sector currently utilizing their IT infrastructure in well manner where as the Wholesale, retail and hotels sector and Educational, health and recreational services sector are currently utilizing practices at a level below to that as per the proposed utilization model discussed.

## 7. RECOMMENDATIONS

Since the results indicate that firms with sophisticated IT infrastructure characteristics have higher business performance, it is timely for all the service sector firms to consider suitable action to further strengthen their IT practices for success with higher business performance. This may be done with increased investments in IT geared towards enhancing business performance.

The wholesale sector has not shown enhancement of business performance when higher levels of IT infrastructure practices utilized. We are now in an era where the e-business initiatives are becoming popular. Therefore this wholesale sector must look at strategic ways and means of using IT for their business as in other service sector organizations. Also they must further evaluate other factors, which affects to the business performance when compared with IT infrastructure practices.

It is recommend improving non-IT factors like leadership quality and cooperation among employees to achieve higher business performance.

This research has derived an IT practices utilization model. Therefore the organizations may use a similar model to assess their current utilization and it is recommended to take any necessary actions to implement lacking practices, which ultimately lead them to a higher utilization level.

The financial services sector and communications services sectors are currently utilizing their IT infrastructure in well manner. The percentage level of utilization of IT infrastructure practices in these organizations is between 82%-100%. These organizations could further take necessary actions to improve utilization of IT infrastructure, which further lead enhancement of business performance.

The Wholesale, retail and hotels sector and Educational, health and recreational services sector are currently utilizing practices at a level below compared to above two sectors. These organizations are currently utilizing 51%-81% of practices considered for this analysis. It is recommended to these sector organizations to take remedial actions to find means of how they can move to the higher level of proposed utilization model

Proper use of IT strategic plan is highly recommended. The level 1 organizations also show that they are having IT strategic plan but It is recommended to properly use it in order to move to the higher level of IT infrastructure utilization.

Even though this research has not focused on other major economic sectors like manufacturing and agriculture, it is recommended to practice use of IT, which may lead higher business performance.



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## 8. FUTURE STUDY

IT is still an emerging area for a majority of Sri Lankan companies. Similar research looking into the impact of IT infrastructure usage on achieving business performance for other segments like Industries and Agriculture also needs to be done. The same research can be done to find the differences between major economic sectors like Industries, Services and Agriculture. It will ultimately help policy makers to make strategic decisions towards enhancement of Sri Lankan economy.

A case study can be done to measure the impact of IT infrastructure on business performance collecting investments data throughout a period for selected companies, which show similar capacity in the use of IT.

The same analysis for individual sectors, selecting a higher sample could be carried out and it may help to prove the findings of this research.



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## Appendix

### RESEARCH: Impact of IT Infrastructure on Business performance

I am a MBA student at the University of Moratuwa Sri Lanka and am currently conducting a research project to analyze the impact of IT infrastructure on the Business Performance in Trade and Services Enterprises.

In this research, I investigate the level the IT infrastructure practices that enterprises follow towards successful business performance. The results of this study would help industry measure success with the use of IT

For this purpose, I look forward to your assistance and would be grateful if you could kindly complete the attached questionnaire (**This document-section A-F to be filled by senior IT person and other attached doc-section G to be filled by senior finance person**) and return both to me.

Thank you for your willingness to participate in the study.

*Research project for* : MBA in IT, University of Moratuwa

*Researcher* : Uditha Gamage



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#### Confidentiality

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I assure you that the information you provide will be treated in the strictest confidence. There is nothing on the form that will allow us to identify you and there is no mandatory requirement to identify your self by name or address.

#### Instructions

---

- Questions in this survey are answered either by putting ticks on check boxes or circling the answer.
- Answering all questions would really be appreciated
- The document is set for single click use, if it is not available, Select Tools-  
→protect Document-→forms (This helps you to use single click for answers)

**Section A: General Information regarding your Organization**

1. Your Position  
 Executive       Manager       Chief Officer       MD/President       Other,  
 Specify

Industry Sector: .....

	Sector	✓		Sector	✓
1	Wholesale and Retail trade	<input type="checkbox"/>	7	Business services	<input type="checkbox"/>
2	Hotel & Restaurant	<input type="checkbox"/>	8	Education	<input type="checkbox"/>
3	Transport, Travel and storage	<input type="checkbox"/>	9	Health and Social work	<input type="checkbox"/>
4	Communication services	<input type="checkbox"/>	10	Cultural & recreational services	<input type="checkbox"/>
5	Finance Services	<input type="checkbox"/>	11	Other, Specify .....	<input type="checkbox"/>
6	Insurance	<input type="checkbox"/>			

2. When was the company started? .....

3. Total Number of employees in organization .....

If you are unaware of the exact number please select from the following

100 –200       301-400       501-1000   
 201-300       401-500       1000+

4. Are you currently following IT strategic plan? Yes       No

If yes, please indicate the duration of your IT strategic plan

1 year       3 years       5 years   
 2 years       4 years       5 years +

**Section B-1: Types and features of IT Components**

5. Number of working computers you have in your enterprise

0-250       251-500       501-750       751-1000       1000+

6. Does your organization use which of the following desktop platforms for the majority of its everyday work?

- i. Microsoft Windows only
- ii. Linux only
- iii. Both Microsoft Windows and Linux
- iv. MAC OS
- v. Other

7. Number of Servers you have in your enterprise

0-20       21-40       41-60       61 -80       +81

8. Total Number of business related Applications running on your servers

0       11-15   
 1-5       16-20   
 6-10       21+

9. Mostly used type of Server Operating system

Microsoft Windows	<input type="checkbox"/>	Novel	<input type="checkbox"/>
Linux	<input type="checkbox"/>	MAC OS	<input type="checkbox"/>
UNIX based OS (Solaris)	<input type="checkbox"/>	Other	<input type="checkbox"/>

10. Number Networked Routers in possession?

0-20	21-40	41-60	61 -80	+81
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

11. Does your enterprise use IP Phones ?                      yes                       No

12. The fraction of the company Budget spent on IT infrastructure

<20%	<input type="checkbox"/>	61%-80%	<input type="checkbox"/>
20%-40%	<input type="checkbox"/>	81%-100%	<input type="checkbox"/>
41%-60%	<input type="checkbox"/>		

**Section B-2: Related Practices of IT Component**

13. If your company currently follow these practices, please answer as “ yes”, otherwise “No”

	Practice	Yes	No	Don't Know
A	Does your company use centralized Software Distribution for Desktops?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B	Does your company use Antivirus Software in almost all Desktops?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C	Do your IT personnel have pre-prepared Software Images for Desktops?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

14. Please rate each item by ticking 1,2,3,4 or 5 using the following scale that corresponds to your organization.

	Practice	Totally Disagree	Disagree	No Idea	Agree	Strongly Agree
A	Unused switch ports are sufficient for 10% increase of future connections	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B	There are formal ways of monitoring Critical Recourses for availability	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C	Current corporate rules and standards for hardware and operating systems support future platform compatibility	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
D	Maintain Service Level agreements for critical IT Components properly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
E	Taking backups and do restorations for critical Servers at due time.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
F	Other, specify .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Section C-1: Types and features of shared IT Services**

15. Speed of your major LAN Backbone and type(whether copper or Fiber)

10Mbps	100Mbps	1000Mbps	Copper	Fiber
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

16. Local Area Network Speed and Type(whether copper or Fiber)

10Mbps	100Mbps	1000Mbps	Copper	Fiber
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

17. Type of Internet Access available

Broad band	Dial-up	ISDN	Leased Line	Broadband & Leased Line	No Internet	Other
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Section C -2: Related shared IT services practices**

18. If your company currently follow these practices, please answer as yes, otherwise say “No” or “ Don’t Know”

	Practice	Yes	No	Don’t Know
A	Does your company use a central firewall to protect the IT Infrastructure?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B	Does your company use a Central tool to manage user accounts?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C	Does your company have active Acceptable Use Policy?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

19. Please rate each item by ticking 1,2,3,4 or 5 using the following scale that corresponds to your organization.

		Totally Disagree	Disagree	No Idea	Agree	Strongly Agree
A	Service downtime due to failures of WAN Link is very rare	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B	Customer support time has been tremendously reduced due to Higher performance of Intranet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C	Our IT Help Desk pays prompt attention to requests	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
D	Our Data Center can provide any service that customer requires	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
E	Database oriented Applications are regularly used in daily operations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
F	There are no complaints about the accuracy of shared data in databases	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
G	Our users feel happy about easy access (connectivity) to shared data required by them	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
H	Other, specify .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Section D-1: Type and features of Human IT Infrastructure**

20. How many IT Personnel are there in your organization? ..... if you do not know the exact Number, please tick from the following

0-20	21-40	41-60	61 -80	81-100	101-200	201-300	301-400	400+
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

21. The type(s) of general IT/systems support does your organization currently have and are these available full-time or part-time

Type of support	Full-time	Part-time	Ad hoc
External paid	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Internal paid	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other type(s)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



**Section D-2: Related Practices of IT personnel**

22. Please rate each item by ticking 1,2,3,4 or 5 using the following scale that corresponds to your organization.

		Totally Disagree	Disagree	No Idea	Agree	Strongly Agree
A	Our IT personnel are capable of interpreting organizational policies, business problems and environmental constraints and develop technical solutions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B	The members of the information systems department attend IT conferences regularly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C	Our IT personnel are skilled in multiple Technologies and tools	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
D	Our IT Staff is well experienced enough to face new requirements and problems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
E	There are formal procedures to evaluate new technologies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
F	Our IT personnel have the ability to work cooperatively in a project team environment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
G	Our IT Personnel are self-directed and proactive	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
H	Other, specify .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Section E: Shared/Standard IT Applications features**

23. Please rate each item by ticking 1,2,3,4 or 5 using the following scale that corresponds to your organization.

	Features	Totally Disagree	Disagree	No Idea	Agree	Strongly Agree
A	Our ERP type shared applications continuously support day today operations without any delay	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B	Our ERP type shared applications have integrated all the major business process well	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C	Our ERP type shared applications have necessary flexibility for modification and customization	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
D	Other, specify .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please rate as a percentage how these four practices contributes to IT Infrastructure Utilization in your organization

	IT Infrastructure practices	Contribution to your Total IT Infrastructure Practices as %
1	IT Components related Practices (Pc, servers Maintenance, Service Level Agreement)	
2	Shared IT Services Related Practices (Help Desk, Service Availability and Other IT Services)	
3	IT Personnel Practices (Skills, Knowledge use, Ability etc)	
4	Shared IT Application related Practices (Service Availability, ERP Type shared applications)	
	Total	100%

**Section F: Non IT Related Variables**

24. Please rate each item by ticking 1,2,3,4 or 5 using the following scale that corresponds to your organization.

	<b>Leadership Quality of Senior Management</b>	Totally Disagree	Disagree	No Idea	Agree	Strongly Agree
A	Our Senior Management always encourage Organizational Values	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C	Senior Management always communicate about values	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
D	There is provision of a supportive environment for innovation, organizational agility and employee learning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
E	Our Senior Management review org performance and capability to assess org success	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
F	Findings from Review are translated to priorities for improvement.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
G	Other, specify .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<b>Strategic Planning</b>					
H	Our organization does planned sales promotions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I	Our organization is keen on developing new services to cater to a competitive environment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
J	The strategic decision process is participative	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
k	Other, specify .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<b>Cooperation of Non IT employees</b>	Totally Disagree	Disagree	No Idea	Agree	Strongly Agree
L	All individuals are committed to the same project goals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
M	There is a cooperative effort among individuals to carry out difficult tasks.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
N	There is a high level of mutual trust.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
O	Other, specify .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Section G: Business Performance (Before IT was used heavily & Present Condition)**

25. Your Position

Executive  Manager  Chief Officer  MD/President  Other, Specify

26. The turnover during the last financial year

Rs. 100-250Mn <input type="checkbox"/>	Rs.5001-10000Mn <input type="checkbox"/>
Rs. 251-500Mn <input type="checkbox"/>	Rs.10001-15000Mn <input type="checkbox"/>
Rs.501-1000Mn <input type="checkbox"/>	Rs.15001-20000Mn <input type="checkbox"/>
Rs.1001-1500Mn <input type="checkbox"/>	Rs.20001-25000Mn <input type="checkbox"/>
Rs.1501-2000Mn <input type="checkbox"/>	Rs.25001-30000Mn <input type="checkbox"/>
Rs.2001-5000Mn <input type="checkbox"/>	Other .....

27. The after tax Net profit as a percentage of turnover during last financial year

0-5%	6-10%	11-15%	16-20%	21-40%	41-60%	61-80%	81-100%
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

28. The Sales growth in the company during the last financial year

0-5%	6-10%	11-15%	16-20%	21-40%	41-60%	61-80%	81-100%
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Questions about enterprise financial situation Before IT was heavily introduced (you may answer Questions 6- 9 considering year/s that your enterprise did a major investment in IT or any kind of major improvement of IT Use)**

29. Year on which major financial investment (Improvement) was done:

30. The turnover of the year before that major investment in IT made:

Rs.50-100Mn <input type="checkbox"/>	Rs.2001-5000Mn <input type="checkbox"/>
Rs. 100-250Mn <input type="checkbox"/>	Rs.5001-10000Mn <input type="checkbox"/>
Rs. 251-500Mn <input type="checkbox"/>	Rs.10001-15000Mn <input type="checkbox"/>
Rs.500-1000Mn <input type="checkbox"/>	Rs.15001-20000Mn <input type="checkbox"/>
Rs.1001-1500Mn <input type="checkbox"/>	Rs.20001-25000Mn <input type="checkbox"/>
Rs.1501-2000Mn <input type="checkbox"/>	other .....

31. The after tax Net profit as a percentage of turn over (in the year before that major investment in IT)

0-2%	3-5%	6-10%	11-15%	16-20%	21-40%	41-60%	61-80%	81-100%
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

32. The Sales growth in your company ( in the year before that major investment in IT )

0-2%	3-5%	6-10%	11-15%	16-20%	21-40%	41-60%	61-80%	81-100%
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

33. Please complete each item by ticking 1,2,3,4 or 5 using the following scale that corresponds to your organization.

	Present Condition (After IT was used)	Very Low	Low	Medium	High	Very High
1	Our last year turnover relative to our principal competitors was	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Our last year After Tax Net profit relative to our principal competitors was	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Our last year Market Share relative to our principal competitors was	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Our last year Sales growth relative to our principal competitors was	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Our last year Return on Corporate investment position relative to our principal competitors was	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	Our last year Financial liquidity position relative to our principal competitors was	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Questions about enterprise financial situation Before IT was heavily introduced (you may answer Questions A- F considering year/s that your enterprise did a major investment in IT or any kind of major improvement of IT Use)**

(You may provide answers to following Questions considering the year/s before you made the improvement or investment in IT.

	Before IT Was heavily used	Very Low	Low	Medium	High	Very High
A	Our turnover relative to our principal competitors was	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B	Our After Tax Net profit relative to our principal competitors was	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C	Our Market Share relative to our principal competitor s was	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
D	Our Sales growth relative to our principal competitors was	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
E	Our Return on Corporate investment position relative to our principal competitors was	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
F	Our Financial liquidity position relative to our principal competitors was	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



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