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<td>CAD</td>
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<td>3.</td>
<td>CII</td>
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<td>4.</td>
<td>CNC</td>
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<td>10.</td>
<td>FIT</td>
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<td>12.</td>
<td>ICT</td>
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<td>14.</td>
<td>IT</td>
</tr>
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<td>15.</td>
<td>NIT</td>
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<td>16.</td>
<td>OECD</td>
</tr>
<tr>
<td>17.</td>
<td>SME</td>
</tr>
<tr>
<td>18.</td>
<td>TSI</td>
</tr>
<tr>
<td>19.</td>
<td>UK</td>
</tr>
<tr>
<td>20.</td>
<td>UNCTAD</td>
</tr>
<tr>
<td>21.</td>
<td>US</td>
</tr>
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</table>
Chapter – II: Review of Literature

2.1 Introduction

During the research work researcher perused through number of publications available worldwide and which were related to the subject of the research. While doing so the review of literature was mainly categorised into following three types:

- Literature related to the business processes
- Literature related to the information technology and its impact
- Literature related to the small and medium sector enterprises

The research papers and books which are found to be directly relevant to the topic of the research are reviewed in depth and details; while for other research papers and books review is limited to the reference of the topic as it occurred in these literatures. The list of all the literature referred reviewed and analysed, is given in the bibliography alphabetically by authors’ names.

2.2 Review of literature


Objectives of the survey:

- To identify reasons of lag in adoption of on-line applications of e-commerce by SMEs in Canada
• To find out benefits of E-commerce solutions as perceived by SMEs in Canada

• To uncover the reasons which act as the barriers for adoption of E-commerce

The authors of this survey report had undertaken a study of E-commerce and its applications’ usage in small and medium enterprises (SMEs) in Canada. E-commerce is an advance application of Information Technology wherein prerequisite may be these SMEs, already would have implemented basic computer applications in their units.

The authors recognised that the SMEs are most important sector to the Canadian economy. For the purpose of this study, the authors had defined SMEs as the units having less than 300 employees and who traditionally conducting businesses. The survival strategies for these businesses are mainly customer service, flexibility to customers and supply of quality products. The Canadian E-business Opportunities Roundtable Report (2000) had listed four challenges for SMEs to adopt to E-commerce:

• Lack of education about e-business and uncertainty (fear) about its potential impact

• Lack of strategic business resources like qualified and skilled talent as well as means of funding to operate the E-business

• Cost associated with implementing E-commerce business and non-understanding of cost/benefit (return on investment) analysis

• Fear of Security as there is a lack of knowledge of technology and techniques available to ensure secured online transactions.
Canadian SMEs surveys

The authors of this report - Adam Jopko, Derrick Morgan, Dr. Norm Archer, and Michel G. DeGroote in 2001 had extensively reviewed variety of the reports available at the time of their study. In summary this review reveals following facts:

- Many of the SMEs who had deployed E-commerce in their businesses reported increase in productivity mainly due to the ease of disseminating of information (internally and to the customers)

- Only a small percentage (12%) of the SMEs had actually implemented E-commerce, but large numbers of them were in development stage; while few of the SMEs even had not considered application of E-commerce in their business.

- The purposes perceived by the SMEs to have E-commerce, were as follows:

  o Use email for internal communications, customer service and communications with vendors

  o Convey information about company and the products to the prospective customers in particular and to society in general

  o Expansion to new markets

  o To reduce average dollar value of transactions compared to traditional transactions; in case on-line business model is adopted.
Barriers to E-commerce

CommerceNet’s (Canada) Barriers and Inhibitions Survey conducted in 1999 laid out the top 10 Global Barriers and Inhibitors for SMEs in adopting to E-commerce. The list compiled by the authors of the report is reproduced below:

Table: 2.1 Global Barriers and Inhibitors for SMEs in adopting to E-commerce

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Cannot attract qualified personnel to small business – there is a lack of qualified consultants and staff to implement e-commerce systems for small business.</td>
</tr>
<tr>
<td>2.</td>
<td>Lack of business models – there are few proven business models that show how small business can use e-commerce to profit or expand their business.</td>
</tr>
<tr>
<td>3.</td>
<td>Not sure of benefit – small business does not understand how electronic commerce can really benefit them.</td>
</tr>
<tr>
<td>4.</td>
<td>Customers can’t find me – it is difficult to differentiate small businesses over the Internet.</td>
</tr>
<tr>
<td>5.</td>
<td>Technology vs. Business Models – there are too few proven business models for small business to justify the expense of a major investment.</td>
</tr>
<tr>
<td>6.</td>
<td>Can’t get paid – small businesses cannot easily receive payment for their products/services ordered over the Internet; current payment and billing systems are too complicated or too expensive for small numbers of transactions.</td>
</tr>
<tr>
<td>7.</td>
<td>Cost of entry – the entry cost or cost of maintaining an e-commerce site for a small business is prohibitive; to get the full functionality that is required to transact business, a small company would have to invest in large amounts of time and money.</td>
</tr>
<tr>
<td>8.</td>
<td>Legal issues – contracts, liability, etc. – there are too many legal issues to make it easy for small businesses to use the Internet to transact business with suppliers and customers.</td>
</tr>
<tr>
<td>9.</td>
<td>Fraud and risk of loss – small businesses are concerned about risk from fraud over the Internet.</td>
</tr>
<tr>
<td>10.</td>
<td>No customer need – customers of small business often do not perceive a benefit from using the Internet to communicate and do business.</td>
</tr>
</tbody>
</table>

Source: (Terry, 2000)

Benchmarking E-commerce

The major barrier recognized by the SME owners was that there was not any benchmark for the rating of a web-site as how the SMEs websites should be. ‘Industry Canada’ – a Canadian government organisation do
give some guidelines. However, a benchmark was developed by Dr. James Ho, which is now known as Ho Matrix and one of the largely accepted indicator of how an E-commerce web site should be. In this three by four matrix, Dr. James Ho has considered majority of the business processes, viz. ‘Promotion’, ‘Provision’, and ‘Processing’ which SMEs need to implement. ‘Ho Matrix’ also considers ‘value’ of these processes for SMEs. This ‘Ho Matrix’ is given below:

**Table: 2.2 ‘Ho Matrix’**

<table>
<thead>
<tr>
<th>Value Purpose</th>
<th>Promotion</th>
<th>Provision</th>
<th>Processing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timely</td>
<td>Items on sale; special offers; product announcements</td>
<td>Stock quotes; employment opportunities; press release</td>
<td>On-line auctions; interactive brokering;</td>
</tr>
<tr>
<td>Custom</td>
<td>Product/service database search; customized product/service reports</td>
<td>General database search; customized news reports</td>
<td>Custom orders; interactive counseling</td>
</tr>
<tr>
<td>Logistic</td>
<td>Rates and fare quotes; facilities locator</td>
<td>Financial reports; research data; comparative, benchmark, and survey results</td>
<td>On-line customer service; delivery or job status tracking</td>
</tr>
<tr>
<td>Sensational</td>
<td>Contests, sweepstakes, giveaways; outstanding web design</td>
<td>Freeware; games; puzzles; downloadable multimedia</td>
<td>“Surprise discounts and bonuses; instant winners</td>
</tr>
</tbody>
</table>

This study further suggest measures to overcome the gap which is existing for the implementation and usage of E-commerce between SMEs of U.S.A. and Canada.

**2.2.2 Andrew Gemino, et al, (2006)**, in the paper “Executive decisions about website adoption in small and medium-sized enterprises” narrate their research where a survey of 89 SMEs devoid of websites was used to
check a model assuming association amongst: seeming paybacks, apparent pressure, managerial willingness and determination to accept a website. Review conclusions show apparent paybacks (strategic and informational), managerial willingness (IT resources) and in-house pressure directly impact intent to accept a website. Though, monetary assets and outer pressure were not found to be considerably effective.

2.2.3 Andrew McAfee (2006), “Mastering the Three Worlds of Information Technology” This is a very interesting paper written by Andrew McAfee, which tries to analyse how and why an organisation can adopt to Information Technology. At the beginning of this paper he observes that the executives (even in advance country like U.S.A.) feel ill equipped to take a decision about investment in Information Technology because of plethora of the alternatives available and the constantly changing nature of technology. Consequently, they involve less and less with any decision making related to Information Technology. The author – Prof. Andrew McAfee refers to a survey conducted by Financial Executives Research Foundation, where in 50% of the respondents have reported that “aligning business and IT strategy” was a major problem. Many of them also remarked that IT is not of “strategic” importance, like other business processes – say, Marketing, Finance or Human Resource management and hence it need be given much importance. These facts only show that the executives in other business processes, really have not understood what Information Technology is and thus they want to distance themselves from the “unknown”. The author comments that the executives should look at Information Technology not only as technology installations but look at them as the organisational change.

The author cites reference of the Harvard Business School Professor Clayton M. Christensen and Boston University Professor Paul R. Carlile from their paper “The cycles of Theory Building in Management Research
(HBS, February 2005)” that “a good model or theory does two things: It groups important phenomena into categories, and within categories, it makes statement of cause and effect.” The author feels that the indifference (towards Information Technology) on the part of the executives may be because of Information Technology (so far) as failed to create such a model in their minds. In other words Information Technology can make an impact only when it gets adopted as “General Purpose Technology (GPT)” like electricity, transistor or laser.

Prof. Andrew McAfee further observes that the performance of GPTs improve over time, when people become more familiar them, leave their old way of thinking, and find many new usages for these innovations. GPTs deliver better benefits as people invent supplements that multiply the power, impact and uses of GPTs. Research suggests that four organisational complements given below, allow GPTs to deliver improved performance:

- Better skilled workers
- Higher level of team-work
- Re-designed processes
- New decision rights

However, the author’s research has proven that the organisational complements can have variations in relationships with Information Technology, compared to other GPTs. These are given in table below:

**Table: 2.3 Three varieties of work-changing Information Technology**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>IT Category</th>
<th>Definition</th>
<th>Characteristics</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Function IT</td>
<td>IT that assists with the execution of discreet tasks</td>
<td>Can be adopted without complements</td>
<td>Simulators, spreadsheets, computer-aided design and statistical</td>
</tr>
</tbody>
</table>
|   | **Network IT** | IT that facilitates interactions without specifying their parameters | **Does not impose complements but let them emerge over time** | **E-mail, instant messaging, Wikipedia, blogs**  
|   |               |                                                                          | **Does not specify tasks or sequences** |                                                                          |
|   |               |                                                                          | **Accepts data in any formats** |                                                                          |
|   |               |                                                                          | **Use is optional** |                                                                          |
| 2. | **Enterprise IT** | IT that specifies business processes | **Imposes complements throughout the organisation** | **Software for enterprise resource planning, customer resource management, supply chain management** |
|   |               |                                                                          | **Defines task and sequences** |                                                                          |
|   |               |                                                                          | **Mandates data format** |                                                                          |
|   |               |                                                                          | **Use is mandatory** |                                                                          |

**Function IT (FIT):**

It makes the execution of standalone tasks more efficient. FIT has following capabilities:

- It enhances experimentation capability
- It increases precision

**Network IT (NIT):**

It facilitates the people to communicate with one another. NIT allows people to interact, the way they desire allowing experimentation in interaction. NIT can be said to have following capabilities:
• Facilitating collaboration
• Allowing expressions of judgment
• Encouraging emergence of high level of information because of low level of interactions

Enterprise IT (EIT):

It is an IT application used by the companies for interactions among the groups of employees or business partners. EIT percolates from top-to-bottom. For adopting EIT, the companies have to introduce new interdependencies, processes, and decision rights. In this complements have to be created as soon as EIT is implemented. Thus, EIT has following capabilities:

• Redesigning business processes
• Standardising work flows
• Monitoring activities and events efficiently

Having understood these three categories, the author advises the executives to take three tasks to make Information Technology implementation successful in their organisations:

• IT selection: selecting IT (FIT, NIT or EIT) after exactly assessing the needs of the organisation
• IT adoption: creating necessary complements within the organisation, to overcome the resistance of change
• IT exploitation: extract maximum benefit from Information Technology once it is in place
While concluding, the author remarks that the adoption Information Technology impacts the working of the organisation and brings about the change. As a result the organisation becomes more competitive and successful in the market place.

2.2.4 Arun Sukumar, David Edgar (2009), have explored an altogether new dimension in their paper “e-business, SMEs and risks: towards a research agenda”. The authors state that there is there is an inadequate understanding of the nature of e-business risk in companies and in SMEs. The outcomes focus on the key subjects revolve near planned risk, client risk, branding risk, safety pressures, legitimate and excise risks, management risks, dependency and outsourcing risk and technology risk.

2.2.5 Aykut Hamit Turan, Taylan Ürkmez (2010), in their paper “Information technology satisfaction of small and medium sized enterprises in Turkey” states that acceptance of new technologies is very essential to start the movement for a higher quality and competitiveness in SMEs. In this research, a review was conducted to quantify the user contentment of IT in SMEs in Turkey. The outcomes discovered that Turkish SME owners and top managers are not very pleased with their IT investments and IT setup in place.

2.2.6 Birgül Kutlu, Meltem Özturan (2008), study in their paper “The usage and adoption of IT among SMEs in Turkey: an exploratory and longitudinal study”, practice and acceptance of Information Technology in SMEs. The review was directed in two stages in 201 SMEs. The conclusions state that the improved usage of IT in SMEs is restricted largely for functioning and mundane tasks, growth of core IT skills. Additional outcomes show that the improved acceptance levels of IT in SMEs in Turkey are growing leading to market change from national to global.
2.2.7 Boemo Nlayidzi Jorosi (2006), in this study “The information needs and information seeking behaviours of SME managers in Botswana”, investigates the evidence necessities and data in search of performances of SMEs in Botswana. The main outcomes conclude that: for SME client and competition are the most significant kinds of information, information basis selection is mainly determined by availability and ease of use; and SMEs use information for making significant decisions and executing their repetitive activities.

2.2.8 Carr, J. (2005), in his article “The implementation of technology-based SME management development programmes” investigates how the higher education segment can use its increasing proficiency in learning technology application to develop efficient SME management development results. The author states that there is a possibility for the growth of new learning technologies by business schools for usage in SMEs. This is explored through the development of the learning technology practice framework, leading to five crucial references for HE educationalists, learning technology developers, SME trainers and public funding bodies to study.

2.2.9 Chad Lin, et al., (2005), observe in the paper “Electronic commerce project adoption and evaluation in Australian SMEs: preliminary findings” that most establishments failed in specific ways to conduct appropriate assessment of business requirements before implementation of IT investment in e-commerce. Pre-project scheduling and validation procedures were not appropriately carried out to evaluate the necessities and viability of those projects. Maximum users were not involved in the early stages of approving and executing e-commerce project and usage of these systems was enforced upon them by senior administration. Likewise, the deficiency of means and proficiency accessible to SMEs
owing their magnitude seems to obstruct every phase of acceptance, execution and assessment of e-commerce.

2.2.10 Damien Power (2006), in his interesting research paper “Adoption of supply chain management-enabling technologies in SMEs” associated views of Australian SMEs in relation to the profits accumulating from the usage of business-to-business facilitating technologies for the administration of supply chains. Results specify that compared with executives of practical areas, senior executives are found to be more negative about their impact to business consequences, and they usually show a lower level of consideration of their probable consequences of implementation.

2.2.11 David Borger, et al., (2000), “The SME and Information Technology – Practical Study of SMEs at the IT Frontier” International Trade Centre of UNCTAD/WTO, Geneva, Switzerland, published this study written by Prof. David Borger at the London School of Economics. Mr. Saumitra Jha carried out data analysis; while Mr. Kai Bethke, ITC Adviser on small Business Export Development, coordinated the survey. This survey was conducted in total 430 SMEs and 70 trade support institutions (TSI) of 44 countries in the world.

Because of the diverse nature of SMEs in these countries, the study could not be focused on one or similar industries; hence, it was decided that the survey would be focused on (SMEs in) export sector of these countries. This was of the premise that the dynamism of the export sector in the country determines the use of Information Technology. However, because of the expanse of the geography and the subject understudy the sample per country was only representative.
Objectives of the study

The main objectives of this study were as follows:

- To identify critical factors that prevent making optimal use of IT
- To make findings and conclusions available to SME support institutions as basis for designing technical assistance services for the business sector.

The advantage of and constraints to IT Investments

The relationship between IT and the SME sector is the “web” of beliefs and perceptions. On one hand it is looked upon as the symbol of success while on the other hand IT is associated with risk and considered to be difficult to understand. These perceptions about IT are the major determinants of investment into IT. Following chart gives perceived benefits of IT as revealed in this survey of SMEs and the TSI.

Figure: 2.1 SMEs and TSIs perspective of advantages in the use of computers

<table>
<thead>
<tr>
<th>Benefits perceived</th>
<th>SMEs</th>
<th>TSIs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saving time in daily operations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improving quality of services</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reducing manpower requirements</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improving company Image</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
This chart shows how SMEs views Information Technology. The benefits most valued are those which have most impact on the balance sheet. Predominantly IT is seen as a labour-saving device after which it is considered as a tool to give improved services. Image building attributes for SMEs are considered more than its functional aspects.

**Cost, training and reliability barriers**

Though the perceived advantages of Information Technology look attractive, but the perceived constraints actually decide the investment pattern in Information technology. The SMEs would not hesitate to buy a
new production machine or hire a new employee as both of these will result in enhanced production. However, since purchase of a computer or software does not guarantee return of (tangible) investment, for SME owners an investment in Information Technology is always a matter of risk. Following chart 3 adopted from this report confirms this perception.

**Figure: 2.2 Percentage of SMEs and TSIs that consider areas of high or very high constraints for investment in Information Technology (reproduced partially)**

<table>
<thead>
<tr>
<th>Constraints Perceived</th>
<th>SMEs</th>
<th>TSIs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suitable software too costly</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Suitable computers too costly</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer training too costly</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Software support not available</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer skilled staff too costly</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Problems with power supply</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Software has many defects</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Telephone/ modem line frequently breakdown</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Other constraints which are also important (not shown in above chart) but falls within 20% are:

- Suitable software not available in area
- Computer training not available in area
- Computer skilled staff not available in area
- Nobody available to repair hardware
- Computers frequently break down
- Suitable computer not available in area
- Trained staff leave company

For SMEs cost barrier is of dual nature – one is cost of acquisition of computer and systems and other cost being training and hiring staff who can use Information Technology effectively. The above chart also shows a significant correlation between the responses of SMEs and TSIs; suggesting awareness of TSIs about the constraints faced by SMEs.

A detailed examination of perceived advantages and constraints reveal that SMEs are more concerned about the use of Information Technology on their profits than gaining access to the trade information or internet.

**Training and human resources for Information Technology usage in SMEs**

This study further indicates that the SMEs access to training in IT-related issues remains painfully low; which is another reason for non-adoption of IT in SMEs. Those SMEs which use Information Technology do try various options to overcome the problem. However, compared to the formal outside training, preference is given to the “on-the-job-training” within the company, mainly because of the cost factor. Figure: 2.3 reproduced below from the study report reveals the responses of the SMEs.
Current patterns of IT usage by SMEs

This study also explored the usage of Information Technology in the SMEs. Amongst the most popular usage, predictably was of word processing and spreadsheets, equally followed by usage of graphics and databases. Following is the list of software applications ranked by the preference of usage by the SMEs:

(1) Financial accounting
(2) Stock and inventory control
(3) General sales order processing
(4) Specific export order processing
Within these applications, most used are found to be financial accounting, computer-aided design. Other popular application are payroll automation, documentation, costing and simple invoicing systems, stock and inventory control and simple communication application like email. It should be noted that most of these applications are standard utilities rather than tailor-made programs.

In case of computer hardware, the usage was dominated by the universal standard brands and their regional availability.

**Case studies**

Chapter 5 of this The SME and Information Technology – Practical Study of SMEs at the IT Frontier, covers 15 case studies of SMEs in different countries, relating to the subject. The countries selected in this UNCTAD/WTO project are mainly developing countries like Brazil, Zimbabwe, Kenya, Philippines, Indonesia, and India. For the purpose of review, the researcher has selected case studies only from India.

All the companies selected are in the export business as had been mentioned in the preamble of this survey report. The Indian companies selected for the case studies are:

- Roseship Diagnostics, Goa.
- STV Limited, Calcutta.
- Aspick Engineering Pvt. Ltd., Chennai.
Devi Polymers Pvt. Ltd., (location not mentioned)

Following extract narrates implementation and usage of Information Technology in these export SMEs.

Table: 2.4 Implementation and usage of Information Technology in the export SMEs.

<table>
<thead>
<tr>
<th></th>
<th>Name of the organisation &amp; location in India</th>
<th>Roseship Diagnostics, Goa</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Name &amp; designation of the person contacted</td>
<td>Mr. D’Souza, Director</td>
</tr>
<tr>
<td>2</td>
<td>Nature of products produced and exported</td>
<td>Medical diagnostic kits</td>
</tr>
<tr>
<td>3</td>
<td>Countries of exports</td>
<td>South-east Asia, Middle east, Europe, Africa</td>
</tr>
<tr>
<td>4</td>
<td>Manpower</td>
<td>125 nos.</td>
</tr>
<tr>
<td>5</td>
<td>No. of computers installed</td>
<td>12 nos.</td>
</tr>
<tr>
<td>6</td>
<td>Applications being used</td>
<td>Invoicing system (home-grown), Sales Order Processing, Production Planning and Control, Financial Accounting (all standard)</td>
</tr>
<tr>
<td>7</td>
<td>Constraints faced for IT implementation</td>
<td>Inadequate telecommunication infrastructure, costs, computer breakdowns, limited availability of computer repairers, limited availability of computer professionals and their retention</td>
</tr>
<tr>
<td>8</td>
<td>Perceived advantages of implementation of IT</td>
<td>Great help in strategic planning and management, export marketing, opportunity assessment.</td>
</tr>
<tr>
<td></td>
<td>Name of the organisation &amp; location in India</td>
<td>STV Ltd., Calcutta</td>
</tr>
<tr>
<td>---</td>
<td>--------------------------------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td></td>
<td>Name &amp; designation of the person contacted</td>
<td>Dr. Shah, Chief Executive</td>
</tr>
<tr>
<td></td>
<td>Nature of products produced and exported</td>
<td>Cast iron, sanitary and industrial castings</td>
</tr>
<tr>
<td></td>
<td>Countries of exports</td>
<td>United States of America, United Arab Emirates, Oman, and Europe</td>
</tr>
<tr>
<td></td>
<td>Manpower</td>
<td>450 Nos.</td>
</tr>
<tr>
<td></td>
<td>No. of computers installed</td>
<td>12 Nos.</td>
</tr>
<tr>
<td></td>
<td>Applications being used</td>
<td>Specifically developed software and most business applications and communication services.</td>
</tr>
<tr>
<td></td>
<td>Constraints faced for IT implementation</td>
<td>High cost of computer-skilled trained staff, costly computer training for staff</td>
</tr>
<tr>
<td></td>
<td>Perceived advantages of implementation of IT</td>
<td>Savings in time and money, improvement of quality and company image, obtaining trade information, internal and external communication.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Name of the organisation &amp; location in India</th>
<th>Aspick Engineering Private Ltd., Chennai</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Name &amp; designation of the person contacted</td>
<td>Mr. Singh, Chief Executive officer</td>
</tr>
<tr>
<td></td>
<td>Nature of products produced and exported</td>
<td>Special purpose fabrication equipment</td>
</tr>
<tr>
<td></td>
<td>Countries of exports</td>
<td>Not mentioned.</td>
</tr>
<tr>
<td></td>
<td>Manpower</td>
<td>43 Nos.</td>
</tr>
<tr>
<td>No. of computers installed</td>
<td>8 Nos.</td>
<td></td>
</tr>
<tr>
<td>---------------------------</td>
<td>--------</td>
<td></td>
</tr>
<tr>
<td>Applications being used</td>
<td>Web-site, Computer-Aided-Design (CAD) facility</td>
<td></td>
</tr>
<tr>
<td>Constraints faced for IT implementation</td>
<td>Not mentioned specifically; however suggest that there is a requirement of common databases related to their industry.</td>
<td></td>
</tr>
<tr>
<td>Perceived advantages of implementation of IT</td>
<td>IT extremely beneficial for estimating costs, quick response to customers,</td>
<td></td>
</tr>
</tbody>
</table>

4. **Name of the organisation & location in India** | Premier Press Parts and Premier CNC Press Shop Pvt. Ltd., Chennai.  |
| Name & designation of the person contacted | Mr. Mukharjee, Owner |
| Nature of products produced and exported | Sheet metal products |
| Countries of exports | Not mentioned. |
| Manpower | 130 Nos. |
| No. of computers installed | Not mentioned |
| Applications being used | Costing and accounting software, CNC software systems |
| Constraints faced for IT implementation | Costs of CAD systems prohibit their purchase |
| Perceived advantages of implementation of IT | Precision quality control and operations. |

5. **Name of the organisation & location in India** | Devi Polymers Pvt. Ltd., (location not mentioned) |
<p>| Name &amp; designation of the person contacted | Ms. Raina, Owner |</p>
<table>
<thead>
<tr>
<th>Nature of products produced and exported</th>
<th>Sheet melting and dove melting compounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Countries of exports</td>
<td>Not mentioned</td>
</tr>
<tr>
<td>Manpower</td>
<td>270</td>
</tr>
<tr>
<td>No. of computers installed</td>
<td>35</td>
</tr>
<tr>
<td>Applications being used</td>
<td>CAD – Computer Aided Design software,</td>
</tr>
<tr>
<td>Constraints faced for IT implementation</td>
<td>Not mentioned specifically; however</td>
</tr>
<tr>
<td></td>
<td>suggest that there is a requirement of</td>
</tr>
<tr>
<td></td>
<td>common databases like government</td>
</tr>
<tr>
<td></td>
<td>tenders, related to their industry</td>
</tr>
<tr>
<td>Perceived advantages of implementation</td>
<td>Precision designing and quality control</td>
</tr>
<tr>
<td>of IT</td>
<td>because of use of CAD, to make up-to-</td>
</tr>
<tr>
<td></td>
<td>date market assessment, and to respond</td>
</tr>
<tr>
<td></td>
<td>rapidly to purchase enquiries.</td>
</tr>
</tbody>
</table>

Since this researcher’s project is pertaining to the impact of Information Technology on SMEs in Pune; the case studies about Indian SMEs had been reviewed. It observed by the researcher that the case studies of SMEs in other countries mentioned also have more or less same profile of usage of Information Technology.

2.2.12 David H. Brown, Nigel Lockett (2004), in their paper “Potential of critical e-applications for engaging SMEs in e-business: a provider perspective” investigate the development of and prospective for the acute e-applications defined as 'an e-business application, in SMEs. The three main conclusions are: the development of aggregation-related e-business applications; the development of collaboratively created 'one to many' business models; and the significance of trustworthy third parties in the implementation of higher-level complexity e-business applications by SMEs. Suggestively, this work takes an intentional source perspective and
supplements the already considerable literature on SME IT implementation from a user and network viewpoint.

2.2.13 David S. Sward, (2006), in his book titled as “Measuring the business value of IT” brings about few basic points. The author suggests that the efficient set up for IT will be conceivable only when business goals, user necessities and IT abilities are brought together for redefining the business procedures. The ITBV procedure developed by Intel attempts to improve sustainable distinction in four organization domains – IT budget, IT competency, IT business value and IT as a business.

2.2.14 Donald L. Lester & Thuhang T. Tran, (2008), “Information Technology Capabilities: Suggestions for SME Growth”. In this research paper, the authors have tried to link up organisational development and growth with that of the Information Technology capabilities, considering a life cycle model of organisational development put forth by Kanzanjian in 1988. The authors feel that, the crisis of growth issues faced by the SMEs can improved by the usage of IT in the SMEs.

The authors have reviewed a lot of literature published on the subject. They identify variety of crisis of growth for an organisation:

- Need for leadership, coordination and control
- Technical efficiency
- Delegation of work and authorities

If these crisis issues are not overcome at proper time during the life cycle, the organisation will either stagnate or die.

It has been observed that the larger firms have found it necessary and profitable to invest in Information Technology; while SMEs are reluctant for
IT investment because of the lack of adequate resources. The authors have also found out that the degree of complexity of information, planning & control in an organisation; is a prominent factor in determining the success or failure of business growth. This becomes increasingly important as the business grows larger and more complicated.

For SMEs in particular, four factors found to be affecting IT investments made by them:

- The perceived cost savings and income generation benefits
- External pressure from rivals, suppliers and buyers
- Organisational readiness
- Perceived ease of use
- Smaller number of people have decision making responsibility
- Standard procedures are not instituted
- Long-term planning is limited
- More reliance on external IT experts

The authors propose that the IT capabilities can be matched to address variety of problems occurring in SMEs in organisational growth cycle as given in the figure below:
In this figure, the lower part indicate the crisis points, while upper part indicates the way IT capabilities can be utilised to overcome them.

The following table enumerates the concept of this figure:
In conclusion, the authors remark that if SMEs adopt Information Technology for mitigating the crisis of growth, then they can:

- Increase the market reach
- Increase speed to respond to the market
- Lower operating cost in long run

2.2.15 Drew, Stephen (2003), has expressed in his “Strategic uses of e-commerce by SMEs in the East of England” that the SMEs' industries are evolving as important Internet consumers and are gradually accepting e-commerce. This paper recommends that SMEs in diverse business verticals may implement dissimilar policies for e-commerce and have diverse requirements for support and training. This article also discovers the option that the Internet may position both, a hazard and a prospect for SME industry policies. Review outcomes of this study indicate that in spite

<table>
<thead>
<tr>
<th>Life Cycle Stage</th>
<th>Kazanjian’s Problem Factors</th>
<th>IT Capability Suggestions</th>
</tr>
</thead>
</table>
| 1. Conception and development | • Product development  
• Resource acquisition  
• Sales/Marketing | • Creativity – Open source collaboration; Website  
• Connectivity – Website; e-mail  
• Design – CAD/CAM |
| 2. Commercialization | • Strategic positioning  
• Recruitment and Training | • Flexibility – Project planning and scheduling software; Inventory management system  
• Training – Online recruitment and training system  
• Communication – Web-linked value chain activities |
| 3. Growth | • Sales/Marketing  
• Internal control | • Customer relations – CRM software  
• Market responsiveness – Blogs; e-mail; Text messaging  
• Marketing – Website; Social networking site |
| 4. Stability | • Profitability  
• Internal control  
• Future growth | • Efficient Production – Web-linked value chain activities  
• Back-office support – Automation software for accounting, payroll, purchasing, travel, etc.  
• Collaboration – Website |

**Table: 2.5** Summary of IT Capability Suggestions for Kazanjian’s Life Cycle Model
of current obstacles to the dot-com vertical, SMEs are enlisting ecommerce at the core of their technology and business policies and propose to use the Internet as a medium for attaining transformational amendment.

2.2.16 **R. Dyerson, et al., (2009)**, “National Survey of SMEs’ Use of IT in Four Sectors”. This article studies the implementation and usage of communication and information technology in SMEs. The article discovers the features enabling or obstructing the positive implementation and usage of ICT by SMEs. Conclusions are that SMEs are normally contented with their funds in ICT but that they are apprehensive about the budget of such funds and are indeterminate about the commercial profits. Much of the share in ICT is focussed at meeting bottom line concerns of cost and output but little expenditure is made on probable planned applications.

2.2.17 **Elena Urquía Grande, et al., (2011)**, with two other co-authors write in their research paper titled as “The impact of Accounting Information Systems (AIS) on performance measures: empirical evidence in Spanish SMEs” that this examination study is directed at determining the relationship between the usage of the Accounting Information Systems by SMEs in Spain. This experiential review is built on a review carried out amongst SME firms to determine the amount of execution of accounting information systems. An examination was also done as to know the influence on enhancement in result pointers and efficiency. The results show that there is an affirmative relationship amongst the SMEs that practice AIS for financial and bank management and improved performance methods.

2.2.18 **Elizabeth Daniel, et al., (2002)**, infers in the paper “Adoption of E-Commerce by SMEs in the UK - Towards a Stage Model” that SMEs are promptly implementing the Internet and e-commerce. This paper states
the research gap by pursuing to comprehend how SMEs in the UK are implementing e-commerce, through an examination of their level and system of implementation. The authors studied four divergent groups of implementation. These made a set of chronological phases, through which organizations seem to pass through the implementation of e-commerce.

### 2.2.19 Eric Shih, et al., (2008)

In the paper “IT diffusion in developing countries” observes that the development of technology transmission happens asymmetrically across national boundaries due to the differences in the national atmospheres and associations to global economy. The reasons that are linked to IT investments – means for technology funds, structure of economy, balancing resources and openness to outdoor effects. The authors state that it is significant for the managements in the emerging countries to recognize the welfares of IT execution and make inspiring strategies for IT funds.

### 2.2.20 Farhad Nejadirani, et al., (2011)

With 2 other co-authors in their paper “Developing countries and electronic commerce the case of SMEs” state that all analysts agree that how business is done will be greatly influenced by ICT. SME’s in developing countries need to find out when, how, if and where to use electronic commerce systems to obtain these improvements. They face hindrances and restrictions precise to the developing countries in which they function such as greater costs to use the internet and language obstacles. In SMEs in developing countries, e-commerce positions the benefits of compact information exploration charges and trade charges.

### 2.2.21 Federici, Tommaso

In his paper “ERPs in SMEs: ex-post evaluation of success factors”, has observed that the overview of ERPs into SMEs cannot be built on a complete imitation of the practices with larger businesses and signifies a fresh task with important particularities to be measured. The investigation accessible here was precisely focussed on
the SMEs which previously completed the procedure of implementing an ERP scheme, with the objective of assessing these experiences ex-post, by probing some development pointers related with some situation and scheme features. The outcomes recommend that the ERP overview is assessed as an achievement and that the paybacks achieved are commonly connected to the simplification of internal processes, a much easier data recovery, an enhanced performance administration and certain growth in production effectiveness.

2.2.22 G. Kannabiran, P. Dharmalingam, (2012), this paper "Enablers and inhibitors of advanced information technologies adoption by SMEs: An empirical study of auto ancillaries in India" is most extensive research relevant to India. The auto auxiliary business in India has seen huge capability growth and renovation due to entrance of external automobile companies in the post liberalization period. In spite of probable welfare, the implementation of innovative IT amongst SMEs is less in India. There are numerous technical, cost-effective and administrative features that permit or constrain the acceptance of innovative IT. The main focus of this study is to recognize and assess the important aspects that are permitting or constraining implementation of innovative IT in the Indian auto subsidiary SMEs.

2.2.23 Giovanni Fulantelli, & Mario Allegra (2003), in their research paper “Small company attitude towards ICT based solutions: some key-elements to improve it” have demonstrated some investigation outcomes regarding the approach of small firms towards ICT created systems in Italy. They have also presented some vital aspects to surpass the hindrances to familiarizing ICT in small firms for new business methods; between others, and emphasized the requirement for training about technical modernization as well as about administrative and social modifications that must happen within an organization.
2.2.24 Graham Vickery, et al. (2007), “ICT, E-Business and SMEs”. OECD undertakes lot of research on contemporary issues prevailing in its member countries. One such report on the subject relevant to the research topic is available from OECD, as mentioned above.

Benefits of ICT and Internet use to SMEs

In this report, authors have noted number of interesting observations about the subject as mentioned below:

a) They indicate that ICT applications provide number of benefits for intra and inter firm business processes and transactions.

b) ICT applications increase information and knowledge management within the firm and decrease transaction costs for both business-to-business (B2B) and business-to-consumer (B2C) transactions.

c) ICT applications are found to be effective means for better external communications and quality of services for existing and new customers.

d) In other words, ICT in SMEs can not only utilise firm’s resources more efficiently, but also increases efficiency of business processes like documentation, data processing, and back-office transactions.

Limitations of ICT adoption and firms’ performance

Despite these advantages, SMEs in OECD countries are slow to adopt ICT because of several reasons, which are as follows:
• ICT benefits must not be outweighing investment and maintenance costs.
• Commercial considerations and potential returns may not be visible.
• E-commerce benefits are not enough driver to change traditional business processes of SMEs.
• Non-availability of ICT competencies within the firm.
• Cost of purchasing, implementing and operating ICT applications
• Lack of reliable trust and grievance redressal system to address e-commerce legal and regulatory issues for domestic and cross-border transactions.
• Lack of ICT/ e-business awareness and training programs and business consulting services.

The authors further explore the reasons for ICT (non) adoption in SMEs. The authors of this report observe that there is an argument about whether and how ICT adoption increases the performance of the business processes in SMEs. Moreover, only investment in ICT does not suffice for the improvement of business performance, but it also requires complementary investment in skills, organisation, and innovation with an ability to take (associated) risks. Authors make an interesting observation: many studies do point out as market expansion as benefit for the SMEs because of the adoption of ICT; but this is true for the large business too. In fact, there are evidences that because of ICT, the large businesses in same product lines are expanding where earlier SMEs were dominating.

The author cite a US survey of Small Business Finances (SSBF) conducted in 1998 (Bitler, 2001), which indicates that there is no (direct) relation between ICT use and firms performance (in terms of the sales turnover). OECD analysis recently (year when this report was published) conducted, shows that ICT and e-business strategies do impact positively
on the firm’s performance, but that ICT is not a panacea in itself. ICT perhaps helps to reduce any inefficiencies in any of the business processes like finance and inventory management, workforce management and customer management OECD study group conducted two surveys in member countries which makes an remarkable observation that the positive impacts of e-commerce on their turnover and profitability and to certain extent on employment can be seen only when e-commerce is part of larger business strategies of the firms. This can be interpreted in the context of SMEs that these SMEs need to be part of large network of business transactions to reap the benefit of e-commerce or ICT.

**Barriers to use of ICT in OECD countries**

The authors have researched in details the barriers to use ICT and e-commerce by SMEs in OECD member countries. It is very interesting to see that the barriers to use of ICT reported in advanced OECD countries look very similar to any other non-advanced Asia-Pacific country including India:

- Unsuitability to business.
- More focus on daily operations and lack of time to understand new technologies.
- Lack of expertise and ICT knowledge within the organisation.
- Absence of strategic vision to understand importance for ICT for the business
- Cost of developing and maintaining e-business systems.
- Network infrastructure issues: accessibility and interoperability.
- Lack of confidence in purchasing, implementing and operating ICT and its applications as there is a lack of trust in ICT vendors and service providers and security of ICT / e-commerce applications.
• Legal uncertainties in usage of cross-border e-commerce in particular.

**ICT & E-business use by sector**

The authors of this report also studied the business sectors (in OECD countries) where SMEs are making use of ICT & E-business. It has been found that the business sectors where there is a wide-spread use of ICT & E-business are – tourism, retail, textiles, automobiles, construction wholesale, manufacturing and business services.

The following graph reproduced from this report gives commercial activities undertaken by the SMEs in Europe (not all OECD countries) using internet.

It shows that major use of internet in these European countries is for distribution of information of the products to the customers, while actual receiving the orders on internet is rather limited.

In remaining part of this report, the authors have discussed the policy measures required to be taken to increase adoption of ICT & E-business in OECD countries, which would help the SMEs to improve their business performance.
2.2.25 Griffiths, M and Light, B (2008), have investigated in their paper “Innovation in ICT adoption by SMEs, the part played by a managing director of a small to medium-sized enterprise consultancy in an ICT scheme related with company progress. Conclusions of this study are that those involved with company growth assignments must be better educated as to the motives for conflict, predominantly optimistic ones and the approaches by which this may happen.

2.2.26 Hazbo Skoko, et al., (2006), in this article “ICT Adoption Policy of Australian and Croatian SMEs”, have stated that though numerous SMEs are presently implementing information and communication technology and services centred on it, there is little methodical investigation into by what means they are doing this and what are the administrative and ecological factors related to this implementation. In this study, the authors construct the framework of ICT implementation in Croatian and Australian SMEs. By implementing Qualitative Comparative Analysis and Boolean algebra, the writers established an outline of essential and adequate features for ICT implementation by SMEs Croatia and Australia.

2.2.27 Hegin Lee, et al. (2002). The authors in their paper “Time and Information Technology: Temporal impacts on individual, organizations and society” conclude that IT would have an impact on an individual, an organization
and the society, the way mechanical clock had when it was invented in 1657 AD. IT has already modified the business processes, reduced product cycle time, allowed just-in-time production and increased the competition. IT allows multiple tasks to be conducted simultaneously. In fact, on organizational level, ICT is generating innovative methods of functioning and different systems of the establishments like simulated groups and practical trade.

2.2.28 Hemant Verma, (2010), “ICT Adoption in Indian SMEs, Status & Scope”

Objective of the Survey: To assess the extent of adoption and usage of Information, Communication Technology in micro, small and medium enterprises.

National MSME Council of Confederation of Indian Industry had been conducting ICT adoption survey for last 3 years. The extract of this survey was made available in the Journal of Small Business and Enterprise May 2010 issue. Also Mr. Hemant Verma, who works with Small Industries Division of CII, wrote a detailed paper based on this survey. Both of the above are reviewed by the researcher in the context of his research project

The Survey report firstly recognises the importance of SMEs as a contribution to the national economy. Mr. Singhal comments that MSMEs collectively function as the pivot of national economy, as they account for bulk industrial output, exports and employment. CII is sure about the appropriate adoption and utilisation of ICT within business processes and operations of MSMEs, at least to certain extent, will considerably strengthen national economy and provide new opportunities for advanced efficiency, integration of business and flow of trade & commerce.
ICT Adoption in Indian SMEs

Mr. Hemant Verma in his paper based on this survey indicates that the ICT adoption in the Indian SMEs can be evaluated by using a four stage model, having following stages:

i. Basic ICT infrastructure
ii. Functional automation
iii. Business automation
iv. Business integration

The explanation of the above stages is given in following table:

Table: 2.6 ICT adoptions in the Indian SMEs

<table>
<thead>
<tr>
<th>Stage (i)</th>
<th>Computerisation in selective roles, basic level computerisation and LAN for office automation, communication / promotion purposes (e.g. word processing, spread sheets, database, drafting, graphics, intranet, email, web site, product catalogues, etc.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage (ii)</td>
<td>Computerisation in selective functions (e.g. financial accounting in accounts, material accounting in stores, payroll in HR, invoicing in sales) – mainly non-cross functional.</td>
</tr>
<tr>
<td>Stage (iii)</td>
<td>Computerisation in core business processes, process automation and integration (DSS + ERP)</td>
</tr>
<tr>
<td>Stage (iv)</td>
<td>Computerisation in business networks (DSS+ERP+E-Commerce)</td>
</tr>
</tbody>
</table>
CII Survey Findings

CII survey also found out current and next two years’ (probable) adoption of ICT in select SME sectors which is presented below:
(Source: MSME Outlook Survey Report On ICT -2010)

Table: 2.7 ICT adoptions in the Indian SMEs - (2010) status

<table>
<thead>
<tr>
<th>Stage</th>
<th>Auto components</th>
<th>Garment Industry</th>
<th>Drug &amp; Pharma</th>
<th>Leather Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Small Mediu m</td>
<td>Small Mediu m</td>
<td>Small Medium</td>
<td>Small Medium</td>
</tr>
<tr>
<td>(i)</td>
<td>30-50%</td>
<td>&gt; 30%</td>
<td>10-30%</td>
<td>&gt; 30%</td>
</tr>
<tr>
<td></td>
<td>50-70%</td>
<td>&lt; 10%</td>
<td>10-30%</td>
<td>50-70%</td>
</tr>
<tr>
<td>(ii)</td>
<td>10-30%</td>
<td>50-70%</td>
<td>10-30%</td>
<td>50-70%</td>
</tr>
<tr>
<td></td>
<td>30-50%</td>
<td>&lt; 10%</td>
<td>&lt; 10%</td>
<td>30-50%</td>
</tr>
<tr>
<td>(iii)</td>
<td>&lt; 10%</td>
<td>30-50%</td>
<td>&lt; 10%</td>
<td>&lt; 10%</td>
</tr>
<tr>
<td></td>
<td>Nil</td>
<td>&lt; 10%</td>
<td>&lt; 10%</td>
<td>&lt; 10%</td>
</tr>
<tr>
<td>(iv)</td>
<td>Nil</td>
<td>&lt; 10%</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td></td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
</tr>
</tbody>
</table>
The percentage figures mentioned above, for all stages, of course are not promising. The above table shows some improvement between the years 2010 and 2012; however, growth is not impressive.

**Reasons for “poor adoption” of ICT**

The CII survey identifies reasons for “poor adoption” of ICT in SMEs due to numerous major constraints like:

- Lack of skilled technical capabilities
- Limited ICT literacy of employees
- Inadequate internet connectivity
- Inadequate (ICT) infrastructure
- (Relatively) High cost of ICT equipment and lack of financing options

<table>
<thead>
<tr>
<th>Stage (i)</th>
<th>Auto components</th>
<th>Garment Industry</th>
<th>Drug &amp; Pharma</th>
<th>Leather Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage (ii)</td>
<td>50-70%</td>
<td>&gt; 70%</td>
<td>50-70%</td>
<td>&gt; 70%</td>
</tr>
<tr>
<td>Stage (iii)</td>
<td>&lt; 10%</td>
<td>50-70%</td>
<td>&lt; 10%</td>
<td>10-30%</td>
</tr>
<tr>
<td>Stage (iv)</td>
<td>?</td>
<td>&lt; 10%</td>
<td>Nil</td>
<td>&lt; 10%</td>
</tr>
</tbody>
</table>
• ICT products and services available in the market are not tailored for the requirement of SMEs
• Low awareness and weak understanding of demands of new digital economy

In other words, SMEs are on low level of awareness, access, adoption and advantage for ICT. Consequently, SMEs will lose out opportunities to become an active part of global supply chain, bid for outsourcing business, and increase their internal productivity and efficiency.

CII’s recommendations to the government for encouraging use of ICT in MSMEs

Confederation of Indian Industry has sought tax concessions for MSME sector to encourage them for investing in ICT to enhance competitiveness. CII has requested to the government to consider 100% depreciation on ICT equipment upto Rs. 25 lakhs; once in three years. CII believes that this tax provision would certainly increase the usage of ICT in MSME sector, which will help MSMEs to increase general competitiveness and better communication to the outside world.

Most of the literatures reviewed by the researcher originate from abroad, with the exception of a few. A lot of research is being conducted overseas, especially in the advanced countries like U.S.A., Canada, etc. This is obvious because of two facts, first being the Information, Communication technology originated and developed in these countries since beginning and secondly, the technology management studies are also in advanced stage in these countries. Unfortunately in India, the researcher could not find any research work relevant to the topic of the research.
2.2.29 Hemant Verma, (2005), has elaborated in detail in his paper “Enhancing Export Competitiveness of Indian SMEs through ICT”, that in current years, firms have applied thousands of small and large inventions in software applications, work procedure, business association, customer relationship management, enterprise resource management and planning, business intelligence & agility and supply chain management. ICT implementation in the Indian SME segment can be assessed by means of a 4 phase model. These phases are (i) Elementary ICT Set-up, (ii) Practical Mechanisation, (iii) Commercial Mechanisation, and (iv) Professional Assimilation. This model can also be applied for benchmarking ICT implementation amongst diverse business segments.

2.2.30 Idisemi Apulu, Ann Latham, (2011), observe in their paper “An evaluation of the impact of Information and Communication Technologies: Two case study examples” that there is a rising condition in current times for robust budget regulator and a request for greater earnings in productions. The use of Information and communication technology to achieve economic benefit has become a crucial planned matter amongst administrations in the fast globalizing atmosphere as ICT plays a calculated part in the administration of firms. Hence, it indicates that ICT brings about organizational advantage. This paper aims to extend understanding on the influence of applying ICT in establishments by using two firms in Nigeria as case study instances.

2.2.31 Indranil Bardhan, Shu Lin (2008), A Model to Measure the Business Value of Information Technology: The Case of Project and Information Work. The author trio has done an extensive research in Information Technology and its relation to the business value. This is because Information Technology investment is believed to be done only after realising what it can do to improve existing business processes and assisting in increase of productivity of business operations. The
authors observe that the operational and process level changes need to be understood and separate out the force of exact category of computer technology functions on business vibrant capacity which influences organisations' performance. For this purpose the authors propose to study two categories of results, i.e.

a. Industry procedural stage calculations
   
   i. Cycle times
   ii. Rates of completion
   iii. Costing
   iv. Quality of the project

b. Industry specific economical efficiency calculations
   
   i. Return on assets
   ii. Gross margin
   iii. Return on equity

However, this is difficult as the indefinable and multiplicity of “data related work” and its results pose disputes like its explanation, dimension and enhancement.

The authors further explain “dynamic capabilities”, representing the industrial and premeditated customs that assist the organisations to revert to varying selling environment and build tenable advantages. These include effective product development, strategic decision making, and effective external communication, knowledge transfer to and from vendors and customers and reuse capabilities. Thus, Information Technology can make available constructing mass for company progression to improve their active competencies.
For the purpose of this study, the authors have taken a case of project/program management wherein impact of implemented Information Technology can be researched. They classify Information Technology used in the program or project administration into three forms:

- CCT-Core communication technologies
  - It comprises of essential expertise like email, web portals

- Enterprise computing technology (ECT)
  - Includes Enterprise wide Resource Planning (ERP)

- Group collaboration technologies (GCT)
  - Includes collaboration technologies like databases, instant messaging and video-conferencing

To study impact of Information Technology on ‘productivity’; they have considered two distinct aspects of productivity, viz. effectiveness and efficiency. Competency indicate “doing things right” while efficiency indicate “doing right things”.

Efficiency using Information Technology can be calculated with the help of multiple factors like time required for looking for the data, assignment job periods, elimination of rework and non-value added tasks.

Similarly, effectiveness can be measured using following variables, viz. quality and its uniformity of the assignment, client and business significance of result, level to which the assignment endeavour is planned to influence the hard work of vendors and other partners in the value chain, and their alliance of the endeavour with the organisations’ company policy.
Based on these premises, the authors surveyed 625 organisations from diverse sectors. The findings of the survey are summarised as follows:

**Impact of Information Technology resources on Dynamic Capabilities**

The authors have mentioned that the Core communication technologies and Enterprise computing technology have affirmative force on the efficiency; however, force of Group collaboration technologies on assignment efficiency is affirmative, but not data-wise significant. However, Group collaboration technologies have an important force on effectiveness. Further, IT human capital (application development, maintenance, managerial expertise, etc.) has a positive impact on improving dynamic capabilities.

**Impact of Information Technology on Project Performance**

The authors tried to evaluate impact of Information technology on 4 program efficiency calculations, i.e. costing, change in cycle time, quality of the program and completion on-time rate. The studies have proven that Information Technology has positive impact on these performance measures, which will vary as per the industry sector.

In conclusion, the authors comment that Information technology need to be implemented to improve dynamic capabilities of the firm. Organisations will not realise significant performance improvements unless effectiveness and efficiency are focused to make investment in Information Technology successful.

**2.2.33 Ismail, Noor Azizi (2009).** This study titled as “Factors influencing the effectiveness of information system implementation among small and medium manufacturing enterprises in Malaysia” studies information system efficiency and its effect causes in the particular perspective of
SME. The framework assessed the significance of administrator involvement in IS execution, administrator IS familiarity and accounting understanding, and outside specialists (sellers, counsellors, administrative organizations and secretarial companies) for IS success. The outcomes recommended that it is essential for administrators of SMEs to attain adequate secretarial information to support them better in recognizing business information necessities.

2.2.34 Jan Devos, et al., (2008), observed in their paper “Outsourced Information Systems failures in SMEs: a multiple case study”, that since the 1980s, an amount of outlines have been projected for consideration of the theory of information system failure. Two methodologies to IS failures appear mostly significant: the theory of anticipation failure and the theory of conclusion failure. The concept appears to work in two ways; adaptable conduct is also witnessed on the side of the foremost. The results specify that absence of conviction is a noticeable element for failure.

2.2.35 Japhet Lawrence (2010), states in her study “The Factors that influence adoption and usage decision in SMEs: assessing informational case study research in Information Systems” by means of case study was to offer a consideration of the aspects that effect SMEs choice to implement and practice Internet in industry. The results recommend that improved implementation models should not only account for technical aspects, but also administrative and ecological elements should be involved in IT implementation and practice in SMEs firm.

2.2.36 Juell-Skielse, Gustaf (2006) in “ERP adoption in small and medium sized enterprises” observes that this article states the level of implementation of ERP jobs, apparent administrative efficiency and acute achievement aspects. The maximum mutual application of ERP is for monetary regulation and reporting, followed by order record and buying. An important association between the level of implementation and
administrative efficiency was established. The implementation of functionality for customer relationship management appears to be in progress, but the usage of e-commerce, business acumen and supply chain management is very little.

2.2.37 Julie Eatock, et al., (2002), in their conceptual paper titled as “A study of the impact of information technology on business processes using discrete event simulation” concludes that the actual worth of Information Technology is that it provokes innovative changes in the business processes. The outcome of the project undertaken by these authors gives an indication that describing dynamic behavior of IT could be very helpful in predicting the impact of IT may have on business processes. This paper describes the rational of the simulation framework used and analyses the results obtained when applying this framework to a case study.

2.2.38 Kyle Eishen, (2000). “Information Technology: History, Practice & Implications for Development.” This report initially gives history and practice of Information Technology mainly from the technological perspective. The relevant part of the Information Technology history and its perspective for the purpose of this research project has already been covered in the Chapter – I – Introduction. Therefore this part from this literature is not reviewed here by the Researcher. The remaining part of this literature has been reviewed by the Researcher mainly in the context of the topic of the research.

The author has extensively considered technological aspects of Information Technology, viz. hardware – computer machines & networks and software. He observes that rapid developments in hardware definitely increases opportunities in usage of computers and in fact, opens up new opportunities too. However, he emphasizes that development of software is a crucial area in Information Technology. This is because, he feels that
there is no limitation of converting any ‘process’ – be it scientific, social or commercial into ‘software’. From purely technology point of view, software development is nothing but the ‘central method of digitising algorithm’ for a given process. He further claims that in this way software is ‘just recent medium’ for knowledge storage. However, the software only can model well enough understood processes to be translated into a logical sequence of procedures and outcomes.

The author further notes that though there had been growing improvements in software products and processes have failed to keep pace with complexity and size of the software programs the users’ requirements. This is because, as new and new processes being converted into a program, the expectations of the users are also increasing with a desire to convert more complex manual processes.

When out of the total Information Technology investments almost 75 percent is utilised by software alone, the author says that there is a large scale impact upon the following areas:

- Organisational and institutional policies & practices
- Economic practices of the community
- Social practices of the society

The author further opines that this very nature of the software or in larger terms of Information technology has power to convert existing economy into ‘Information Economy’ as it can consist of globalisation, networked economy, flexible specialisation and organisational change, etc.

2.2.39 G. Kannabiran, and P. Dharmalingam, (2012), This paper "Enablers and inhibitors of advanced information technologies adoption by SMEs: An empirical study of auto ancillaries in India" is most extensive research
relevant to India. The auto ancillary business in India has seen enormous capability growth and transformation due to entrance of overseas automobile industrialists in the post liberalization period. In spite of prospective paybacks, the acceptance of cutting-edge IT amongst SMEs is little in India. There are numerous technical, cost-effective and administrative features that permit or constrain the implementation of cutting-edge IT. The main aim of this paper is to recognize and assess the important features that are permitting or hinder in implementation of innovative IT in the Indian auto supplementary SMEs.

2.2.40 Li, Ping and Mula, Joseph M. (2009), wrote in their paper “Extent of adoption of EDI by Singaporean SMEs: a survey of practices” that EDI implementation and small business use of IT, the four variables of choice or that impact Singaporean SMEs to approve EDI were recognized as supposed advantage of EDI, administrative willingness for EDI, economical stress and authority and inter-company associations. Singaporean SMEs did not anticipate that implementation of EDI would increase their dealing partner transactions. Still, Singaporean SMEs enhanced their level of responsiveness of EDI paybacks after implementation of EDI, in run through.

2.2.41 Mahadevan Supramaniam, and Mudiarasan Kuppusamy (2009). “Investigating the Critical Factors in Implementing Enterprise Resource Planning system in Malaysian Business Firms” This article defines the effect of Critical Success Factors in the Enterprise Resource Planning system applications by means of the replies from 151 establishments that have accomplished or are in the process of concluding an ERP execution and recognizing the important aids of ERP application in the organization. The significance of these aspects was examined within Malaysian businesses using questionnaire study technique.
2.2.42 Mahesha Kapurubandara (2009), “A Framework to e-Transform SMEs in Developing Countries”, numerous aspects recognized as reasons for the decision can be generally classified as Internal and External Barriers. This article discovers the query on how barriers for acceptance of e-commerce influence the SMEs at various stages of complexity. The article also offers an outline to regulate the existing phase of an SME on a roadmap, which trails e-transformation and supports in overpowering obstacles for moving between phases. The article also recognizes hurdles leading at numerous stages for dissimilar SMEs on the roadmap.

2.2.43 Masayuki Morikawa (2004), “Information Technology and the Performance of Japanese SMEs”, this article studies the influence of investment in information technology on the effectiveness of Japanese SMEs organizations. The conclusions recommend that there is an optimistic and statistically important connection between IT and company’s productivity and invention, for small organizations. The approval of IT by this segment is essential to the achievement of organizational amendment in the Japanese economy.

2.2.44 Meshram K.G., Chavan S.R. (2011), in their paper “The Role of CRM in Indian SMEs Growth: Issues and Challenge”, state that SMEs play a dynamic role for the development of Indian Economy. The main input of SME sector is to generate employment and they are the major originators of work prospects which are next only to agriculture. Ever since the progression of globalization and privatization added push through the world, SMEs are facing countless encounters to continue and withstand in the market

2.2.45 Mihane Berisha-Namani, (2009), observe in his paper “The role of Information Technology in SMEs in Kosova, that IT is impacting most of the industries and all aspects of economy. Usage of IT is resulting in
structural transformation of enterprises including that of SMEs. The usage of IT in SMEs in Kosovo is increasing because of many factors – cost reduction, effective and rational promotion of IT, faster communication, faster realisation of the products and the services. Despite all these SMEs in Kosovo are lagging behind in usage of e-commerce. The author suggests that the government need to play a major role in supporting and helping SMEs to adopt IT to increase competitiveness, productivity as well as to open opportunities for e-business.

2.2.46 Monika Sharma, et al., (2010), has stated their observations in the paper “Scope of Cloud computing for SMEs in India”, about Cloud computing by SMEs. The authors mention that the Indian SMEs are one of the most hostile implementers of ERP systems. This article grants the cost savings and decline in the level of difficulty in implementing a cloud computing Service enabled ERP system. In the cloud computing atmosphere the SMEs will not have to own the set-up so they need not employ any spending and in its place they can apply the assets as a facility and recompense as per their usage.

2.2.47 Morteza Ghobakhloo, et al., (2012), in their paper titled as “Strategies for Successful Information Technology Adoption in Small and Medium-sized Enterprises”, observe that Owing to the abundant benefits of IT, SMEs are trying to implement IT systems to help their companies. IT implementation by SMEs varies from larger industries because of their particular features, such as income restraints. This paper targets to offer an improved and perfect understanding of IT implementation inside SMEs by studying and investigating existing IT work.

2.2.48 Morteza Ghobakhloo, et al., (2011), have in their paper “Information Technology Adoption in Small and Medium-sized Enterprises; An Appraisal of Two Decades Literature” reviewed variety of aspects of the subject. Due to the increased economic burden and requirement for
entering into world-wide market experienced by SMEs, these firms are incrementally retaining Information Technology to take benefit of its considerable paybacks. The objectives of this article are to assess and compare the external and internal concerns disturbing the development of IT implementation in SMEs.

2.2.49 Muafi, R. et al., (2012), in their research paper “The Information Technology (IT) Adoption Process and E-Readiness to Use within Yogyakarta Indonesian Small Medium Enterprises (SME)”, state that to understand adoption process and its relevant factors influencing this research they have applied the model that uses T-O-E approach (technology, organization, and environment) and orientation process approach. The conclusion of all the hypothesis proposed are there is positive influences of; (1) technology competence on IT usage, (2) of government policies on IT usage, (3) government policies on technology competence, (4) IT usage on IT value, and (5) IT usage on E-readiness to use.

2.2.50 Nidhi Tondon, (2002), in her paper “E-Commerce training with small scale entrepreneurs in developing countries - some findings”, which was published by UNCTAD, Geneva, she mentions that she had working experience of ICT training the SMEs in the parts of Africa. From her experience she concluded that different types of training were required for different sub-groups in SMEs sector; which is enumerated below:

**Table 2.9 ICT / E-commerce training required**

<table>
<thead>
<tr>
<th>Type of SME</th>
<th>ICT / E-commerce training required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Micro-businesses</td>
<td>E-mail, search engines, to find out relevant government programs</td>
</tr>
<tr>
<td>Small</td>
<td>Useful groups on web, purchase and use of accounting</td>
</tr>
<tr>
<td>Enterprises</td>
<td>Software, SME specific applications, downloading free softwares from the net, payment gateways, e-business opportunities</td>
</tr>
<tr>
<td>-------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Medium enterprises</td>
<td>Application specific software, Linux OS, converting manual processes to IT processes, payroll, accounts software, website for company profile</td>
</tr>
</tbody>
</table>

2.2.51 **Olaf Nielingler, (2003)**, presents in his paper titled as “ICT utilization of SMEs in Tanzania” and he also presents his findings of the survey of 150 SMEs in Tanzania, from food processing, textile and tourist sector. He observed the following:

- There was a slow transition from normal modes of communication to new areas like e-mail.

- Telephone, mobile, e-mail, computers, and web are new preferred areas of communication by the Tanzanian SMEs.

- Tourism followed by food processing and textile are adopting ICT in Tanzania.

- IT usage in Tanzania is mainly for – word processing, bookkeeping, email, inventory management, and production control.

- Acquisition of computer skills is done by SMEs, using one or more following methods – learning by doing, in-house training by consultants, attending outside courses, formal training before employment.
• Obstacles for computer utilization are – perception that there is no use of computers in business, high cost for computer services, and lack of technical skills

2.2.52 Organisation for Economic Cooperation & Development, (2003). “ICT &economic growth – Evidence from OECD countries, Industries & Firms” Under the Chairmanship of Mr. Dirk Pilat this report was prepared by the OECD Directorate of Science, Technology & Industry in 13 of the OECD member countries and was submitted in the year 2003. Here ICT means Information, Communication Technology. It deals with following aspects of ICT in the OECD member countries:

• The diffusion ICT in OECD economies
• The contribution of ICT to growth
• ICT and firm level performance
• Policy implications

This report is very exhaustive. However, this had been reviewed by the Researcher mainly in the context of the topic of the research.

The diffusion of Information & Communication Technology (ICT)

While discussing the diffusion of ICT, it reports that the economic impact of ICT is strongly linked to the different ICT technologies have diffused across OECD economies. This is partly because ICT is a network technology and it generates more benefits as more people and the firms use the network. The high growth of ICT investment can be contributed to the speedy decline in the relative prices of the computers and related equipment and also due to the growing scope for the application for the application of ICT. As a consequence, ICT offers large prospective benefits to a firm like augmenting information flows and increase in
productivity. However, incidence of ICT is mainly in services sector like legal services, business services, trading & retail services, education, financial services, health, etc. The usage of ICT is observed to be much lesser in goods producing sectors like agriculture, mining, manufacturing and construction sectors, even in OECD countries. This suggests that any impact on economic performance is predominant in the services sector compared to the other sectors of the economy; though in practice ICT can be use for all the sectors and they can benefit from its use.

This OECD report further analyses distribution of ICT usage according to the size of the firms. It observes that the smaller firms use typically less ICT compared to the large firms. It offers a basis for this phenomenon: It says that large firms invest more in ICT compared to small firms as ICT investment is risky and uncertain for small firms and they may not able to bear that risk. This possibly will imply that the impact of ICT could be larger for large firms than for small firms.

**Factors affecting diffusion of ICT**

OECD report examines the reasons for different diffusions across OECD countries, they are:

- Lack of relevant skills
- Lack of competition
- High cost of ICT
- High cost of making ICT effective in the workplaces
- High cost of related personnel
- Telecommunication costs
- Organisational change
- Fear of security
- Non-availability of conducive e-commerce environment
International competitive pressures
Perception of anticipated benefits
Ability to absorb knowledge
Government regulations either on end-product or on ICT

The Contribution of ICT to Growth

Major concern of using any technology is always its contribution to the furthering the business performance, i.e. growth. This OECD report has identified three effects of ICT implementation, these areas are follows:

- Investment in ICT contributes to overall make deeper on capital and raises labour productivity
- Rapid technological progress in the production of ICT goods and services may contribute to increase multifactor productivity
- Greater use of ICT may help the firms to increase overall efficiency by lowering the transaction costs and may help in rapid innovation.
However, as before, the contribution of ICT to growth in the OECD countries is not uniform as it highly depends on level of adoption of ICT in different OECD countries. The following figure reproduced from the original report compares contribution of the key ICT-using services (wholesale & retail trade, finance, insurance and business services) to the aggregate productivity growth over the 1990s. Interestingly, in some countries (Austria, Korea, Belgium, Denmark, Japan, Germany and Italy and partially in Switzerland and Spain) ICT-using services made a negative contribution to aggregate productivity growth. However, the exact reasons for this phenomenon are discussed in this report in Chapter 2.
ICT & Firm Level Performance

The strongest evidence of impact of ICT use comes from the organisational level studies. There are explicit and implicit evidences which tell about impact of ICT on firm level performance, particularly for:

- Gaining of more market share in competitive markets
- Expanding product range and services offered
- Responding better to the clients’ demand
- Reducing inefficiencies in the use of capital and labour
- As the spill-over effects, it may help in:
  - Reducing transaction cost
  - More efficient matching of supply and demand
  - Enabling the growth of new markets which were not feasible before

In conclusion, this OECD report observes that ICT-using firms have better productivity performance compared to those who are not using or having restricted use of ICT in their firms.

In case of within firm level impact of ICT, this OECD report informs that:

- The demand for skilled labour within these firms increased
- The wages paid to workers in ICT-using firms were better than non-users
- There is a positive relationship between IT spending and productivity of the firm
- Because of the within the firm network (intra-net) and firm’s network connected to the outside world (inter-net), these firms were
able to use e-commerce protocols like Electronic Data Interchange (EDI) for commercial transactions

• As a consequence, the firms were able to offer their products internationally

This OECD report gives an interesting graph depicting usage of ICT’s different components in one of the member country, viz. United Kingdom which is reproduced below. It indicates that the most used ICT’s components in UK are intra-nets, internet and websites. As far the user sectors are concerned, finance, real estate & business services and manufacturing are the sectors that have a large scale usage of ICT in their firms.

Factors that affect impact of ICT

This OECD report attempts to find out the factors which are responsible that affect the impact. Following narration gives insight into these factors.

• ICT can impact firms’ performance only with an appropriate investment
• Investment in ICT only is not enough; but there has to be associated investments like, training & maintenance
• There will be need to have investment in making organisational change to make ICT work
• Impact of ICT on firm level performance will vary depending upon size (investment, sales turnover, manpower, & production capacity) of the firm
• The impact also will vary depending upon age of the firm. Older firms may be slow to adopt; while newer firms may adopt ICT from the beginning.
Changes in ownerships of the firm, style of management are some of the factors, which also affect the impact. This OECD report mentions that post-ownership change adoptability of ICT is better compared to earlier ownership-regime. Similarly, foreign management is more ICT savvy compared to the domestic management.

This OECD report also gives the graph of usage of ICT network technologies by size researched in UK.

Figure 2.7 Use of ICT network technologies by size class, United Kingdom, 2000

Percentage of all firms, business-weighted

It indicates especially for small (10-49 employees) and medium (50-249) sector firms the largest percentage usage is mainly of internet and own website only.

In the Annex – I of this OECD report, the editor of the report confesses that ‘ICT’s impact is difficult to measure at the aggregate and sectoral level in many services sectors, due to the problems in measurement of the output. Therefore, from firm level studies, one may infer that the productivity growth in services sector is positively affected by the usage of ICT’.

Policy Implications

This OECD report also comments on the roles played by the governments of the OECD member countries. This is because, the Governments have primary responsibility to create a conducive environment for the business in any country. Looking at the benefits which are derived from the usage of ICT, this OECD report suggest to policy makers to have following policies in place so that there would positive impact of ICT on the economies in their countries.

• The investment in ICT varies in the OECD member countries because of the government policies related to non-tariff barriers like the standards, import licensing and government procurement. The governments need to remove these non-tariff barriers

• Because of the above there is not adequate competition of ICT vendors and the users may not get competitive cost advantage.

• Regulatory reforms in telecommunications lead to large scale networking thus enabling EDI, e-Commerce to boost particularly
B2B (business-to-business) trade. As such if the trade has to increase then basic telecommunication infrastructure and services at affordable cost need to be provided.

- As an investment in ICT not only going to enable the increased usage, but also investment in intangible assets like training of skilled manpower (to operate ICT) and conscious change in organisational practices is needed to be brought in. Typically in the OECD countries US$1 investment in ICT requires US$ 9 additional investment in intangible assets.

- Social partners and the governments need to work together to ensure that a upgrading of education, organisational change, ICT and productivity should be given impetus.

- To generate trust in security of network transactions, the governments need to formulate and implement on-line security standards and legal framework.

- The growth in any technology can happen only if there is continuous up gradation. The governments need to promote such initiatives especially for the rapid changing technology like ICT.

At the end, this exhaustive OECD report on ICT & Economic Growth infer that despite slowdown in the economy and the parts of ICT sector (1999-2002); ICT has emerged over a past decade (1993-2003) as a key technology with a potential to transform economic and social activity.

2.2.53 Peter Vrgovic, et al., (2012), “Open innovation for SMEs in developing countries –
an intermediated communication network model for collaboration beyond obstacles”, The authors state that there is growing concern in discovering open invention in developing countries, the abstract and probable uses of by means of open invention in the SMEs segment are seldom seen. This article recommends that in these circumstances an administration agency, using invention centres, could support SMEs to link, connect and join forces with self-governing architects and other events to kick-start invention methods.

2.2.54 Promod Mantavadi, (2008), in his book titled as E-Business - organising for success” concludes that to be effective the firms must assimilate their corporate processes and technology with simulated market place and form the competences to modify quickly. The businesses need to do a detailed prospect valuation for e-business proposal, stock forecasting, leveraging on present technology and other commercial possessions. In employing e-business the distributed methodology has not given projected outcomes. Companies are recognizing the significance of integrated methodology of e-business.

2.2.55 R. Dyerson, et al., (2009), “National Survey of SMEs’ Use of IT in Four Sectors”. This article scrutinizes the adoption and use of information and communication technology (ICT) in SMEs. The article discovers the reasons enabling or obstructing the effective implementation and use of ICT by SMEs. Conclusions are that SMEs are usually content with their funds in ICT but that they are worried about the budget of such funds and are ambiguous about the commercial paybacks. Much of the share in ICT is focussed at consultation of lowermost issues of rate and efficiency but little use is made of prospective planned uses. SMEs seem to be facing competency gaps associated to ICT. They may be too minor to be able to engage a devoted ICT professional and lack the knowledge to have self-confidence in its dependability of consultancy guidance. They frequently
have incomplete knowledge in choosing, executing and appraising recommended ICT resolutions.

2.2.56 Rakesh R Neunaha, (1996). In his paper “Information Technology: Nature of Impact on and Potential Value to Business Operations”, the author has presented a two dimensional framework that illustrates impact of information Technology applications on business operations. This framework identifies three areas of impact of IT on business operations, viz.

- Productive
- Coordinative
- Informative

**Productive impact:**

The automation of processing capabilities and substitution of labour-intensive operations is the impact on production. Technology applications improve productivity of operations in three different forms, viz. reduction of processing time, reduction of processing complexity and substitution of human labour.

**Coordinative impact:**

This relates to the coordination of activities and processes between all temporarily and geographically distributed agents. This again takes place in one of the three ways: coordination across time gaps, across geographically dispersed sites/agents and restructuring relationships.

**Informative impact:**
At this level IT’s impact on operations relates to support provided in enabling strategic and competitive use of information resource and decision making activities. This reduces complexity of un-structured decision making processes within the organisation.

**Business value of Information Technology**

Further in this paper, the author discusses the parameters to understand how business value of information Technology can be assessed. The business value of IT operations is characterised by:

- Increased operative efficiency – The benefits include increased productivity, with either lowered costs for existing level of transactions or avoided costs for increased volume of processing.
- Improved business effectiveness – IT can give increased processing capability and improve information access to become more competitive.
- Basic transformation of the organisation’s business functions (innovation) – IT facilitates change in basic business processes (customer relationship management, supply chain management) to make it more accurate and efficient.

The following table presents two dimensions of nature of Information Technology impact with business value parameters.

**Table: 2.10 Nature of Information Technology impact with business value parameters.**

<table>
<thead>
<tr>
<th>Nature of Impact</th>
<th>Business Value of IT</th>
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<tbody>
<tr>
<td></td>
<td>Efficiency</td>
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</table>

At the end, the author cites number of examples of the businesses (American Airlines, Federal Express) to emphasize the impact of Information Technology which enabled them to redefine business processes and increase revenue of their operations.

### 2.2.57 Ramayah Thurasamy, et al., (2009)

The authors in their paper “Technology Adoption among Small and Medium Enterprises (SME's): A Research Agenda”, present the research agenda that has been projected...
to improve a combined outline to clarify technology implementation of SMEs in Malaysia. Technology implementation has been a key concern among SMEs as they need big expenditure which may not be accessible to the SMEs. Keeping this in mind this article recommends a model to clarify the technology implementation problem amongst SMEs.

2.2.58 Ritchie. B., Brindley. C. (2005), in their paper “ICT adoption by SMEs: implications for relationships and management” discuss a conceptual model of the changes in SMEs boundaries and associations resulting on their implementation of information and communication technologies is established and discovered in this article. Stress is given on the inferences for administration, employees and working methods. Experiential proof from two firms is given to demonstrate the outline and to confirm this fresh viewpoint.

2.2.59 Roslin, Rosnimah Mohd Ismail, Noraini (2008), in his study “Assessing competitive advantage of SMEs through effective supply chain management”, begins with an inter-organizational method where social features are assimilated in the exploration of Supply Chain Management of SMEs. The answers propose are markable viewpoint on SCM and delivery channel tasks amongst SMEs where components of data sharing, collaboration and incorporation are related to economic gain. The association between the three autonomous variables of collaboration, evidence sharing and assimilation with economic advantage are all important, portraying the significance for SMEs to emphases on these social elements. There are possibly other aspects that should be measured besides social components that effect economic advantage.

2.2.60 Sarut Jaidi, Nicholos Beaumont (2003), state in their paper “Factors affecting SME’s Owner’s/managers in adoption of Business-to-Business techniques: A research framework”. This study uses invention and
distribution model and the technology reception model as a hypothetical basis. The fresh outline for SMEs is projected in this article which comprises separate aspects, apparent practicality, supposed simplicity of usage, innovativeness, approach and conduct as a feature influencing owners’ judgement.

2.2.61 Shahawai, S.S. (2010), comments in his paper “Pre-considered factors affecting ERP system adoption in Malaysian SMEs using a technology-organization-environment framework”, that the implementation of ERP system among most Malaysian SME’s are yet behind schedule. The article purposes to discourse the pre-assumed features influencing ERP structure implementation in Malaysian SMEs by consuming a technology-firm-environment outline. The findings would help plan the policies that should be measured to upsurge the consideration on the effective implementation of ERP amongst SMEs in Malaysia.

2.2.62 Southern A., Tilley, F. (2000), “Small firms and information and communication technologies (ICTs): toward a typology of ICTs usage”, In spite of management support for the amount of enterprises to implement information and communication technologies (ICTs) application of ICTs has been a sluggish and very sundry progress. The paper scrutinizes the association amongst small firms and ICTs. It points a number of distinctive, but often contradicted features that display how small organizations practice the expertise.

2.2.63 Stephen O. Migiro, Dennis N. Ocholla (2005), in the paper “Information and Communication Technologies in Small and Medium Scale Tourism Enterprises in Durban, South Africa”, enlist the aim of this article is to recognize issues manipulating the implementation of inventions, explicitly e-commerce inclination and to find precise hurdles or hindrances to the practice of ICT by SME tourism firms in KwaZulu-Natal Province, Durban
in South Africa. Firms considered comprised lodges, guesthouses, self-catering tour operators. The outcomes disclose that more charge, inadequate resources and not clear of what to implement are the supposed obstacles to the distribution of ICTs amongst the tourism facility suppliers in the research.

2.2.64 Stuti Kacker, (2005). “Overcoming Barriers to Innovation for Indian SMEs”. The author, an Indian Administrative Services Officer, has written quiet in detail about various problems faced by the Indian SMEs for innovation. She presents an interesting statistics about the SMEs in India:

• Small industries have 40% share in industrial output and produce over 8000 value added products
• They contribute to 35% of direct and 45% of overall export of the country
• After agriculture, they provide huge employment opportunity to 28.28 million people.
• SMEs constitute 80% of total industrial enterprises in India.
• They suffer from three main problems:
  - Sub-optimal scale of production
  - Technological obsolescence
  - Increase in intense competition because of liberalisation

SMEs almost all times work under certain constraint or the other. In larger organisations, there is a job security, good wage rate, and career development opportunities. As such SMEs cannot hire skilled and competent manpower. Consequently, a hold-up develops in the SME organisation and results into only one or two people controlling the organisation, whether at decision-making level or operational level. These one or two persons are busy solving bottlenecks as if not, it will stop day-
today function of the SME. This fact prohibits them from taking any risk
taking decision, especially about innovation.
The author observes that SME are resistive to adopt E-commerce and
Information Technology as it requires risk-taking and innovation for
implementation. Besides this, the reasons for not adopting Information
Technology in SMEs are:

- Limited skilled human resource
- Absence of corresponding background processes
- Inadequate management skills
- Non availability of institutional finance on affordable terms

In remaining paper, the author outlines the measures taken by the
Government of India to support SMEs to adopt to the new technologies
like Information Technology in their day-today business processes to
remain innovative and competitive at the same time.

2.2.65 Sudhakar S., & Sudharani Ravindran. D. (2012) in this paper “Adoption
of Customer Relationship Management Technologies among Indian Small
& Medium Enterprises – A Review and Suggested Model” propose that an
outline for implementation of invention like Customer Relation
Management amongst SMEs in India. The features and inhibitions to
acceptance of CRM are considered. Assistance is given so that both
investigators and Administration reconsider the strategy for technical
implementation amid business with precise orientation to SMEs.

2.2.66 Sylvestre Uwizeyemungu, Louis Raymond (2011), in their research
paper “Information Technology Adoption and Assimilation: Towards a
Research Framework for Service Sector SMEs” observe that IT has
develop as one of the utmost significant infrastructural foundation for
SMEs in service businesses. However, these companies show precise
features and conducts regarding accepting and integrating IT. In this paper after studying the writings on IT in the services segment, the contextual of IT implementation and integration in the situation are recognized and combined within a study outline. This outline is then used to create a group of twenty-two prominent schemes for upcoming investigation on IT implementation and integration in service segment SMEs.

2.2.67 Tapas Mahapatra & Nivedita Roy, (2006), in their paper “Information System Architecture for auto component manufacturing SMEs - An empirical study” states that they studied the existing Information System architecture available in Indian auto component manufacturing SMEs. They conclude that these SMEs are constrained by their ability to invest in IT solutions. These SMEs rely on no-frill, ready to use and cheap software packages, which can provide quick results. Very few SMEs had invested in branded ERP solution and dependent upon internet or other networking technologies.

2.2.68 Ta - Tao Chuang; et al., (2009) investigate in their paper “An exploratory study of the extent of information technology adoption in SMEs: an application of upper echelon theory” the effect of configurations of administrative/demographic features of the senior administration on the level of information technology implementation in SMEs. The conclusions of the research were that the age average and the education average of TMT in SMEs are significant predictors of the extent of IT adoption.

2.2.69 Thuy Uyen H. Nguyen, (2009), in the paper “Information technology adoption in SMEs: an integrated framework” also attempts to lay down framework for the stronger knowledge of information technology implementation in SMEs by studying the present work. The paper also highlights the enablers and the inhibitors that influence the adoption process. The findings suggest that SMEs adopt IT because of pressures
from both internal and external sources. The paper suggests an abstract outline that is collected on those perceptions which are applicable to the implementation of Information Technology in SMEs.

2.2.70 Usman A. Tar & Japhet E. Lawrence, (2011). The authors in their paper “The Potentials of ICT infrastructure in a developing economy: the case of small businesses in Kurdistan Region” observe that ICTs have the potential to improve efficiency and productivity in many areas and, present opportunities in developing economies especially for small businesses in Kurdistan region of Iraq. The paper first examines the IT infrastructure in the region of Iraq, and then assesses the potentials opportunities and challenges of e-commerce to small businesses in the region. It is found that this region is rapidly catching up ICT development, though small businesses are yet to exploit full potentials of ICTs.

2.2.71 Vadium Kotenikov, (2007). “Small and Medium Enterprises and ICT”. In this literature the author remarks that all the governments encourage the growth of local small & medium enterprises (SMEs), because they help in lessening the poverty by providing jobs and thus increasing income levels. However, the SMEs in Asia-Pacific region¹ are yet to obtain benefits and had been slow to adopt ICT because of number of constraints they face. These constraints are as follows:

- Poor telecommunications infrastructure
- Limited ICT literacy
- Inability to integrate ICT into business processes
- High cost of ICT equipments
- Incomplete government regulations for e-commerce
- Poor understanding of dynamics of economy.

¹Asia-Pacific region: Hong Kong, Japan, Malaysia, Philippines, Republic of Korea, Singapore, Taiwan, Thailand
This paper further discusses issues like impact of knowledge based economy on SMEs and usage of ICT by SMEs. The author proposes that in Asia-Pacific region, SMEs can adopt ICT in following way to increase productivity and thus achieve global competitiveness:

**Figure: 2.8 Progression of ICT Adoption**

- **Basic Communications**
  - Fixed line/mobile phone, fax

- **Basic Information Technology**
  - PC equipped with basic software and hardware (e.g., PC with proprietary and/or free and open-source software connected to a printer)

- **Advanced Communications**
  - Email, Internet browsing, video conferencing, intranet, file sharing, creating websites, e-commerce, Voice over Internet Protocol

- **Advanced Information Technology**
  - PC with advanced software such as databases, Enterprise Resource Planning, Inventory Management, Customer Relationship Management
The author further reasons that ICT can not only will create business opportunities, but also can fight pressures of competition. Appropriate ICT (implementation) can help SMEs to cut costs by improving their internal processes, improvement of product reach to customers through better communication, better promotion and distribution of the products. He comments that ICT has the prospective ability to improve the core business process of SMEs. The paper illustrates Porter’s value chain to summarise various ways that ICT can be used and the SME can be benefitted, in following format:

### Figure: 2.9

**Benefits of ICT Tools Categorized under Porter’s Value Chain**

<table>
<thead>
<tr>
<th>Inbound Logistics</th>
<th>Operations/Manufacturing</th>
<th>Outbound Logistics</th>
<th>Marketing and Sales</th>
<th>After-sale Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Cheaper and faster communication with suppliers through Supply Chain Management</td>
<td>• Improve Inventory Management systems</td>
<td>• Easier to link to global supply chains and outsourcing opportunities</td>
<td>• e-Commerce</td>
<td>• Customer Relationship Management software</td>
</tr>
<tr>
<td>• Enterprise Resource Planning software</td>
<td>• Enterprise Resource Planning software</td>
<td></td>
<td>• e-Marketing through websites</td>
<td></td>
</tr>
<tr>
<td>• Rapid Prototyping and Manufacturing programmes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Firm Infrastructure (Finance, Planning)**
- Better accounting and financial management practices
- Improved communication between different departments through the intranet
- Better grasp of business trends and market prices through easier access to information
- Use models to enhance business planning capabilities

**Human Resource Management**
- e-Learning for employee training

**Technology Development**
- Better Knowledge Management within the firm
- Integrate different software platforms through Enterprise Application Integration

**Procurement**
- Use e-procurement for cheaper and faster communication with suppliers
The author has tried to explore the reasons for slow adoption of ICT in Asia-Pacific region. For doing so, he has classified these reasons in two categories, viz. Supply side (availability of ICT and its infrastructure) and Demand side (requirements of the SMEs) as follows:

Supply side (availability of ICT and its infrastructure)

- Poor communication infrastructure results in limited access and higher costs.
- Most advanced ICT products are designed for larger firms and not for SMEs.

Demand side (requirements of the SMEs)

- Limited ICT literacy of SME owners hinders their ability to choose the appropriate technology and understand the concrete benefits it can bring to their business.
- Limited ICT literacy of employees in SMEs hinders ICT adoption.
- Adopting ICT is a “getting used to” challenge, not a technical challenge.
- Lack of financing options limits SME ability to purchase ICT.
- Lack of financial and legal infrastructure (to implement and use ICT-e-commerce)

Having commented upon variety of issues of ICT adoption and supply-demand side constraints, the author has suggested many ways for expediting speedier adoption of the ICT by SMEs. These measures need to be undertaken while framing the ICT policies, by the respective governments, banks, industry associations, chambers of commerce, NGOs/ SME support agencies, etc.
2.2.72 **Vipan Kumar, (2003)**, in his paper “Evolution of Information Technology and emergence in India” states that compared to other technologies, emergence of IT in India was quick. The major sectors which got impacted were insurance, government administration, energy, banks, defense, financial institutions, ports, public tax system, education, SME sectors and custom. This happened because of huge accessibility of qualified, skilled and well competent workforce in India.

2.2.73 **Yu Chung William Wang, et al., (2004)**, write in their research paper titled as “The levels of IT adoption, business network and a strategic position model for evaluating supply chain integration” that like firms system maintenance promptness, size, seeming assistances, industrial product life cycle, network position of supply chain are the factors which affect the adoption of IT for a business. This paper has collective concepts of levels of IT adoption, business network and allied elements into a situation model as it relates to planned assessment of SCM.

2.3 **The review findings summary**

The review findings can be summarised in nutshell as below:

a. Every author has a different approach to look at the problem, though the problem is same.

b. It has been generally agreed that though Information Technology is said to be beneficial to the business processes; it is difficult to measure its impact directly, in terms of tangibles, say business turnover. This is because; deploying the Information Technology in the business is not the sole contributing parameter for the enhanced business success or turnover.
c. Therefore, not only the productivity, but also efficiency and effectiveness of Information Technology to improve business processes, need to be considered.

d. The reasons for adopting or not adopting Information Technology by the large scale organisations and the SMEs are different as their method of business operations is different.

e. Not all the SMEs will implement entire spectrum of Information Technology to improve their business processes; but will adopt it mainly on need basis. Basic office automation like word processing, etc., and communication technology like email will be one group. In second group, networked computing operations, like enterprise resource planning (ERP) applications can be included, while third group can consist of advanced databases and their applications.

f. SMEs world over are observed to be the backbone of large industries and contribute a lot to the national economy. Collectively they are larger in size than the large industries, in the terms of turnover, investment and manpower employment. However, they are owned by a single or a small group of entrepreneurs who are basically interested in running their business operations in the minimum cost. Since they have a very low manpower, there no specialists for different operations, but multiple natures of jobs are undertaken by the available manpower.

g. It is observed that one of the main reasons for scarcely implementing Information Technology is unawareness of Information Technology. They are also not aware of its operations, fear of security arising out of unawareness. Other reasons are non-availability of Information Technology experts who can identify exact requirements, design the systems, implement, train the staff and maintain the Information
Technology systems. In short, SMEs see Information Technology, as a black box even in the advanced countries like U.S.A., Canada, New Zealand, etc. Naturally, it receives last priority of funding in scarce-fund situation of SMEs. Therefore they are not able to visualise the benefits of Information Technology compared to the return-on-investments (ROI) they may receive for by implementing core technologies of their businesses.

h. Most of the authors agree that if SMEs are made to use Information Technology overcoming all the barriers, not only they will benefit, but also everybody in the value chain would benefit because of improvement in the business processes of the SMEs. The respective governments should promote the increased usage of Information Technology in SMEs, by incentivising them some or the other ways. In India, the government is making conscious efforts to promote more and meaningful usage of Information Technology by offering number of schemes to SMEs.