1.1 INTRODUCTION

Science has given a new shape to the modern lifestyle. The traditional lifestyle has been modernized through scientific innovations evolved over years. Science and technology has evolved such inventions through time. Mechanization, one of the major scientific inventions, increases the production and reduces the mental and physical strain. Computer—the artificial brain is the crown of all the inventions in science and technology. The speed of modern day's computer is more than a human brain. The so called computer, a modern electronic device is designed for accepting, storing and processing of the data and instructions to produce the desired results. Though the talent and intelligence of human beings can never be substituted by a computer, the assistance what the human being gets from a computer has helped them to perform better.

The unprecedented industrial revolution which took place in 1940's and 1950's solved many of the global human physiological demands. But the widening of global demand after 1960's needed a supporting brain to improve the human technology. This has made computerization as an indispensable part of human life. In the early stage of computerization, the top places were occupied by the U.S.A, Japan, China and other developed countries. From 1985 to till date, India’s competitive role in both hardware and software fields are admirable\(^1\). The growth of ordinary personal computer sales at the

\(^1\) Daily Thanthi, Tirunelveli, April 28, 2010, p. 6.
global level has increased by 27 per cent than the previous year. It was around 8.43 crores of personal computers. Software production has also increased at faster rates in India. Domestic turnover of software in the country in 2008-2009 was Rs. 59000 crores, which increased to 76100 crores in 2009-2010. Similarly exports from software brought in US $ 41.1billion in 2008-2009 to India which increased to US $ 56.67 in 2009-2010. It shows that software production has tremendously increased in India in recent times.²

The National Association for Software and Services Companies report (NASSCOM) further reports that the software exports in terms of IT-BPO were raised up to Rs. 2,35,080 crores during 2009-2010. It has increased three times from Rs. 80,180 crores in 2004-2005³. The domestic consumption of IT-BPO during 2009-2010 was Rs. 66,200 crores. It is more than three times over Rs. 21,740 crores in 2004-2005. The software output during 2009-10 was Rs. 3,01,209 crores. Among all the states in India, Tamil Nadu gives much priority for the development of hardware and software products. Out of the total exports of Rs. 1,53,300 crores in 2006-07 from India, the share of Tamil Nadu was Rs. 20,658 crores. It has risen to Rs. 36,680 crores in 2008-09. The number of units producing software has also grown up from 1114 in 2004-2005 to 1683 in 2008-2009. It all shows the promising attitude of the Tamil Nadu state in software development.

³ http://www.mit.gov.in
Though India is meeting a tough competition in the global market, with the support of the huge expertise manpower in information technology, India is able to strengthen its position to compete. Quality education, novel thinking, creativity, and hardworking nature are the reasons for the surplus manpower in information Technology. So India faces healthy competition at the global level. Increased demand for hardware and software in the local and foreign market and the popularity of the product as a consumer product prompted the existing units to increase their production. It further pulled down many new entrants in the field at the global and local level. Even entrepreneurs in other fields have entered into the software market. Now the time has come where the computer not only assist industrial units but also small retailers and individuals. The total personal computer sales during the first half of 2009-10 (April-September 2009), with desktop computers, notebooks and net books taken together were 3.71 million units, registering a growth of about one per cent over the corresponding period in the last fiscal year. Out of this total personal computer sale, the sale of desktops is about 2.61 millions. Year to Year, the sales of personal computers are increasing in India particularly in Tamil Nadu\(^4\). So the need for computer has percolated from the global market to rural centers in Tamil Nadu. The individual users of personal computers have grown at a vast rate in Tamil Nadu. Very soon, no house could be found without a personal computer.

\(^4\) www.mit.gov.in, 20-11-2010, p. 16.
1.2 STATEMENT OF THE PROBLEM

The necessity of computers has been felt at the global level as well as national and state levels. The main reason for the growing need of computers is that many works which were manually carried out are now mechanized and controlled through computers. Further the perfection in the quality of output is another reason for growing demand for computers. India has witnessed himalayan growth in IT, during the past two decades. The Central and State governments are extending liberal assistance for the promotion of computer industry, because export of software earns a huge foreign exchange to the country. Tamil Nadu leads many other states in India in this respect. Software is the heart of the computer without which the computer cannot function. In the growth of computer industry development of software has an immense role. Software directs the hardware to work in a particular direction. Even though the hardware of a system is same in all computers; the software loaded in the system differs according to which the applications vary. Hence the system mainly differs on the application of software.

Many companies in India are developing different types of software according to the demand. In India, variety of purpose oriented software is developed. Area based developers are solving the necessity of software in the area concerned. Many authorized software are developed by the leading companies like Microsoft, IBM, Oracle,
UNIX and others. They are all patented with the companies concerned. The present trend in software market is that Indian companies fight with other foreign companies to capture the global market. The cost of production is also playing an important role in the development of software for the Indian software manufacturers. The popular software exported from India are engineering software, software for BPOs, system software, product development software, medical transcription software, call centre software, e-publishing software, data entry software, and online consultancy software. There are thousands of similar other softwares. More than 1400 companies develop different categories of software in Tamil Nadu. Many software companies started in Tamil Nadu in a small scale level have grown well. Software companies in Tamil Nadu have developed specialized software to fulfill the needs of small traders and companies.

In many developed countries personal computers are loaded with patented software. But in developing countries including India computers are not bundled with software. Hence the buyers of computers are forced to buy software at higher price, which is not affordable to ordinary consumers. It prompts them to get pirated software. Hence use of pirated software has become the order of the day. Consumers are not worried about the use of pirated software. Even the computer centers offering computer education and other small companies load the pirated software when they install the
system. The main reason for piracy in India is the higher cost of software. Because of the higher cost, many consumers prefer pirated software. Hence, in Indian market most of the systems are loaded with pirated software. So, Software piracy has become a major threat to software industry.

Computers are consumed by individuals and organizations. Individuals are personal computer users. Computers are mainly used by individuals. More than 50 per cent of the total users of computers in India are personal users. Different individuals use different softwares. The use of software depends upon individual users. Tamil Nadu is a forerunner to many other states in India in the use of personal computers. The utilization level of software in North, South, East and West zones in Tamil Nadu are different. According to the necessity different software are used by different types of individual consumers. Use of software depends upon a number of factors. The factors determining utilization of software differ among four zones of individual consumers. The main factor which determines the level of utilization of software is software familiarity. Those who are familiar in software use it to its maximum. While the other, who are not familiar in software does not use so. Similarly there are several other factors which determine the level of utilization. Hence it raises the following questions.
i) How far softwares have been utilized by individual users in their personal and official uses? (purposes)

ii) What are the factors which motivate the individual users to utilize the software more?

The study will bring to light all these issues. Hence a study of this assumes importance.

1.3 REVIEW OF PREVIOUS STUDIES

A review of the previous studies made in the related field is presented here. The review of previous studies helps to locate the probed area in the field. This is needed to find the research gap.

Barry J. Hensley (2000) made a study on “Development of a software evaluation process for military systems composed of integrated commercial off the shelf (COTS) components”. The problem found by the researcher that the traditional DoD source code development and evolution methodologies do not effectively support COTS-intensive systems. To fully realize the benefits of COTS technologies and products, the DoD must adopt new ways to sustain system evolution in the face of a dynamic market environment subject to constant change. The study proposes a new software evolution methodology to effectively maintain COTS-intensive military systems. The integrated COTS component evolution (ICCE) model provides
evolution processes designed to support the maintainer as a consumer of software instead of a source-code developer⁵.

Ashish Arora, Suma Athreye, (2001) did a study on, “The Software Industry and India’s Economic Development”. The study assesses the contribution of software to India’s economic development paying particular attention to the role of the software in the absorption of labor and the development of human capital in the Indian economy. India’s specialization in software has been driven by two sorts of wage advantages that have reinforced each other: the lower wages for Indian software developers relative to that of their US and European counterparts makes Indian software cheaper in global markets, while the higher wages earned by software professionals in India relative to that in other industrial sectors has ensured a steady stream of supply of software professionals. However, the impact of this growth has been limited to a small section of the Indian economy⁶.

Richard Heeks (2002) conducted a study on “Indian Software Industry”. The study has highlighted many problems in software industry such as,

---


a) Though the liberalization policy has given sufficient support to industrial growth, their impact on software industrial development is less positive.

b) Government interventions have become a necessary part of software industry development. The interventions have been iterative and responsive to the shortcomings and to the changing needs of the software industry.\(^7\)

Arulpandi, D. (2002) did “A Study on Comparative Analysis of major five softwares companies’ performance and their related, impact on its share prices listed in NSE”. By comparing Infosys, Satyam, HCL, Silverline and Hughes, it is concluded that during the study period their performance is reasonably good. Moreover, the researcher identified another result as that these companies did not give high dividend to investors.\(^8\)

Murugan, C. (2003) has undergone “A study on software utilization in Kanyakumari district”. The researcher has revealed many facts such as,

a) Small scale industries are using software but are not fully utilized.

b) Most of the companies are using only pirated software.

c) Unnecessary software is installed without the knowledge of owners. It is a loss.


d) The availability of licensed software is rare even though the companies are ready to buy.

e) Due to lack of software knowledge no company has utilized fully\(^9\).

Momaya, Kirankumar’s, (2004), study on “Challenges for Indian software firms to sustain their global competitiveness” concludes that software is India’s best big hope for economic development. The software services industry has made a revolution in India in the last decade. The success was possible mainly because of the evolution of free enterprises where the techno-entrepreneurs freely scoured the world markets and grab the outsourcing opportunity to India. The study identified that India to capture the global market; firms in India should have to grow beyond being volume-dependent firms into value-capturing organizations. So, the software firms in India needed to move up in the value chain. There is need to do a few complete IT outsourcing deals not just projects. Firms have to increase their visibility globally through brand building. Further, it is observed in the study that the low cost of operations and effective delivery mechanisms have become commodities and do not provide long-term sustained competitive advantage\(^{10}\).

McManus et al. (2004) in their study titled “A macro and micro perspective of the global software industry with specific orientation to

\(^{9}\) Murugan, C., A Study on Software Utilization in Kanyakumari District, Dissertation submitted to Manonmaniam Sundararanar University, 2003, Tirunelveli.

\(^{10}\) Momaya, Kirankumar, Challenges for Indian Software Firms to Sustain their Global Competitiveness, Singapore Management Review, July 01, 2004.
India, China and the Philippines” explored the importance software industry in India. It is further found in the study that the market in India is a less cost markets as like china and Russia. The study concludes that India will have to move up higher in the value chain to maintain its favourable position in the global market\textsuperscript{11}.

Sankaran Krishna, (2005), did a study on, “India: Globalisation and IT Development”. The study highlights that the success of the IT sector has come about on account of India capitalizing on its comparative advantage in the segment in the world economy. The availability of a pool of relatively skilled, English speaking, low-cost workers at a time when India was strengthening its links to the world economy, and distances had been shrunk by new communications technologies, has produced striking growth rates and excellent export earnings. In the study it is recommended that the Indian government should liberalise corporate taxes and provide other assistances, to ensure the success in the IT sector\textsuperscript{12}.

McManus, John \textit{et al.} (2005) in their study titled, “The global software industry” identified that Indian companies are developing expertise in the vertical domain areas in software rather than more traditional code programming. It is pointed out in the study that


comparing India with China, as an outsourcing destination, one of the important strengths of China is its huge domestic software market that attracts domestic software firms as well as foreign software firms. China is starting to promote social and economic development through the wider use of information technology\(^\text{13}\).

Nasir Aziz Rizvi, S. (2005), conducted a study on “Marketing of software in the changing scenario of world trade since 1990”. He has attempted to examine the development of software, exports, marketing strategies, marketing network and government policies in India. He identified that to become a successful global player, India needs to develop successful persons in the domestic and International market. For this the software industry should aim at expanding the market through extensive market research, proper brand building and targeted customer segmentation. It is further reported that the software industry in India must invest soundly in product development, build brands for International market and acquire assured high quality standards\(^\text{14}\).

Ashish Arora (2006), in the study titled “The Indian Software Industry and its Prospects” identified that India has emerged as a major exporter of software services in less than a decade. Indian exports continue to be mostly services with modest technology content


and there is little evidence of successful product development. Indian firms are participating in software innovation. This has helped the industry to provide higher value added products and services\textsuperscript{15}.

Ruchi Gupta (2006), conducted a study titled, “Evaluation of Executive Development Program of selected software development companies in National Capital Region”. It is found in the study that the Indian software industries are grappling with the crucial issue of manpower acquisition and retention. Another major hurdle found in the study is the shift changing technological environment. It has been concluded that emphasise is to be given for the preparation of human resources on one hand and elimination of human obsolescence on the other, through well designed executive development programmes. Further it is suggested that all enterprises are needed to devote great attention to the continuous supply of future managers\textsuperscript{16}.

Mallika Srivastava (2007), made a study on, “Comparative study of Human Resource Management Software being used in industry and develop a suitable software model, for Indian Industry”. The researcher conducted a detailed study of Enterprise Resource Planning software provided by different vendors across the globe. Based on the comparative model software is developed during this


investigation work which provide a platform for human resource services that can be used by two types of users, viz., general employee and administration\textsuperscript{17}.

Aggarwal S.K. (2008), made a study on “Marketing strategies for Indian IT industry (software products and services) for development of exports”. The researcher carried out the research to assess the present status of IT industry in India, global share of Indian software and IT/ITES. It was critically observed by the researcher that lack of branding initiatives, lack of IPR initiatives, more coders than programmers and more men workers than women workers were the reasons for the backwardness in the industry. Further he found that the software industry in India follows the clustering pattern\textsuperscript{18}.

Baljeet Singh Hothi (2008), attempted a study on “Information Technology as an aid to management – A study of selected electronic enterprises”. The effectiveness of IT in planning and controlling in different areas of management like HR management, marketing management, production, inventory and purchase are studied in the study. It has been highlighted that the IT has helped the executives in approaching their customers, to access the new customers, to record and track human resources within a company and to found the extent


of marketing network. Moreover, it is identified that IT application has helped in developing marketing network, distributed network and dealer network which supports the saving of costs\textsuperscript{19}.

Laliwala, (2008) conducted a study on, “Event-driven Service-oriented Architecture for Dynamic composition of web services”. The researcher identified that today’s dynamic environment, changes in business process requirements, terminologies, technologies and policies are reflected in the software systems. To provide seamless interoperable integration, automation, execution monitoring, state and notification management of a dynamic business, scalable software architecture is required. This study proposed event-driven service-oriented architecture by converging the web services, semantic web, and grid computing, to model, compose, deploy and execute event driven dynamic business process\textsuperscript{20}.

Xiongyu Zeng Yang Du, (2008) made a study on “A Study of Marketing Strategy in Chinese Software Market-A Case Study of UFIDA Software Co., Ltd”. The study investigated the Chinese financial management in the company under different software market conditions. From the analysis, the authors found that the market situation is good for UFIDA. UFIDA has competitive


advantages to defend itself against the forces and influence them in its favor. As a consequence, in order to increase market share as well as support its leading position, UFIDA should maintain the existing competitive advantages and improve the disadvantages of marketing mix found from the feedbacks of customers.21

Nils Hammar, (2008), undertakes a study on “Skype-Reasons for growth”. According to the researcher, Skype managed to grow its user base so quickly because of the quality of the product. More specifically, the company managed to develop a standardized product that was valuable to people across borders, age groups, and other demographic differences, Finally, Skype had covered journalists and partners from all over the world. It has created brand awareness. Existing marketing theories are not quite suited to explain Skype’s extreme growth; further it is not suitable to structure the marketing activity in similar companies.22

Ashish Arora et al. (1999) in their study titled “Indian Software Services Industry” stated that Indian software industry is remarkable in a number of respects. It is service rather than product oriented; heavily export oriented, and is largely managed by professional and entrepreneurial managements. From a social perspective, the disconnect between domestic and export markets is a major challenge,

but the growing diffusion of computers and the improvement of the communication infrastructure make easier to confront. The study concludes that the impact of software industry on the Indian economy is indirect\textsuperscript{23}.

Luciana, (2009) conducted a study on “Variability management in software product lines using adaptive object and reflection”. The researcher found that variability management is a key and challenging issue, since this activity helps identifying, designing and implementing new products. This work defines a process for the variability management of a software product line.\textsuperscript{24}

**1.4 SCOPE**

There are varieties of consumers consume different types of software. All of them are different. The study is attempted from the angle of the individual consumers, who are using it for their personal purposes. The study approaches the issue only from the point of view of consumers. There are varieties of software consumers like institutional, commercial, government, companies, small organizations and individual consumers. Among various consumers, individual consumers had alone been targeted in the study. Moreover, this study concentrates the marketing problems related to individual


consumers. The study analyses the behavior of individual consumers of different zones from the point of view of their purchase pattern, consumption pattern, brand loyalty, qualification and experience of the field and usage, knowledge of software, nature of software used, types of software used, reasons for software used, and level of internet usage. Thus, the patterns and practices exercised at the regional level are highlighted in the study.

1.5 OBJECTIVES OF THE STUDY

The study has the following objectives:

(i) To know about the software knowledge or familiarity of software users in Tamil Nadu.

(ii) To find the level of consumption or utilization of software in their daily work in the study area among individual consumers.

(iii) To learn the level of consumption of unauthorized software in Tamil Nadu.

(iv) To study the spatial consumption pattern of individual software users in Tamil Nadu.

(v) To locate the factors influencing the consumption pattern of individual software users in Tamil Nadu.

(vi) To identify the problems and other solutions to the problems faced by individual software consumers.

(vii) To identify the popularity of software used by individual consumers in Tamil Nadu.
1.6 HYPOTHESES

The researcher has set the following hypotheses on the basis of objectives of this study.

1.6.1 There is no significant difference in software familiarity among rural, urban and semi urban consumers in four different zones of Tamil Nadu.

1.6.2 There is no significant difference in software familiarity among the different age group of consumers in different zones of Tamil Nadu.

1.6.3 There is no significant difference in software familiarity among the male and female consumers in different regions of Tamil Nadu.

1.6.4 There is no significant difference in software familiarity among the married and unmarried consumers in different zones of Tamil Nadu.

1.6.5 There is no significant difference in software familiarity among different communities in four zones of Tamil Nadu.

1.6.6 There is no significant difference in software familiarity among different religious consumers in four zones of Tamil Nadu.

1.6.7 There is no significant difference in software familiarity among consumers having different educational qualification in four zones of Tamil Nadu.

1.6.8 There is no significant difference in software familiarity among consumers having different profession in different regions of Tamil Nadu.
1.6.9 There is no significant difference in software familiarity among consumers having different monthly income in different zones in Tamil Nadu.

1.6.10 There is no significant difference in software consumption among rural, urban and semi urban consumers in four different zones of Tamil Nadu.

1.6.11 There is no significant difference in software consumption among the different age group of consumers in different zones of Tamil Nadu.

1.6.12 There is no significant difference in software consumption among the male and female consumers in different regions of Tamil Nadu.

1.6.13 There is no significant difference in software consumption among the married and unmarried consumers in different zones of Tamil Nadu.

1.6.14 There is no significant difference in software consumption among different communities in four zones.

1.6.15 There is no significant difference in software consumption among different religious consumers in four zones of Tamil Nadu.

1.6.16 There is no significant difference in software consumption among consumers having different educational qualification in four zones of Tamil Nadu.

1.6.17 There is no significant difference in software consumption among consumers having different profession in different regions of Tamil Nadu.
1.6.18 There is no significant difference in software consumption among consumers having different monthly income in different zones in Tamil Nadu.

1.7 OPERATIONAL DEFINITION OF CONCEPTS

1.7.1 Computer

Computer is an electronic machine which accepts data, instructions and stores them and processes the data according to the instruction and produces the desired results.

1.7.2 Consumption

In this study, consumption of software is otherwise named as utilization of software. Consumption of software is the utilization of software by consumers or users for their personal purposes. So utilization of software is nothing but consumption of software.

1.7.3 Individual Consumers

Individuals who use or consume software for their personal or official purpose in their individual capacity are called as Individual consumers.

1.7.4 Unauthorized users

The persons who are using software without the knowledge of patent holders are unauthorized users.
1.7.5 **Software**

It is a collection of programmes which is based on logical instructions to accomplish a task. The program is a set of instruction given in any of the computer languages.

1.7.6 **Zone or Region**

Demographic classification of the state into many divisions is herein regarded as zone or region in the study. Tamil Nadu is divided into four regions or zones namely, South, North, East, and West. In each region a group of districts are grouped together.

1.7.7 **South Zone**

The South zone comprises eight districts namely, Kanyakumari, Thoothukudi, Theni, Tirunelveli, Sivagangai, Madurai, Ramanathapuram, and Virudhunagar.

1.7.8 **North Zone**

North zone comprises Dharmapuri, Chennai, Vellore, Krishnagiri, Thiruvallur, Villupuram, Kanchipuram and Thiruvannamalai.

1.7.9 **East Zone**

East zone contains Ariyalur, Nagapattinam Thiruvarur, Perambalur, Cuddalore, Pudukottai, Thanjavur, and Tiruchirapalli.
1.7.10. West Zone

West zone consists of the Nilgiris, Dindigul, Karur, Namakkal, Salem, Erode, Coimbatore, and Tiruppur.

1.8 SAMPLING

Since the consumers of software spread over Tamil Nadu, the researcher has selected the total Tamil Nadu for the study. There is a wide disparity in the consumption pattern among consumers in different regions in Tamil Nadu. Hence, it is decided to study the software marketing region wise in Tamil Nadu. There are four zones in Tamil Nadu. The four zones are South, North, East and West. The South zone has eight districts namely, Kanyakumari, Thoothukudi, Theni, Tirunelveli, Sivagangai, Madurai, Ramanathapuram, and Virudhunagar. The eight districts included in North zone are Dharmapuri, Chennai, Vellore, Krishnagiri, Thiruvallur, Villupuram, Kanchipuram and Thiruvannamalai. Ariyalur, Nagapattinam, Thiruvarur, Perambalur, Cuddalore, Pudhukottai, Thanjavur and Tiruchirapalli are assumed as East zone. The West zone includes The Nilgiris, Dindigul, Karur, Namakkal, Salem, Coimbatore, Erode, and Tiruppur.

Since the individual software consumers scattered in different zones of Tamil Nadu, to draw sample respondents, the list of software and hardware vendors in each district were drawn from the NASSCOM. These dealers are the official representatives who have
sold software and hardware in their district. Further other agencies who are assembling/selling branded/unbranded hardware in the districts were drawn from the trade associations such as Federation of Indian Chambers of Commerce and Industry (FICCI) and other regional trade associations. Further the respective District Industries Centres (DIC) were also contacted. Thus, by all the above means the list of the software and hardware dealers in different district have been drawn. While approaching them individually, with a little hesitation they gave a list of computer users. The list of computer users submitted by the dealers is presented in Table 1.1.

Table: 1.1

List of computer users in different zones

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Regions</th>
<th>No of Computer users</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>South</td>
<td>1830</td>
</tr>
<tr>
<td>2</td>
<td>North</td>
<td>1670</td>
</tr>
<tr>
<td>3</td>
<td>East</td>
<td>1424</td>
</tr>
<tr>
<td>4</td>
<td>West</td>
<td>1697</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>6621</strong></td>
</tr>
</tbody>
</table>

Even though it is reported that there are 6621 computer users in Tamil Nadu, the real number could go more than that.

Stratified random sampling method has been followed to select the appropriate respondents from whom the data are to be collected. Accordingly, in each zone 500 respondents have been selected.
through lottery method. Thus, a total of 2000 questionnaires were distributed. Through postal means the questionnaires were sent to these 2000 respondents. Out of the 2000 samples to whom the questionnaires were distributed the researcher received 357 filled questionnaires. Out of them 107 semi-filled and defective questionnaires were neglected and the balance 250 respondents are taken for analysis. The spatial distribution of the selected respondents appeared as in Table 1.2.

Table: 1.2

Spatial distribution of sample respondents

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Regions</th>
<th>No of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>South</td>
<td>80</td>
</tr>
<tr>
<td>2</td>
<td>North</td>
<td>46</td>
</tr>
<tr>
<td>3</td>
<td>East</td>
<td>56</td>
</tr>
<tr>
<td>4</td>
<td>West</td>
<td>68</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>250</td>
</tr>
</tbody>
</table>

1.9 GEOGRAPHICAL AREA

Tamil Nadu is located at the end of South India. It is situated in the world Map 8° 5’N to 13 35’N latitude and 76° 15’E to 80° 20’E longitude. It is an educationally developed state among various states in south India. It is surrounded by Kerala in the West, Karnataka in the North West, Andhra Pradesh in the North and Bay of Bengal in the East. Tamil Nadu covers an area of 1,30,058 square kilometers. The
total population as per 2001 census is 6,24,05679. In Tami Nadu 73.5 per cent are literates\textsuperscript{25}. Since Tamil Nadu has the potentiality in education, software field still keeps a very good rate of growth. Except a few districts, all other districts have an excellent growth in software education and consumption. Among the total population 55.96 per cent are from rural.

Tamil Nadu has 32 districts at present. A number of Software Parks have been established by both the Government of Tamil Nadu and Government of India. The Software Technology Parks are organized by the Government of India. It has various centres in Tamil Nadu namely, STPI at Chennai, Coimbatore, Trichy, Madurai, Tirunelveli, Salem, Vellore, Tirupur, Erode, Dindigul, Sivakasi, Pollachi, Virudhunagar, Ranipet and Tanjore. ELCOT of Tamil Nadu is governing the software development activities and introduces number of steps to promote software marketing. The Map 1.1 shows the study area (Tamil Nadu)\textsuperscript{26}.

\textsuperscript{25} Census of India, 2001.
\textsuperscript{26} http://www.tn.nic.in
Map: 1.1

Study area
1.10 METHODOLOGY

The present study is an empirical research based on survey method. Number of preliminary discussions has been conducted by the researcher with guide as well as number of field experts and users of software. Different dealers of software and hardware have also been contacted. Moreover almost all the popular journals and different published and unpublished theses have also been referred. Many consumers of software were consulted. On the basis of such information available from various resources, a well structured questionnaire (Appendix-A) has been prepared by the researcher. The first hand information has been collected from software consumers in different zones in Tamil Nadu. They have been collected and processed with the support of various suitable statistical tools.

1.11 CONSTRUCTION OF TOOLS

The researcher himself prepared the questionnaire used in this study. Before preparing the questionnaire the researcher has contacted various software experts and had number of discussions with different individual consumers as well as the dealers of software. The researcher has also discussed with a number of individual consumers about the problems existing in the software consumption field. From the various discussions and references, the researcher has prepared a questionnaire in the proper format. The prepared questionnaire has been tested through the selected 25 sample
respondents. Further the researcher had a depth analysis with the support of the questionnaire prepared for final study. After that the researcher finalized the final well structured questionnaire with the support of contribution from various field experts and individual consumers.

1.12 STATISTICAL TOOLS

Data collected through questionnaire is analyzed through statistical test. The following statistical tools are used for analysis.

(i) Compound Growth Rate (CGR)
(ii) Software Familiarity Index (SFI)
(iii) Software Consumption Index (SCI)
(iv) Cronbach’s alpha
(v) F test (One-way ANOVA)
(vi) Karlpearson’s Co-efficient of Correlation
(vii) t-Test
(viii) Factor analysis
(ix) Multiple regression

(i) Compound Growth Rate (CGR)

Compound growth rate is calculated for analyzing the growth of software production and sales in India. The growth rate is calculated as below.

\[ Y_t = Y_o (Hg)^t \]

\[ AB^t \text{ where } Y_a = A \text{ and } (Hg) = B \]

\[ Y_t = AB_t \]

Taking log, both sides
\[
\begin{align*}
\text{Log } Y_t &= \log A + t \log B \\
\text{Ie } Y^* &= A^* + t B^*
\end{align*}
\]

When \( \log Y_t = Y^* \log A = A \) and \( \log B = B^* \)

This is simple regression line in \( Y^* \) and \( t B^* \) can be estimated using least squares method. Then the estimate of compound growth rate can be obtained as

\[ \hat{g} (\text{Anti log } \hat{B}) - 1 \]. For expressing the compound growth rate in percentage terms, \( \hat{g} \) has to be multiplied by 100. That is

\[ 100 \hat{g} (\text{Anti log } \hat{B}) - 1 \times 100 \]

\[
AB^* = \frac{\sum Y^*t - \frac{(\Sigma Y^*)(\Sigma t)}{n}}{\sum t^2 - \frac{(\Sigma t)^2}{n}}
\]

(ii) Software Familiarity Index (SFI)

The software familiarity is determined by calculating the software familiarity index (SFI). Software familiarity index helped to know the familiarity of the consumers in software in Tamil Nadu. In a way, software familiarity index shows the familiarity of software among consumers. The software familiarity index (SFI) is calculated by using a specially devised unstandardised model, devised by the researcher. The unstandardised software familiarity index is
standardized through reliability analysis. The Formula used to calculate software familiarity index is:

\[ SFI = \sum_{i=1}^{n} SFV_i \]

Where,

- SFV = Software Familiarity Variable
- SFI = Software Familiarity Index
- \( i = 1 \ldots n \) or number of familiarity variables included.

**(iii) Software Consumption Index (SCI)**

The software consumption is determined by calculating the software consumption index (SCI). Software consumption index helped to know the consumption of the consumers in software in Tamil Nadu. In a way, software consumption index shows the consumption of software among consumers. The software consumption index (SCI) is calculated by using a specially devised unstandardised model, devised by the researcher. The unstandardised software consumption index is standardized through reliability analysis. The Formula used to calculate software consumption index is:

\[ SCI = \sum_{i=1}^{n} SCV_i \]

Where,

- SCV = Software Consumption Variable
- SCI = Software Consumption Index
- \( i = 1 \ldots n \) or number of consumption variables included.
(iv)) ANOVA

The framed null hypotheses have been tested through Analysis of Variance (ANOVA). The ANOVA test is made by the researcher to test the significant difference exist among the three or more sample means. The total variance in a set of data is divided into variation within groups and variation between groups.

The ANOVA used for studying the difference among the influence of various categories of one independent variable on a dependent variable is called One-way ANOVA and that used for studying the influence of two independent variables on a dependent variable is called Two-way ANOVA.

The ANOVA technique is based on the concept of sum of squared deviations from a mean. Corresponding to the total variance and its two components, the total sum of squares (SS), between groups sum of squares (SSb), within groups of squares (SSw) is obtained by combining the sum squares i.e., the squared deviations of every raw score from its sample mean. The formula used is

\[ SS_w = \sum_{1}^{n} d_1^2 + \sum_{2}^{3} d_2^2 + \sum_{4}^{5} d_4^2 + \sum_{5}^{n} d_5^2 + \ldots \ldots \ldots \ldots \ldots \ldots \sum_{n}^{d_n^2} \]

Where d = a deviation of every raw score of a category from its sample mean.
The between groups sum of squares ($SS_b$) is by calculating the difference between each sample mean and the total mean. The squared difference is multiplied by the sample size in the concerned category and these quantities. The formula is

$$SS_b = \sum [(x-x_1)^2 \times n]$$

Where,

- $x$ = any sample mean
- $x_1$ = the total mean
- $n$ = the number of scores in any sample
- $SS_b$ = the between groups sum of squares

The total sum of squares ($SS_1$) is equal to a sum of within and between groups sum of squares.

$$SS_1 = SS_b + SS_w$$

Mean Square

The value of the sums of squares tends to become larger as variation increases and also as sample size increases. The mean square (or variance) is obtained by dividing $SS_b$ or $SS_w$ by the appropriate degrees of freedom.

$$MS_b = \frac{SS_b}{df_b}$$
$$MS_w = \frac{SS_w}{df_w}$$

Where,

- $MS_b$ = the between- groups mean squares
- $MS_w$ = the within – group mean squares
- $df$ = the degrees of freedom
$$df_b = k-1$$
$$df_w = n_1-k$$

Where,

k = the number of samples (groups)
n = the total number of scores in all samples combined.

(v) Correlation Analysis

The correlation analysis is a statistical tool with the help of which the intensity of relationship between two or more than two variables could be positive or negative. When two variables move in the same direction, their association is termed as positive correlation. If they move in the opposite direction, their association is termed as negative correlation.

The most common measures of correlation is the Karl pearson co-efficient of correlation (r). The formula used is:

$$r = \frac{N \sum xy - (\sum x)(\sum y)}{\sqrt{(N \sum x^2 - (\sum x)^2)(N \sum y^2 - (\sum y)^2)}}$$

Where,

r = the Pearson correlation co-efficient
N = the total number of pairs of x and y
X = raw score on the x variable
Y = raw score on the y variable.

(vi) ‘t’ test

‘t’ test is used to study the significant differences among two groups of samples with respect to a variable. It is also used to test the significance of a correlation co-efficient calculated among two
variables. In the study for the latter purpose ‘t’ test is employed. Theoretical work on t-distribution was done by W.S. Gosset in the early 1900. The “t-statistic” is defined as:

$$ t = \frac{x-\mu}{s} \times \sqrt{n} $$

where,

$$ S = \frac{\sqrt{\sum(x-x^2)}}{n-1} $$

The t-distribution is derived mathematically under the assumption of a normal distribution as:

$$ f(t) = C \left( 1 + \frac{t^2}{v} \right)^{-v/2} $$

where,

$$ t = \frac{(X-\mu)}{s} \sqrt{n} $$

C = a constant required to make the area under the curve equal to unity.

v = n-1, the number of degrees of freedom.

To test the significance of the correlation coefficient the following formula is used:

$$ t = \frac{r}{\sqrt{1-r^2}} \times \sqrt{n-2} $$

where, t is based on (n-2) degrees of freedom.
If the calculated value of \( t \) exceeds \( t_{0.05} \) for \( (n-2) \), d.f., the value of \( r \) is significant at 5% level. If \( t < t_{0.05} \) the data are consistent with the hypothesis of an uncorrelated population.

**Factor Analysis**

Factor analysis is a statistical tool employed to find out the factors responsible for software consumption in Tamil Nadu.

The factor analysis model in matrix notation is given by

\[
X = Af + e
\]

Where,

\[
X = (x_1, x_2, x_3, ..., x_p)
\]

\[
F = (f_1, f_2, f_3, ..., f_m)
\]

\[
E = (e_1, e_2, e_3, ..., e_p)
\]

\[
M = \text{Number of factors}
\]

And the relevant matrix is

\[
A = \begin{bmatrix}
a_{11}, a_{12}, ..., ..., ..., a_{1m} \\
a_{21}, a_{22}, ..., ..., ..., a_{2m} \\
..., ..., ..., ..., ..., ..., ...
\end{bmatrix}
\]

where \( a_{ij} \) is the factor loading which give net correlation between the variables \( x_i \) and factor \( f_j \). (where \( i = 1, 2, ..., p \) and \( j = 1, 2, 3, ..., m \)). It is assumed that the error variables \( e \) are distributed independently of \( f \) and \( p \) and \( e \) as a multi-variate normal distribution.
(viii) Cronbach’s alpha

Software familiarity index, software consumption index and factor analysis is an unstandardised one. Hence, the reliability of the index is tested through reliability analysis. Cronbach alpha validated the reliability of the unstandardised tools. Cronbach’s alpha is calculated as

\[ \alpha = \frac{Kr}{1+(K-1)r} \]

Where,

K = number of variables considered
r = Inter-items correlation.

(ix) Multiple Regression

After finding out the determinants of software consumption the next step is to find out the relationship between the determinants and software consumption. ‘Multiple regression analysis’ has been done to identify the relationship between the determinants and software consumption among individual consumer in Tamilnadu. The function in log form is as follows:

\[ \text{Log } Y = \log b_0 + b_1 \log X_1 + b_2 \log X_2 + \ldots + b_5 \log X_5 + \text{eu} \]

where,

Y : Dependent behavior
X_1, X_2, X_3, X_4 \ldots X_5 are independent variables.
b_1, b_2 \ldots b_5 are the parameters of independent variables to be estimated.
b_0 : Regression constant
eu : error term
In order to test the significance of the estimated parameters, \( b_1, b_2 \ldots b_5 \), t-test of the following formula is used.

\[
    t = \frac{b_i}{SE_{b_i}}
\]

where,

- \( b_i \): Parameters of independent variables
- \( SE_{b_i} \): Standard error of \( b_i \).\(^{27}\)

1.13 DATA PROCESSING

The researcher has received 357 filled questionnaires. After deleting the semi-filled questionnaires, 250 fully filled questionnaires are used for further processing. Then the collected data is codified to facilitate further analysis through computers. Then by using SPSS through computers the required classification tables have been prepared. Those classification tables have been the base for further analysis Statistical testing is applied on this data.

1.14 LIMITATIONS

Because of the time and money constraint, the sample size of the study is restricted to 250. The study is limited to software marketing towards individual consumers alone. Because in software marketing individual consumers constitute more than 70 per cent of the total market. Hence purposefully the institutional consumers are not included in the study.

Another limitation is that the study does not cover software marketing from the side of producers, wholesalers, distributors and retailers. Since including the issues of marketers is wieldy the issues of them have not been covered in the study.

1.15 CHAPTER SCHEME

This study has been formatted and presented as six chapters.

The first chapter deals with the design of the study. This chapter has enlightened the introduction, statement of the problem, scope of the study, review of previous studies, objectives of the study, hypotheses, operational definitions, methodology and statistical tools, sampling design, the method of data processed, geographical coverage, limitation of the study and the chapter scheme.

The second chapter deals the theory part. The profile, history and growth of software and the industry have been brought in detail here.

The third chapter presents the analysis of familiarity level of software among the individual consumers of Tamil Nadu.

The fourth chapter reveals the level of consumption of software in Tamil Nadu. The variables and their influence in consumption of software and familiarity of software have also been presented.
The fifth chapter presents the various factors determining the software consumption in four zones of Tamil Nadu.

The sixth chapter highlights the summary of findings, problems and suggestions and ends with conclusion.