

# **DEVELOPMENT OF A MODEL FOR MARKETING INFORMATION SYSTEM (MkIS) FOR SMALL AND MEDIUM ENTERPRISES (SMEs) IN PUNJAB**

**A THESIS SUBMITTED IN FULFILMENT OF THE REQUIREMENTS  
FOR THE AWARD OF THE DEGREE OF**

**DOCTOR OF PHILOSOPHY**

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**May 6, 2013**

### DECLARATION

*I hereby declare that this thesis entitled "DEVELOPMENT OF A MODEL FOR MARKETING INFORMATION SYSTEM (MkIS) FOR SMALL AND MEDIUM ENTERPRISES (SMEs) IN PUNJAB" is an original work done by me for the award of the degree of Doctor of Philosophy in Management. I also declare that this thesis or any part of it has not been submitted by me for the award of any degree, diploma, title or recognition before.*

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May 6, 2013

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### CERTIFICATE

*Certified that the thesis entitled 'DEVELOPMENT OF A MODEL FOR MARKETING INFORMATION SYSTEM (MkIS) FOR SMALL AND MEDIUM ENTERPRISES (SMEs) IN PUNJAB' which is being submitted by Mr. Rahul Surinder Hakhu, (Regn No. 950810004) in fulfillment of the requirements for award of the Degree of Doctor of Philosophy in Management, Thapar University Patiala, is a record of candidate's own work, carried out by him under our supervision and guidance. The matter embodied in this thesis has not been submitted in part or full to any other University of Institute for the awarded of any degree.*

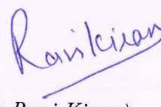


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## ACKNOWLEDGEMENTS

I am endeavoring to express my deep thanks to my Late Grand Parents as whatever I have achieved is because of their blessings. I just pray to them to ignore my mistakes and be with me throughout my life. Thanks for always standing by me whenever I need them.

I warmly acknowledge assorted contributions of my revered supervisors Dr. D.P.Goyal, Professor, Management Development Institute, Gurgaon and Dr. (Ms.) Ravi Kiran, Professor and Head, School of Behavioral Sciences and Business Studies, Thapar University, Patiala for their unflinching encouragement and thorough involvement which I will relish for whole life. I am very grateful to Dr. Abhijeet Mukherjee, Director, Thapar University, Patiala and Dr. K.K. Raina, Deputy Director, Thapar University, Patiala for providing me a stimulating learning environment.

I feel myself extraordinarily fortunate to have a very understanding wife Mrs. Meenakshi Hakhu, whom I owe my thanks for her unflagging love & support throughout this research. Whole heartedly I wish to admit that without her encouragement this research would have never taken this shape. My deep love and thanks to my daughter Reva for having a lot of patience and a deep regret for not sharing time with her.

I am indebted to my father Mr. Surinder Kumar Hakhu as like a perfect father he always stood besides me and encouraged me constantly since my childhood and he spared no pains to provide me the best possible learning environment. I will also like to thank my mother Mrs. Phoola Hakhu whose love is always unconditional and boundless. My deepest gratitude to my Mother-in-law Mrs. Nirmala Raina & Father-in-law Dr. C.L.Raina for being exceptionally supportive that paved the way for a privileged education. I am grateful to my elder brother Mr. Rohit Hakhu, his wife Mrs. Anila Hakhu and their daughter Sasha for motivating me.

I take this opportunity to express my sincere thanks to all the respondents for their cooperation in providing authentic information. I would also like to acknowledge help of my family, colleagues and friends. It is indeed a pleasure to thank one and all who participated and contributed in this research in some way.

*Rahul Hakhu*

(Rahul Surinder Hakhu)

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## **ABSTRACT**

Marketing Information System (MkIS) is a set of procedures and methods designed to generate, analyze, disseminate, and store anticipated marketing decision information on a regular, continuous basis. Small and Medium Enterprises (SMEs) today constitute a very important segment of the Indian economy and has emerged as a dynamic and vibrant sector of the economy. The major advantage of the sector is its employment potential at low capital cost. MkIS provides correct and timely information, with the aim of supporting SMEs for decision-making purposes. The main objective of the study is to develop an MkIS model for the SMEs of Punjab. The study identifies the critical factors for the development of MkIS Model which include MkIS Design Characteristics, Capabilities of MkIS, Primary Characteristics of MkIS and MkIS Sophistication. Further success and hindrance factors are also analyzed for the implementation of MkIS Model. A survey is conducted for 140 selected SMEs of Punjab. Regarding the Nature of Industry in the sample out of total 140 firms there are 30 firms producing Cutting Tools, 50 producing Sports Goods and 60 producing Bicycle Components and firm-wise sample has 124 small enterprises and 16 medium enterprises respectively. Punjab is a progressive state of India with an average growth rate of 10 per cent. Punjab has been ranked as one of the growing states of India, (India Today, 2011). The study also covers detailed case study for the factors of MkIS from selected manufacturing SMEs namely Super Hobs, Super Tools, Padmawati Manufacturing, Dolphin Impex, Appu International and Omega International respectively. The basic reason for selecting these firms has been that they are all exporters and specializing in selective products.

Analysis has been conducted for determining the predictors of MkIS success factors for three sectors, i.e., cutting tools, sports goods and bicycle components and two categories of firms, i.e., small enterprise and medium enterprise. Success factors have been taken as the dependent variable for the development of an MkIS Model for SMEs and the independent variables for the study have been MkIS Design Characteristics, Capabilities of MkIS, Primary Characteristics of MkIS, Hindrance Factors of MkIS and MkIS Sophistication. MkIS has a basic potential capability to quickly meet new needs of information. MkIS is conceived as a data processing and not as information processing system has emerged as critical hindrance factor reported by small

enterprises. In terms of design characteristics of MkIS sample firms have given high priority to accurate information and timely information. Analysis of data which has an ability to make recommendations as an aid to decision making has gained the highest preference in case of capabilities of MkIS. Sector-wise results and scale-wise analysis yielded that in terms of primary characteristics of MkIS, Windows 98/2000 as an operating system, e-mail as an internet and Word as an application found preference. Meeting customer needs has the highest priority in MkIS sophistication.

The regression model results with success factors of MkIS as dependent variable and Critical factors, viz. Design characteristics, capabilities of MkIS, Primary characteristics, hindrance factors, and MkIS sophistication as independent variable yielded that 49 percent of variation has been explained by these variables. In the end on the basis of inputs of survey based results and the case study analysis, a framework of MkIS model has been presented with top prioritized factors of each Critical Factors of MkIS based on synthesis of survey based results of 140 SMEs and case study analysis of six firms The framework highlights the areas where SMEs need to focus for overall Success of MkIS Model.

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## ABBREVIATIONS

| <b>Abbreviations</b> | <b>Full Form</b>                         |
|----------------------|------------------------------------------|
| ANOVA                | Analysis of Variance                     |
| CA                   | Capabilities                             |
| CSF                  | Critical Success Factors                 |
| DC                   | Design Characteristics                   |
| DSS                  | Decision Support Systems                 |
| ERP                  | Enterprise Resource Planning             |
| EUISS                | End-User Information System Satisfaction |
| F                    | Firms                                    |
| GDP                  | Gross Domestic Product                   |
| GSDP                 | Gross State Domestic Product             |
| HF                   | Hindrances Factors                       |
| IS                   | Information Systems                      |
| IT                   | Information Technology                   |
| KIM                  | Key Indicator Management                 |
| MkIS                 | Marketing Information System             |
| MSS                  | Management Support Systems               |
| N&C                  | Nolan and Croson                         |
| NNDP                 | Net National Domestic Product            |
| NSDP                 | Net State Domestic Product               |
| OPM                  | One-Page Management                      |
| PC                   | Primary Characteristics                  |
| PDCA                 | Plan-Do-Check-Act                        |
| R & D                | Research and Development                 |
| RDI                  | Result-Driven Incrementalism             |
| SF                   | Success Factors                          |
| SMEs                 | Small and Medium Enterprises             |
| SO                   | Sophistications                          |

# CHAPTER-I

## INTRODUCTION

---

### **1.1 Marketing Information System (MkIS):**

Marketing Information System (MkIS) is a set of procedures and methods designed to generate, analyze, disseminate, and store anticipated marketing decision information on a regular, continuous basis. An information system can be used operationally, managerially and strategically for several aspects of marketing. MkIS also provides methods for interpreting the information it provides.

The first definition of an MkIS was presented by Cox and Good (1967), MkIS was seen as a set of procedures and methods for the regular planned analysis and presentation of information for use in making marketing decisions. Numerous academic articles have been written attempting to explain the MkIS and researchers are using various models to explain this definition Graf (1979); Kotler (1991); Li et al., (1993).

Moreover, as Kotler's (2009), definition says, a MkIS is more than a system of data collection or a set of information technologies: "A marketing information system consists of people, equipment and procedures to gather, sort, analyze, evaluate, and distribute needed, timely and accurate information to marketing decision makers". To understand the proper role of information systems, managers examine the information they need for decision making and what kinds of decision problems can be supported by formal information systems.

MkIS can help a firm to:

- i. Improve its operational efficiency.
- ii. Promote business innovation.
- iii. Build strategic information resources.

These three strategic roles support a firm's use of competitive strategies against the competitive forces from competitors, customers, suppliers, substitutes, and new entrants.

Investments in MkIS could help make a firm's operations significantly more efficient which further allows a firm to adopt a low-cost leadership strategy. A firm would be better able to deter competitive threats and its industry rivals. The firms seeking to enter the industry using similar or substitute products would have a harder time beating an efficient competitor.

With an increasingly competitive and expanding market, the amount of information needed daily by an organization is profound. Thus, they have to establish an MkIS where lots of organized data can be collected from the market. Organizing data is very important else the data is meaningless. Hence, MkIS helps to organize database thereby improving productivity.

MkIS is very important for planning and analysis. With a proper MkIS in place, the complete organization can be tracked which can be used to analyse independent processes. This helps in establishing a broader perspective which helps to know which steps can be taken to facilitate improvement. MkIS is critical for planning. No organization can do planning without information. For planning, the first thing which is needed is the organizations capabilities, then the business environment and finally competitor analysis. In a proper MkIS, all these are present by default and are continuously updated.

A formal MkIS can be of great benefit to any organization whether profit-making or nonprofit making, no matter whatever is its size. It is true today that in many organizations, MkIS is integrated as part of a computerized system. With a proper MkIS in place, the complete organization can be tracked which can be used to analyse independent processes. This helps in establishing a broader perspective to help in knowing the steps that can be taken to facilitate improvement.

MkIS is becoming crucial and very useful to any organization. Marketing feedback is important for any organization. Changing customer needs, evolving technology trends, increasing competition necessitate the need to process market feedback and communicate to other departments of the organization. Currently very few information systems provide



features needed by a marketing department. Enterprise applications focus on functions like sales, production, purchase, and inventory.

A well-designed MkIS satisfies four basic criteria:

- It must include a structured organization or established system of people and information- gathering procedures.
- The system should be designed to generate a continuous flow of information to provide accurate and current marketing information for management.
- Information should be gathered from inside and outside the organization.
- Information should be compiled so that management can use it as a basis for marketing decisions.

## **1.2 Small and Medium Manufacturing Enterprises in Punjab:**

Today Small and Medium Enterprises (SMEs) represent one of the fastest growing industrial sectors in India and contributes a lot for its economy. Liberalization and globalization have now created both opportunities and challenges for the industry as a whole and more so for SMEs. On one hand they can now aspire to market their products in any corner of the world, on the other hand they face fierce competition in the domestic markets from low cost imports. Further, in recent years the SMEs sector has consistently registered higher growth rate compared to the overall industrial sector. After the recent recession, it has become very important for SMEs to reorient their focus according to the emerging market trends and thus strive to become globally competitive.

The world is changing fast and the world of business is changing faster. In the new millennium, SMEs have to deal with entirely new challenges to meet customer demands, move from competition to collaborative reconfiguration, dovetail supplier and subcontractor processes to the corporate goals and empower employees to be able to meet and surpass customer expectations. The SMEs today constitute a very important segment of the Indian economy and has emerged as a dynamic and vibrant sector of the economy. The major advantage of the sector is its employment potential at low capital cost. SMEs act as an essential medium for the efficient utilization of the skills as well as resources available locally.

The present study deals with the state of Punjab in India. Punjab state is internationally recognized in terms of industrialization. Punjab has an effective edge on ‘Quality’ of products like, Bicycles components, Leather, Furniture, Nut- Bolts, Cutting Tools, Sports Goods, Woolen Garments, Textiles etc. SMEs provide impetus for facility management and house-keeping business.

At a time when maintaining full capacity production and bearing high costs have become difficult for most businesses in Punjab, investment in automating processes by small firms in the state still continue to be steady. Despite facing severe hurdles on various fronts, small-scale units in the Punjab's industrial sector are investing substantially in automation. The globalised economic scenario, challenging trading environment and the need to stay ahead in the competitive market are some of the major factors for prompting Punjab SMEs to step-up their level of investments in automation. Greater awareness about the benefits of adoption of automation process during an economic crisis has also prompted many SMEs to keep pace with global practices and embrace automation technologies.

| <b>Table 1.1</b><br><b>Growth Rate of GDP and Per Capita Domestic Product of India and Punjab at 1999-2000 Prices</b> |                                |                    |                                  |                    |                                                            |                    |                                                         |                    |                                                   |
|-----------------------------------------------------------------------------------------------------------------------|--------------------------------|--------------------|----------------------------------|--------------------|------------------------------------------------------------|--------------------|---------------------------------------------------------|--------------------|---------------------------------------------------|
| <b>Year</b>                                                                                                           | <b>GDP of India (Millions)</b> | <b>Growth Rate</b> | <b>GSDP of Punjab (Millions)</b> | <b>Growth Rate</b> | <b>Per Capita Net National Domestic Product (Millions)</b> | <b>Growth Rate</b> | <b>Per Capita Net State Domestic Product (Millions)</b> | <b>Growth Rate</b> | <b>Percentage Share of Punjab in GDP of India</b> |
| 1999-00                                                                                                               | 17865250                       | -                  | 611390                           | -                  | 158810                                                     | -                  | 256310                                                  | -                  | 3.42                                              |
| 2000-01                                                                                                               | 18643000                       | 4.35               | 631720                           | 3.32               | 161720                                                     | 1.83               | 259860                                                  | 1.38               | 3.39                                              |
| 2001-02                                                                                                               | 19726060                       | 5.81               | 639950                           | 1.30               | 167640                                                     | 3.66               | 259920                                                  | 0.02               | 3.24                                              |
| 2002-03                                                                                                               | 20482870                       | 3.84               | 650850                           | 1.70               | 171010                                                     | 2.01               | 259550                                                  | 0.14               | 3.18                                              |
| 2003-04                                                                                                               | 22227580                       | 8.52               | 691490                           | 6.24               | 183010                                                     | 7.01               | 270250                                                  | 4.12               | 3.11                                              |
| 2004-05                                                                                                               | 23883840                       | 7.45               | 725870                           | 4.97               | 193010                                                     | 5.46               | 279050                                                  | 3.25               | 3.03                                              |
| 2005-06                                                                                                               | 26156520                       | 9.52               | 757100                           | 4.30               | 208060                                                     | 7.80               | 285770                                                  | 2.41               | 2.89                                              |
| 2006-07                                                                                                               | 28662650                       | 9.58               | 840070                           | 10.96              | 224380                                                     | 7.84               | 311330                                                  | 8.94               | 2.93                                              |
| 2007-08                                                                                                               | 31308630                       | 9.23               | 914700                           | 8.88               | 242530                                                     | 8.08               | 332840                                                  | 6.91               | 2.92                                              |
| 2008-09                                                                                                               | 33424950                       | 6.79               | 974560                           | 6.54               | 254090                                                     | 4.77               | 348190                                                  | 4.61               | 2.91                                              |
| 2009-10                                                                                                               | 36084760                       | 7.96               | 1051260                          | 7.87               | 269510                                                     | 6.06               | 368780                                                  | 5.91               | 2.91                                              |
| <b>* Growth Rates (Entire Period)</b>                                                                                 | <b>2.26***</b>                 |                    | <b>2.54***</b>                   |                    | <b>2.37***</b>                                             |                    | <b>2.82***</b>                                          |                    |                                                   |

\* Self Calculated (\*\*\*) p<.001) Source: Central Statistical Organisation

Table 1.1 presents a comparative picture of Punjab and Indian Economy. The results indicate that the growth rate of Gross State Domestic Product (GSDP) has improved from 3.32 percent in 2000-01 to 7.87 per cent in 2009-10. Gross Domestic Product (GDP) of India has grown at a faster rate for all the years except in 2006-07. Similar trend is visible in per capita Net National Domestic Product (NNDP) and per capita net state domestic product (NSDP). The share of Punjab in GDP ranged between 2.89 per cent to 3.42 per cent. Although, there have been inter-year variations, but the trend shows that Punjab's share is declining. The decadal growth rates depict that GSDP of Punjab has grown at a faster rate as compared with GDP of India. Per capita NSDP has grown at 2.82 per cent, while Per capita NNDP has grown at a slightly lower rate of 2.37 per cent per annum. Thus, it can be inferred that Punjab is a growing state of Indian Economy.

Punjab is an economy where the basis for competitiveness is the intellectual capital and capability to absorb process and apply knowledge. It has a strong technological base both in public and private sector and a vibrant entrepreneurial culture that thrives on creativity, nimbleness and good business sense.

| <b>Table 1.2</b><br><b>Share of Indian Manufacturing</b> |                                                       |                          |                                    |                                    |                                      |
|----------------------------------------------------------|-------------------------------------------------------|--------------------------|------------------------------------|------------------------------------|--------------------------------------|
| <b>Year</b>                                              | <b>GDP at constant prices 1999-2000 in (Millions)</b> | <b>GDP Growth (%age)</b> | <b>Manufacturing in (Millions)</b> | <b>Manufacturing Growth (%age)</b> | <b>Share of Manufacturing in GDP</b> |
| 1999-00                                                  | 17865250                                              | -                        | 2641140                            | -                                  | 14.78                                |
| 2000-01                                                  | 18643000                                              | 4.35                     | 2845710                            | 7.74                               | 15.26                                |
| 2001-02                                                  | 19726060                                              | 5.81                     | 2918030                            | 2.54                               | 14.79                                |
| 2002-03                                                  | 20482870                                              | 3.84                     | 3116850                            | 6.81                               | 15.22                                |
| 2003-04                                                  | 22227580                                              | 8.52                     | 3323630                            | 6.63                               | 14.95                                |
| 2004-05                                                  | 23883840                                              | 7.45                     | 3611150                            | 8.65                               | 15.12                                |
| 2005-06                                                  | 26156520                                              | 9.52                     | 3975960                            | 10.10                              | 15.20                                |
| 2006-07                                                  | 28662650                                              | 9.58                     | 4545050                            | 14.31                              | 15.86                                |
| 2007-08                                                  | 31308630                                              | 9.23                     | 5011660                            | 10.26                              | 16.00                                |
| 2008-09                                                  | 33424950                                              | 6.79                     | 5224560                            | 4.24                               | 15.63                                |
| 2009-10                                                  | 36084760                                              | 7.96                     | 5683880                            | 8.79                               | 15.75                                |
| <b>*Growth Rates (Entire Period)</b>                     | <b>2.26***</b>                                        |                          | <b>2.27***</b>                     |                                    |                                      |

\* Self Calculated (\*\*\*) p<.001)

Source: Handbook of Statistics on the Indian Economy, Reserve Bank of India 2009-10

As the study deals with the manufacturing sector, it is important to understand the share of manufacturing at the all India level and also at state level. As per Table 1.2, Manufacturing contributes an important share in GDP of India and it is 15.75 per cent per annum. The share is almost stable, ranging between 14.78 1999-00 to 15.75 per cent per annum in 2009-10. The yearly growth shows a declining trend from 2006-07 to 2008-09. This has been a period when there was a recessionary trend in Indian economy. In the year 2009-10 there has been a revival with enhanced yearly growth rates for both GDP and manufacturing sector.

| <b>Table 1.3<br/>NSDP of Punjab and its Manufacturing Sector</b> |                                                        |                           |                                    |                                    |                                       |
|------------------------------------------------------------------|--------------------------------------------------------|---------------------------|------------------------------------|------------------------------------|---------------------------------------|
| <b>Year</b>                                                      | <b>NSDP at constant prices 1999-2000 in (Millions)</b> | <b>NSDP Growth (%age)</b> | <b>Manufacturing in (Millions)</b> | <b>Manufacturing Growth (%age)</b> | <b>Share of Manufacturing in NSDP</b> |
| 1999-00                                                          | 611390                                                 | -                         |                                    | -                                  |                                       |
| 2000-01                                                          | 631720                                                 | 3.32                      | 84950                              |                                    | 13.45                                 |
| 2001-02                                                          | 639950                                                 | 1.30                      | 78441                              | 7.66                               | 12.26                                 |
| 2002-03                                                          | 650850                                                 | 1.70                      | 83077                              | 5.91                               | 12.76                                 |
| 2003-04                                                          | 691490                                                 | 6.24                      | 86135                              | 3.68                               | 12.45                                 |
| 2004-05                                                          | 725870                                                 | 4.97                      | 89852                              | 4.32                               | 12.37                                 |
| 2005-06                                                          | 757100                                                 | 4.30                      | 94950                              | 5.67                               | 12.54                                 |
| 2006-07                                                          | 840070                                                 | 10.95                     | 118400                             | 24.70                              | 14.09                                 |
| 2007-08                                                          | 914700                                                 | 8.89                      | 142950                             | 20.73                              | 15.62                                 |
| 2008-09                                                          | 974560                                                 | 6.54                      | 148500                             | 3.88                               | 15.23                                 |
| 2009-10                                                          | 1051260                                                | 7.87                      | 167800                             | 12.99                              | 15.96                                 |
| <b>*Growth Rates (Entire Period)</b>                             | <b>2.54***</b>                                         |                           | <b>4.08***</b>                     |                                    |                                       |

\* Self Calculated \*\*\* (p<.001)

Source: Indiastat database

According to Table 1.3, during the same period manufacturing sector in Punjab moved from Rs. 84950, million to Rs.167800 million. The yearly growth varied from 5.91 per cent to 24.70 per cent. The share of manufacturing ranged from 12.26 to 15.96 per cent. Growth for the entire period has been higher for Punjab manufacturing, i.e., 4.08 per cent as compared to Punjab's State Domestic Product at a rate of 2.54 per cent. This highlights that manufacturing sector of Punjab is a growing sector contributing around 16 per cent to NSDP. The manufacturing sector is extremely important sector. Thus the present research is focused on manufacturing sector to study the steps that can be taken to further improve the performance and growth of this emerging sector.

Small and Medium Enterprises (SMEs) in India constitute an important segment of Indian economy. The contribution of SMEs alone has been greater than 7% to GDP and 45% to manufacturing output (see table 1.4) and 40 per cent of total exports of the country. The sector is estimated to employ about 59 million persons in over 26 million units throughout the country (Annual Report MSME, 2010-11). It is also the second largest provider of employment after agriculture.

In accordance with the provision of Micro, Small & Medium Enterprises Development (MSMED) Act, 2006, Small enterprises are those enterprises where investment in plant and machinery is from Rs 2.5 - 50 million rupees and medium enterprises are those enterprises where investment in plant and machinery is more than Rs 50 million but less than 100 million.

| <b>Table 1.4</b>                                 |                                    |            |
|--------------------------------------------------|------------------------------------|------------|
| <b>Contribution of SMEs at 1999- 2000 prices</b> |                                    |            |
| <b>Year</b>                                      | <b>Total Industrial Production</b> | <b>GDP</b> |
| 1999-00                                          | 39.74                              | 5.86       |
| 2000-01                                          | 39.71                              | 6.04       |
| 2001-02                                          | 39.12                              | 5.77       |
| 2002-03                                          | 38.89                              | 5.91       |
| 2003-04                                          | 38.74                              | 5.79       |
| 2004-05                                          | 38.62                              | 5.84       |
| 2005-06                                          | 38.56                              | 5.83       |
| 2006-07                                          | 45.62                              | 7.20       |
| 2007-08                                          | 45.24                              | 8.00       |
| 2008-09                                          | 44.86                              | 8.72       |

Annual Report MSME 2010-11

SMEs of Punjab manufacturing provide employment to 0.956 million people, have fixed investment of Rs 67523.3 million and total production is Rs 442529.2 million (Annual Survey of Industries, 2009-10). Thus small scale sector is a major contributor to manufacturing. The present study focuses upon this important sector.

### **1.3 Rationale for the Study:**

Marketing information systems are intended to support SMEs decision making. Information systems have to be designed to meet the way in which SMEs tend to work. Given the nature of the work, SMEs rely upon information system that is timely. MkIS is emerging as one of

the most promising opportunities for shrinking the time delays in information transfer. With the help of MkIS, SMEs in India can compete in the global market. MkIS provides correct and timely information, with the aim of supporting SMEs for decision-making purposes. The importance of SMEs increases manifold due to the immense employment generating potential and India which is characterized by acute unemployment problem should especially put emphasis on the model of MkIS for SMEs. In India, since independence, the government as a strategy for economic development, has been providing due emphasis on the growth of the SMEs as a vehicle for transformation of the agrarian economy to the path of industrialization.

#### **1.4 Scope of the Study**

The study focuses on developing MkIS model for selected manufacturing SMEs in the state of Punjab. Due to the constraints such as, time, money and other resources the study has been carried out in the selected districts, namely Patiala for Cutting Tools, Jalandhar for Sports Goods and Ludhiana for Bicycle Components. MkIS are mostly applied by large and dominant firms, but it is right time now for SMEs to focus on the MkIS and initiate steps to enhance Information Technology culture in SMEs of Punjab Manufacturing. The present study has been taken against the above backdrop to develop MkIS Model for SMEs of Punjab in India.

#### **1.5 Objectives of the Study:**

The present study has been taken with the following broad objectives:

1. To identify the critical factors for the development of MkIS Model for the selected manufacturing SMEs of Punjab.
2. To analyse the success and hindrance factors for implementation of the MkIS Model.
3. To develop a model for MkIS in the selected SMEs of Punjab.
4. To test the proposed MkIS Model in some selected SMEs.

#### **1.6 Organization of the Thesis:**

The thesis has been organized in the following five chapters. A brief overview of these chapters has been given below:

## **Chapter I - Introduction:**

This Chapter is introductory in nature providing a brief outline of the background of the research work. It sets the scene for the research questions and problem statement. This chapter introduces the structure of thesis. The chapter covers the current scenario of Marketing Information System and also highlights the role of Small and Medium Enterprises in Punjab. This chapter also covers the Rationale, Scope and Objectives of the Study.

## **Chapter II - Review of Literature:**

This chapter presents results from different studies done on the Marketing Information System. The review helps to know the emphasis and direction of research, the time periods of the studies, the scope and limitations of earlier studies, the conclusions drawn from these studies and objectives fulfilled. A proper review helps to identify the gaps in the earlier studies and avoid duplication of results and thus, focus emphasis on the right direction. This chapter also helps to identify the critical factors for the development of MkIS Model.

## **Chapter III - Research Design and Methodology:**

Chapter III discusses the step wise approach used for data analysis. This chapter deals with the details of research design and methodology. It discusses the different methodologies adopted in the study. It provides information on the population of the study, the variables used in the study, the measuring instrument, the methods of data collection and data analysis techniques.

## **Chapter IV – Data Analysis and Discussion:**

This chapter covers the analysis and discussions of responses gathered from various respondents on the basis of the questionnaire administered and present the outcome of such analysis. The chapter discusses the critical factors for the development of MkIS model. The critical factors covered in the study are: Design characteristics of MkIS, capabilities of MkIS, primary characteristics of MkIS and MkIS sophistication. Along with critical factors

the study also considers the success and hindrance factors. The study uses descriptive statistics, ANOVA analysis and step-wise regression technique for finding the important predictors for success of MkIS model. Supporting this is a comprehensive analysis through case study of selected manufacturing SMEs of Punjab to find out important predictors of MkIS. In the end on the basis of inputs of survey based results and the case study analysis, a framework of MkIS model has been presented.

## **Chapter V - Conclusions, Limitations and Scope for Further Study:**

This chapter covers the learnings, recommendations and conclusions of the study. It highlights the recommendations regarding the model of MkIS. This chapter also involves a critical assessment of the work, demonstrating precision, thoroughness, contribution, and comparison with similar work. The chapter also lists the further research areas/ gaps.

### **1.7 Chapter Summary:**

In order to present discussion in lucid style, the present study is divided into five chapters. Chapter one is introductory in nature providing a brief overview of the MkIS of India and Punjab manufacturing. It also covers the need and importance of SMEs in manufacturing sector. The MkIS focuses on the business culture of the SMEs and its scope on the economy. The development of SMEs will depend upon acquiring development methodologies that connect the technical talent and enable the SMEs to successfully manage the MkIS to compete at the international level. The chapter thus highlights the need for research in this direction.



## **CHAPTER-II**

### **REVIEW OF LITERATURE**

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A review of literature pertaining to the study is a pre-requisite for research as it enables the investigator to have a proper perspective of the subject and avoid the hassles and difficulties experienced by the predecessors. Thus, the planning and execution of any research study should be preceded by a thorough review of literature in related fields since it helps to familiarize with the work that has been done in that area, eliminates the possibility of unnecessary duplication of efforts, and provides valuable information on research techniques.

This chapter presents the review of literature on MkIS adopted by manufacturing industries in different countries of the world, specifically in India. The review also focuses upon the changing perceptions regarding information system in this changed globalised scenario. Section 2.1 covers the studies on the usage of MkIS, section 2.2 covers the critical factors of MkIS, section 2.3 covers the success and hindrance factors of MkIS. A thorough review of literature helps in identifying the uncovered areas, the research gaps which are presented in section 2.4.

A brief summary of empirical work conducted and related to area of the present study has been presented under the following heads:

- Information System and SMEs.
- Critical Factors of MkIS.
- Success and Hindrance Factors of MkIS.
- Gaps in earlier studies.

#### **2.1 Information System and SMEs:**

Several studies have been done looking at different perspectives, viz. success factors, issues, and requirements for MkIS. According to Nicholas (2000) at the very core of MkIS design is the identification of the marketing information needs of decision-makers. Information needs can be defined as the user specifications of information characteristics involved in

information seeking, and refer to those qualities of information perceived by managers to be useful to facilitate their decision-making.

Literature on Punjab economy by Girsh and Prosanto (2001) highlights not only high growth potential of the state, but even potentially high exports in Punjab due to the SMEs. Ludhiana in the state of Punjab produces 95% of India's woolen hosiery. 85% of sewing machine parts, 60% of bicycles and its parts and accounts for over half of Punjab's exports. According to Goyal and Singh (2008) Indian producers in the coming times are going to face a very strong threat from foreign brands, particularly in consumer durable category.

The study by Garg and Jain (2008) deals with a survey of small scale manufacturing units located in and around Jalandhar (Punjab). The result depicts that small scale industry is witnessing a very difficult time in global market after liberalization and globalization of economy; as a result competition amongst small scale manufacturers is becoming stiff.

Gilmore et al., (2001) are of the view that the hindrances of MkIS in a developing country are due to lack of access to computers and the internet, and limited electronic payment capability. According to George and Richard (1998), there is a need to quantify the benefits from the investments in MkIS and building internets will require solid evidence of value-addition to customers. The added value for customers will result in additional profit for the SMEs, as it will enable them to maintain current customer relationships and develop new ones.

Study by Amoroso and Sutton (2002) highlights that small organizations need to focus on providing their customers with a set of web applications that best serve the customer, rather than using a hit-and-miss approach. SMEs that focus on MkIS will have a greater degree of success. Looking at the information environment in a variety of countries, Murray (2003) found that the information environment can be an impediment to the development of emerging economies.

Brien and Stafford (1968) and Smith et al., (1968) contributed further to the development in the field of MkIS. According to Buzzell et al., (1969) marketing information focuses on control, planning and research information. According to Uhl (1974), it is not possible to have one MkIS for all organizations because of the unique information requirements of different organizations – they are composed of sub-systems and they have been built over a long period of time. But at the same time it can be inferred that operations of MkIS have had the same basic functions since the beginning. Kalia et al., (2011) opine that change impact analysis is an imperative activity for the maintenance of software and is a complex activity as it is very difficult to predict the impact of a change in software. A basic reason for this is that managers' tasks are almost similar. Thus, though organizations have different structures but the basic framework for MkIS will be almost similar.

There has been ample literature on technology and technological changes affecting manufacturing. A brief overview of these is essential before focusing on MkIS in SMEs. According to Beets (1994), technological change stands for the change in historically acquired capital structure and the problem of economic growth is then the problem of accumulating a given amount and type of capital. But Martino (1983) believes that technological change also brings about an increase in per capita income, either by reducing the amount of inputs per unit of output or by yielding more output for given amount of inputs. Further the contributions by Steensma (1996) highlight that the first stage of the technology transfer process is simply a firm's awareness of a certain technology's existence. While the decision clearly affects implementation, it is composed of different processes and is analytically distinct from implementation. As per Mansfield (1993), the firms, which are able to adopt a particular type of manufacturing technology, become quite comfortable in adopting the next level of innovation. Adaptation of technology is a phase that starts after a technology has been adopted and put to use in production activities or facilities.

The success or failure of technology transfer solely depends on the accumulated level of technology of a nation. The higher the technological level of a nation, the better judge the nation will be for the assessment and selection of proper technologies. (Roberts and Berry, 1985). For gaining competitive advantage and developing a firm's internal capabilities,

technology adoption and adaptation are considered to be among the most critical elements for a firm (Khamba and Singh, 2001; Kaur et al., 2008).

Amrik et al., (2001), views involvement of suppliers as crucial to attain high levels of customer satisfaction. Business expenditure on R&D is considered an important determinant of an economy's international competitiveness and specialization patterns (Salim and Bloch, 2009).

As per Ramayah et al., (2009) due to the liberalization and globalization, internet has been used as a medium of transaction in almost all aspects of human living. Sheel (2002) states that for technological advances new infrastructures, mainly telecommunication, information technology, new strategic thinking practices are needed for hyper competitive environment.

As per Singh Kawaljeet and Singh Ranjit (2010) quality of data can be compromised depending upon how data is received, entered, integrated, maintained, processed and loaded. The study by Sethi et al., (2007) on manufacturing flexibility highlights that the human factor in terms of skills, technical expertise, training involvement, and attitude has emerged as the most significant factor for achieving flexibilities in manufacturing industries. Kanwar and Robert (2001) empirically examine the relation between the protection of intellectual property rights and technological change. The researchers found an evidence to support the claim that the former encourages the latter. The results of the study imply that the lack of an incentive structure can be a significant mitigating factor for technological change even when other constraints such as internal funds, availability of skills and trade orientation may not be binding.

According to Venkataramanaiah and Parashar (2007), Indian economy is expected to become the second largest in the world, ahead of the United States, by 2050, and the third largest after China and the United States by 2032. The turnaround in manufacturing and other sectors, which has occurred in the face of increased global competition, is due to improved efficiency following several policy reforms in recent years. SMEs constitute 6 per cent of GDP, 34 per cent of national exports and account for the employment of more than

30 million people. SMEs have improved their performance and presence through industrial cluster approaches. The researchers present the experiences of three auto clusters in three major locations in India and conclude that by suggesting suitable cluster interventions competitiveness and sustainability of the SME sector can be improved.

Increased globalization and changes in technology have resulted in increased need by many SMEs to use innovation as a means of seeking competitive advantage. But, there is scant empirical research relating to the implementation of innovation management in SMEs, and almost sparse on MkIS in SMEs.

Gunasakeran et al., (1996) state that overall productivity and quality improvement strategies are lacking in SMEs. Thus, rapid decision making by inspired leaders can fail to incorporate innovative practice due to a basic lack of fundamental resources. The researchers consider continuous improvement to be a fundamental step along the innovation pathway. Bessant and Caffyn (1997) state that continuous improvement can generate a multiplier effect leading to radical innovation.

The research by Singla et al., (2003) on apparel manufacturing reported that labour has been migrating from the high wage developed world to developing countries. However, the developing countries will need to have efficient manufacturing operations if they are to retain their competitiveness in the apparel industry. Many developing countries do not have a culture of sharing data and the absence of shared data can result in a lack of effective information systems due to the lack of reliable and consolidated marketing, customer, and economic data. This also usually results in low data quality and trusts in the data that is available and affect the information environment in an emerging economy.

There can be significant differences in the adoption process and outcomes despite the similarities in the scale of operations and the culture of the organisations. Some organisational factors like top management commitment, unions, middle management participation and the capabilities of IS professionals can be responsible for such differences. For successful IT/IS management, McAfee (2004) suggested the role of IT as an aid to

judgement, not a substitute for it. Yannopoulos et al., (2004) perceived consumer risk is explored in relation to online (Internet) purchasing. The MkIS focuses on the business culture of the SMEs and its scope on the economy. The development of SMEs will depend upon acquiring development methodologies that connect the technical talent and enable the SMEs to successfully manage the MkIS. As per Varsha (1999), Information Technology has a great impact to enhance the business and its growth.

Jean et al., (2006) opine that the relationship between marketing and SMEs raises two kinds of questions: the first relates to the categories of SMEs studied, and it goes without saying that their responses will depend on their size (very small, small, and medium) and the second depends on the elements likely or not likely to bring out a marketing approach. Further, MkIS supports the decision-makers of SMEs to analyze information in time and use it accurately.

Yannis (2003) moved towards the development of such an explanatory and predictive model of IT-based performance by distinguishing three types of organizational systems integration (or coordination) that impact the performance of information-intensive organizations: Technological Integration (i.e., the integration of various IT components such as data, applications telecommunications, and systems); Functional integration (i.e., the coordination of responsibilities and roles across a firm's value-chain activities between corporate and IT planning activities); and Strategic integration (i.e., effective decision-making at all levels, increased productivity and better return on investment). The organizations with coordinated elements (strategy, structure, and technology) will be more successful than uncoordinated ones.

According to Robert and Scott (1999) all elements for a smooth implementation are present, like the support of senior management, adequate staffing and funding, a good fit between the needs of the organization and the capabilities of the software, and a solid information technology (IT) infrastructure, the implementation project sometimes failed to achieve the desired results. The traditional approaches of one time implementation do not work with dynamically changing requirements of an organization. They suggested an approach of

incremental process for software implementation. The researchers suggested implementation strategy based on principle of Result-Driven Incrementalism (RDI).

In the paper titled, “Information technology as a competitive advantage-status and trends of enterprise wide computing in the Indian manufacturing industry” Kapil (1999) emphasized that companies faced the daunting task of reconfiguring their corporate IT networks piecemeal, and were in the dire need of a comprehensive solution. Large organizations worldwide were using ERP to integrate software, hardware, specialized requirements of the corporations, and the built-in up-gradation capabilities. The ERP provided them cost saving and efficiency. The need of the hour for Indian companies was to go beyond the traditional point-to-point integration method and integrate all enterprise businesses, functions, and processes. The challenge for Indian companies lies in managing change. The irony was that a solid and flexible IT architecture is a fundamental requirement for managing change.

Gupta and Sanjay (2004) devised phases of IT usage in Indian organizations. The IT usage could be described in three phases, which coincided with three levels of IT applications, viz., automate, informate, and transformate. The automate phase referred to that period which saw the development of those applications of IT that served essentially to reduce operating time (work faster) and increased operating efficiency (make fewer mistakes). In this phase, there was a strong emphasis on reducing the manual aspects of clerical, routine, and tedious work. In the informate phase, IT was used to generate and deliver extensive management reports and decision support systems (DSS). The transformate phase traced the development of strategic IT for competitive advantage. But only a few large scale organizations had done so in India, what to talk about SMEs.

Computer-based information systems have been applied to support the process of marketing strategy development and strategic marketing planning in different ways. However, such efforts as have been made still reveal a disappointing results. Current information systems developed for this purpose are still in the embryonic phase (Li et al, 2000).

Choueke and Armstrong (1998) concludes that the development of a SMEs is a journey, which might never be completed however, the decision to embark on the journey and the processes leading to embarkation provide the organisation and its people with an increasingly effective compass through which the company is able to navigate itself through the hostile uncertainties of the business environment. Thus, in view of the above, there is a need to undertake a study to suggest an MkIS for SMEs for Indian environment.

## **2.2 Critical Factors of MkIS:**

According to earlier studies by Sigala (2003), Zafiroopoulos and Vrana (2006), Sausser and Ariga (2006), Zaithaml and Britner (2003), Li (1997), SMEs sector tends to be less marketing orientated with less use of external information than the manufacturing sector as a whole, and is more functionally orientated than marketing orientated, and as such, the majority of service organizations do not possess formal, comprehensive and systematic MkIS. To achieve efficient MKIS implementing new information technologies only are not enough. It is equally essential to focus on information needs of marketing managers and integrate business plans with information technology plans (Li, 1995).

Butler (1994) suggested that a major way forward on IT evaluation was to match techniques to objectives and types of projects. A starting point was to allow business strategy and purpose to define the category of IT investment. Butler suggested five main purposes: surviving and functioning as a business; improving business performance by cost reduction/increasing sales; achieving a competitive leap; enabling the benefits of other IT investments to be realized; being prepared to compete effectively in the future. The matching IT investments were categorized as: mandatory investments; investments to improve performance; competitive edge investments; infrastructure investments; research investments.

A review of relevant literature, pertaining to SMEs and the use, benefits and challenges of MkIS prompted this research that will go some way towards contributing to knowledge in this area. Bryson and Milward (1998) argue that failure of national and international SME



initiatives is often caused by the best practice approach for all SMEs, irrespective of the size of the sector.

According to Singh and Jain (2006), there is a need of change felt to adapt cost cutting, technological up-gradation, lean structure and supportive systems to add to the competitiveness in the context of manufacturing small scale industry of Punjab. Alter (1976) emphasised that advances in computer-based Information Technology (IT) have led to a wide variety of systems that managers use to make and implement decisions. McFarlan (1984) argued that computer-based technology is moving from having a strictly supporting role in the back office to offering new competitive opportunities. Companies can use this technology to build a barrier to entry, to build in switching costs and even to completely change the basis of competition.

Ko and Osei-Bryson (2006) have argued that, while IT investments have a positive impact on productivity, the impact is not uniform and depends on the investments in other areas, such as non-IT labour and non-IT capital. The IT impact on productivity can be better maximised when investments in other related areas are considered together than when they are considered in isolation. Ramayah et al. (2007) found top management involvement , business plans and vision to be the major critical factors for the smooth introduction and successful implementation of ERP systems. It has been argued by Shpilberg et al., (2007) that misalignment between business logic and system logic will act as a dampener in realising the potential benefits of ISs, because misalignment is going to be reflected in the poor performance of the enterprise and the system .

Ward et al. (2005) argued that it is imperative for organisations embarking on Enterprise-wide System (ES) projects to be aware of the success and failure factors, and to understand how to address them. For enhancing efficiency, computerisation should be standardised and targeted and organisations should emphasise technology initiatives from within that are process focused and well aligned. According to Talvinen (1995) in addition to the management perspective, MkIS can be an essential tool for the entire marketing organization. Bakos (1991) says that MkIS reduces buyers search costs and improves the

efficiency of business transactions, and therefore creates numerous possibilities for the strategic uses of these systems.

The study by Lynne (1983) identified an emerging trend from single-source sales channels to electronic markets, lowering coordination costs for producers and retailers and resulting in fewer distribution costs. According to Dennis and Albany (2000) developing economies ultimately benefit from lowered sales costs and gain access to larger markets.

From the introduction and literature discussed above it can be concluded that an MkIS is desirable and perhaps indispensable in order to compete successfully and ensure a competitive advantage for SMEs sector. However, it may not need to be formally structured or resource intensive. A more important factor than the structure appears to be the extent of external information gathered compared with internal data. For SMEs to take advantage of technologies they need to overcome any initial problems, persevere and to integrate the information found with internal data within a formal or informal MkIS.

On the basis of literature the following four critical factors have been identified. These are:

### **2.2.1 Design characteristics of MkIS:**

The initial step of any Marketing Information Systems (MkIS) design is the identification of the marketing information needs of decision-makers. Research pertaining to MIS design is principally based on the information characteristic continua advocated by Gorry and Scott-Morton (1971). They suggest that each item of information has a source (information may come from internal or external sources), scope (information may be narrow or wide in its representation), level of aggregation (information may be detailed or aggregated), time-horizon (data items may report what has happened i.e., ex post or what is expected to occur i.e., ex ante), currency (information may report on the most recent events or be older), required accuracy (information may be high or low in its correctness) and frequency of use (information may be used very frequently or infrequently).

According to Piercy and Evans (1983), Little (1979), Ashill and Jobber (1999) and Milis (2008) design characteristics dealing with information broadly cover the following:

1. Broad scope information.
2. Timely information.
3. Accurate information.
4. Current information.
5. Aggregated information.

### **2.2.2 Capabilities of MkIS:**

According to Knuckles (1987) and Fleisher et al., (2008), the broad capabilities of MkIS range from providing data to decision support system for sophisticated analysis of data. These capabilities are highlighted as:

1. It simply provides data on which decisions are made.
2. It has the capability to undertake simple analysis of the data and from this provides information on which decisions are made.
3. It provides sophisticated analysis of data, and therefore provides invaluable decision support information.
4. It provides sophisticated analysis of data and has the ability to make recommendations, if so required, as an aid to decision making.

### **2.2.3 Primary characteristics of MkIS:**

According to Bhagwat and Sharma (2007) primary characteristics of MkIS are considered as a major tool to help companies provide a competitive edge in the era of globalization. Murray et al., (2004) also consider that primary characteristic cover the basic tools for MkIS. The primary characteristics of MkIS identified are:

1. Windows 98/2000 and Windows XP as Operating system.
2. E-Mails and Search Engines as Internet.
3. Word, Excel and PowerPoint as Applications.
4. Timely information of marketing needs.
5. Stores marketing information.
6. Processed information maintained in the data-base.

#### **2.2.4 MkIS sophistication:**

As per Van Nievelt (1984) and Martin (2004) sophistication covers the marketing needs for meeting customer requirements and also for formulating of the strategic plan for effective marketing decision. The MkIS sophistications factors covered in the study are:

1. Strategic perspective.
2. Meeting customer needs.
3. Threat of new entrants.
4. Strategic planning.
5. IT budget.
6. Marketing decision.

#### **2.3 Success and Hindrance Factors of MkIS:**

The major objective of the study carried by Helmut (1996) was to delineate the reasons for the low level of Information Technology acceptance and discuss different aspects of Management Support Systems (MSS). This study emphasized on decision process with special reference to group decisions. Critical Success Factors (CSF), Key Indicator Management (KIM) and One-Page Management (OPM) were discussed as methods to establish yardsticks for measuring a company's performance and provided a framework for data structures in MSS.

Ramaswamy (2002) had provided conceptual framework by combining Nolan and Croson model and Deming's PDCA (plan-do-check-act) model. N and C model proposed 6-stage transformation process about increasing employee's productivity by utilizing capabilities of IT. It started from building of IT infrastructure; seeking dynamic balance in organization to create strategic advantage; developing a market-access strategy to create customer value by quality and cycle time; identifying attributes important to customers rather than attributes based on technical quality; ensuring a fit between the organization and its environment. The researchers emphasized that the organization should pursue global scope by continuously expanding and contracting through strategic alliances. The proposed model combined the modified N and C model and its infrastructures with other strategic initiatives. The model

aimed at integrating the people and the technology aspects while designing an organization as a responsive man machine system.

Vijayraghavan and Kannabiran (2003) suggested a framework for strategic information systems planning in the Indian context. Even though Indian organizations realized the growing strategic importance of IT and the need for IS strategic planning, a comprehensive IS strategic planning exercise and its alignment with strategic business planning was lacking. Traditionally IS functions were viewed as support functions. Organizations, during successive planning periods, would move into another fit from their current fit. An organization that was presently in the offensive or defensive fit will try to move into the competitive fit. Organizations in the offensive fit had to convert the low scope for leveraging IT to high scope through proactive technology development, organizational changes and increased resource commitment. Organization in defensive fit needed to scan the business environment and convert business opportunities into meaningful strategies. There was need to improve the internal factors which may range from additional resource allocation, strengthening of IS organization to consider new business models and identifying new business opportunities.

Discussing the success parameters for technologies companies in the IT arena in Indian perspective, Chandrasekaran (2002) talked about the problems of Indian technology companies. The home-grown technology companies required help on certain fronts like: a network of foreign collaborators who supported with funds and market technology; an Indian network of mentors who could assist the company grow and manage its growth in a proper manner; appropriate growth and expansion funding from Indian banking institutions; support from Indian technologists/ academics; govt. support in Intellectual Property licensing/ patenting at International level, funding, etc.

Jaiswal (2002) on enhancing business value through ERP enabled e-business tried to do business impact analysis of ERP adoption in India. He had taken up the case of Mahindra & Mahindra (M & M). It was found that ERP implementation has resulted into following instant benefits. The manufacturing, logistic management, product data and financial

processes of the company were now linked and it had access to the information it needed to keep the lead in a demanding marketplace. The company had a long-term delivery solution - a high performance business critical system and information was continuously available for decision-making. There was instantaneous availability of inventories and company was able to respond to customers quickly. Overall there was positive impact on enterprise productivity after ERP adoption.

For success of MkIS it is essential to identify the factors that can deter its progress. It is essential to deal with them properly, so that they cannot act as impediments. As per Sisodia (1992) tackling hindrance factors of MkIS is in fact very important. Infact, system implementation success factors is not just use of technology. According to Thatcher and Oliver (2001) problems are the result of the interaction between characteristics of the people being asked to adopt the system and characteristics of the system itself.

Jerry and Tom (1999) working on achieving and sustaining Business-IT alignment talked about enabler and inhibitors that helped and hindered IT-alignment with business. The major enablers were: Senior executive support for IT; IT involved in strategy development; IT understands the business; Business/IT partnership; well-prioritized IT projects; and IT demonstrates leadership. The major inhibitors were IT/Business lacked close relationships; IT does not prioritize well; IT failed to meet its commitments; IT does not understand business; Senior executives do not support IT; and IT management lacked leadership. The components of alignment were Business Strategy (Business scope, Distinctive Competencies, Business Governance); Organization Infrastructure and Processes (Administrative Structure, Processes, Skills); IT Strategy (Technology Scope, Systematic Competencies, IT Governance); IT Infrastructure and Processes (Architecture, Processes, Skills). A six-step approach was designed to make strategic alignment work in any organization and maximize alignment enablers and minimize inhibitors. This approach was: Set the goals and establish a team; Understand the Business-IT Linkage; Analyze and prioritize gaps; Specify the actions i.e. Project management; Choose and Evaluate success criteria; Sustain Alignment.

Norman et al., (2002) presented a critical review of research in End-User Information System Satisfaction (EUISS). To provide more insights into the psychological processing of the information system performance construct and its impact on EUISS, an integrated conceptual model was proposed based on the equity and needs theories. The implications of the proposed model for EUISS were discussed, and suggestions were made for testing the model. The study was focused on end user satisfaction from information system. More stress of the study was on psychological processing of information systems and a model was proposed on equity and needs theory. The basic limitation of this model was that technical aspects of system usage were not considered.

Based upon above literature the following Success and Hindrance Factors are identified. These are:

### **2.3.1 Success Factors of MkIS:**

Success Factors of MkIS have been identified:

1. MkIS is integrated into the managerial functions.
2. MkIS is an appropriate information processing technology required to meet the data processing.
3. MkIS focuses on the results and goals.
4. MkIS is user-friendly design.
5. MkIS has a basic potential capability to quickly meet new needs of information.
6. MkIS concentrates on developing the information support to manager.
7. MkIS can be modified according to the changing information needs.

### **2.3.2 Hindrance Factors of MkIS:**

Hindrance Factors of MkIS have been identified:

1. The MkIS is conceived as a data processing and not as an information processing system.
2. A belief that the computerized MkIS can solve all the management problems of planning and control of the business.
3. Lack of training to the users of the information.

4. Adequate attention is not given to the quality control aspects of the inputs of MkIS.
5. The MkIS is an impersonal system.
6. The MkIS does not give perfect information to all the users in the organization.
7. Underestimating the complexity in the business systems.

## **2.4 Gaps in Earlier Studies:**

From the above review it is clear that although there are a number of studies done on covering different aspects of MkIS. There is limited literature on development of a model for MkIS for SMEs in Punjab. Most studies cover the need for MkIS focusing upon the role of MkIS or at the most talking of impediments and Critical Success factors. In depth analysis regarding designing of MkIS has not been covered as yet. Some analysis regarding large scale and private organizations have been done, but manufacturing SMEs sector is yet beyond the reach of researchers.

The present study tries to fill in the gap by taking a comprehensive view of manufacturing SMEs by finding a relationship between Success Factors of MkIS and other important variables like: MkIS Design Characteristics; Capabilities of MkIS; Primary Characteristics of MkIS; Hindrance Factors of MkIS; MkIS Sophistication.

Thus from the above literature it can be inferred that there is a need for studying all these aspects to understand the role of MkIS on manufacturing SMEs. There is hardly any academically eminent literature available in India. The present study has been undertaken against this backdrop to understand the MkIS and the status of manufacturing SMEs of Punjab for which the model is to be developed for enhancing competitiveness.

## **2.5 Chapter Summary:**

This Chapter presents the views of earlier researchers on various aspects of MkIS, the origin of the concept, the developments in models and methodologies related with information system. The review covers the concepts of MkIS as an important factor than the mere structure in order for SMEs to take advantage of technologies they need to overcome any



initial problems and to integrate the information found with internal data within a formal or informal MkIS for providing data on which decisions are made. The chapter also identifies the research gaps and outlines the broad area of research.

## CHAPTER-III

### RESEARCH DESIGN AND METHODOLOGY

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This chapter covers the different phases of research to explain the complete research process employed to achieve the objectives. This chapter covers the research design, sampling design, methods of data collection, selection of sample and survey areas, development of the hypotheses and methods of data analysis. The main objective of the study is to analyse the success of an MkIS model for SMEs. This study investigates the important factors for MkIS model.

#### **3.1 Phases of Research:**

The complete research process was carried out in following four phases:

##### *Phase I: Understanding the need for MkIS*

Phase I of the study explored the current status of manufacturing sector of India and Punjab. This has been done by analyzing growth rates of Indian and Punjab Manufacturing in Chapter I. In depth study has been undertaken of literature on information system to understand the need for MkIS, role of MkIS, identification of critical factors of MkIS, and also covering literature on Success and hindrance factors of MkIS.

##### *Phase II: Analysis of research survey: Manufacturing SMEs of Punjab.*

Phase II of this research is based upon the analysis of inputs from research survey. The data was collected from three sectors, i.e., cutting tools, sports goods and bicycle components from small enterprise and medium enterprises respectively through questionnaire.

##### *Phase III: Case Study Analysis.*

Case study validation in the Phase III has been done for six firms, with 2 firms producing Cutting Tools from District Patiala, 2 firms producing Sports Goods from District Jalandhar and 2 firms producing Bicycle Components from District Ludhiana respectively.

#### *Phase IV: Synthesis of Survey Based Analysis and Case Study Analysis:*

Phase IV deals with synthesis of the survey based results and Case study analysis. The synthesis is done keeping success factor of MkIS as a dependent variable of the MkIS Model from the three sectors, i.e., cutting tools, sports goods and bicycle components.

### **3.2 Research Design:**

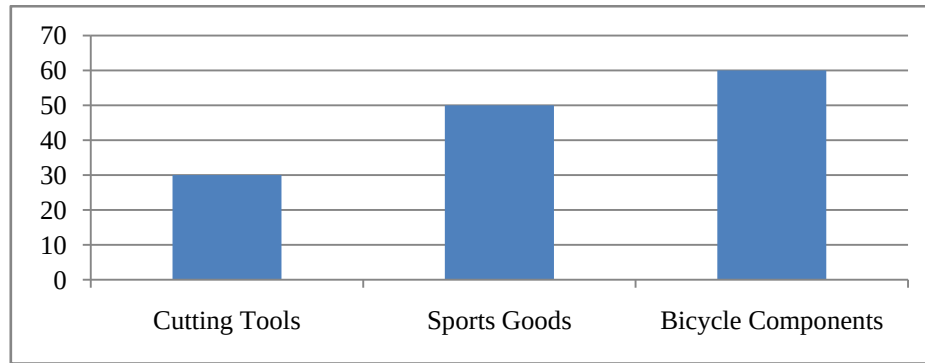
The study uses a survey analysis for 140 SMEs of manufacturing sector of Punjab covering Cutting Tools from District Patiala, Sports Goods from District Jalandhar and Bicycle Components from District Ludhiana respectively to understand the level of MkIS by firms. The study has been conducted in Punjab in India. Punjab is a progressive state of India with an average growth rate of 10 per cent. As per India Today (2009) Punjab walk away with the best performance among big states in agriculture, consumer markets and infrastructure

### **3.3 Data:**

The data has been collected from firsthand experience and the study is only based on primary data. Details of the same are explained below:

#### **3.3.1 Sample Size and Sampling Technique**

The study used a self-structured questionnaire for collecting the data. 140 questionnaires complete in all respects have been taken up for analysis. Data has been collected from the following districts: Patiala, Ludhiana and Jalandhar. The reason for selecting these districts is that 82 per cent of total exports are from these districts of Punjab and they have prominent range of products. These districts contribute to about 43 per cent of the total small units and about 34 per cent medium units respectively in Punjab. Regarding the Nature of Industry in the sample out of total 140 firms there are 30 firms producing Cutting Tools, 50 producing Sports Goods and 60 producing Bicycle Components. Categories of firms within these sectors have been depicted in Fig. 3.1



**Figure 3.1: Category of Industry**

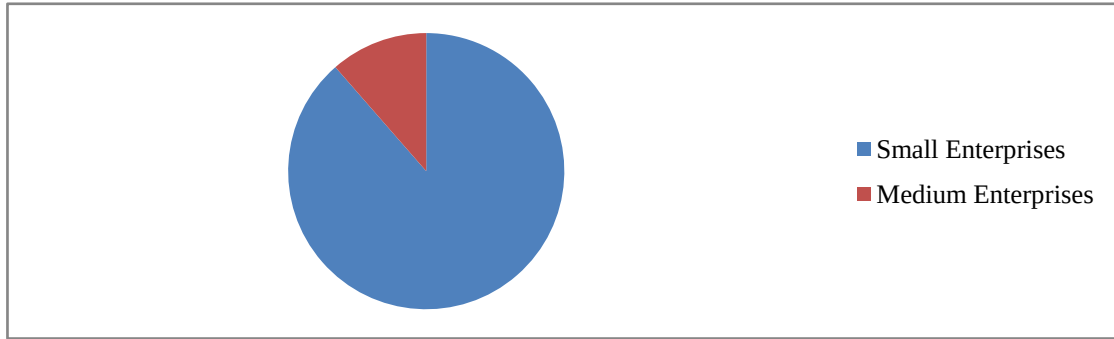
Further, Cutting Tools from Patiala, Sports Goods from Jalandhar and Bicycle Components from Ludhiana compromises nearly 15 per cent of total exports from Punjab and provides 75 percent of the country's requirement.

The random samples were drawn from the population of enterprises in the Punjab state, stratified by districts as explained below:

| <b>Table 3.1:<br/>Sample Size with Segmentation</b> |                     |                      |
|-----------------------------------------------------|---------------------|----------------------|
| S. No.                                              | Manufacturing Units | Percentage of Sample |
| 1.                                                  | < 50                | 100%                 |
| 2.                                                  | $\geq 50 < 100$     | 50%                  |
| 3.                                                  | $\geq 100 < 300$    | 30%                  |
| 4.                                                  | $\geq 300 < 500$    | 20%                  |
| 5.                                                  | $\geq 500 < 1000$   | 10%                  |
| 6.                                                  | $\geq 1000 < 3000$  | 5%                   |
| 7.                                                  | $\geq 3000 < 4000$  | 2.5%                 |
| 8.                                                  | $\geq 4000$         | 1.5%                 |

Bicycle components units in district Ludhiana are 4000, there are 1000 sports goods units in district Jalandhar and 30 cutting tools units in district Patiala. By using Table 3.1, we get 140 manufacturing units as the sample size.

Size-wise sample has 124 small enterprises and 16 medium enterprises respectively as depicted in Fig. 3.2



**Figure 3.2: Type of Enterprises**

### 3.3.2 Details of Questionnaire:

The review of selected literature provided an initial development of the draft questionnaire. The final questionnaire consists of three sections with total of 43 questions which include mostly Likert scale type questions. Random stratified sampling technique has been used for collecting the data. Information has been collected from manufacturing firms located in Patiala, Ludhiana and Jalandhar. Table 3.2 gives details about the purpose of each question. Section A covers the profile of the respondent firm. Section B has factors for the development of model for MkIS and is further sub-divided into four parts: Primary Characteristics, MkIS Design Characteristics, Capabilities of MkIS and MkIS Sophistication respectively. Section C is divided into two parts for Evaluating Success and Hindrance Factors of MkIS respectively.

| Table 3.2:<br>Details of Questionnaire   |                                                         |                             |                          |
|------------------------------------------|---------------------------------------------------------|-----------------------------|--------------------------|
| Sr. No.                                  | Gist of Questions                                       | Response method             | Basic Objective/ Purpose |
| Section A                                |                                                         |                             |                          |
| 1.                                       | Type of firm                                            | Please tick (✓ ) one option | Organizational Profile   |
| 2.                                       | Type of Organization                                    | √                           |                          |
| 3.                                       | Number of Employees                                     | √                           |                          |
| Section B                                |                                                         |                             |                          |
| Factors for the Development of the Model |                                                         |                             |                          |
| 4.                                       | Is a personal computer available to you in your office? | Please tick (✓ ) one option | Primary Characteristics  |
| 5.                                       | MS Windows 98/2000                                      | √                           |                          |
| 6.                                       | MS Windows XP                                           | √                           |                          |
| 7.                                       | E-mail                                                  | √                           |                          |

|                               |                                                                                                                                      |              |                             |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|--------------|-----------------------------|
| 8.                            | Search Engines                                                                                                                       | √            |                             |
| 9.                            | MS Word                                                                                                                              | √            |                             |
| 10.                           | MS Excel                                                                                                                             | √            |                             |
| 11.                           | MS Powerpoint                                                                                                                        | √            |                             |
| 12.                           | Firm has access to timely information of the marketing needs?                                                                        | Likert scale |                             |
| 13.                           | Firm stores Market information (e.g., customers, competitors etc.)                                                                   | √            |                             |
| 14.                           | Processed information (e.g., sales forecasts, market share, distribution trend, etc.) is maintained in the database.                 | √            |                             |
| 15.                           | Broad Scope Information                                                                                                              | Likert scale | MkIS Design Characteristics |
| 16.                           | Timely Information                                                                                                                   | √            |                             |
| 17.                           | Accurate Information                                                                                                                 | √            |                             |
| 18.                           | Current Information                                                                                                                  | √            |                             |
| 19.                           | Aggregated Information                                                                                                               | √            |                             |
| 20.                           | It simply provides data on which decisions are made                                                                                  | Likert scale | Capabilities of MkIS        |
| 21.                           | It has the capability to undertake simple analysis of the data and from this provides information on which decisions are made        | √            |                             |
| 22.                           | It provides sophisticated analysis of data, and therefore provides invaluable decision support information                           | √            |                             |
| 23.                           | It provides sophisticated analysis of data and has the ability to make recommendations, if so required, as an aid to decision making | √            |                             |
| 24.                           | Strategic Perspective                                                                                                                | Likert scale | MkIS Sophistication         |
| 25.                           | Meeting customer needs                                                                                                               | √            |                             |
| 26.                           | Threat of new entrants                                                                                                               | √            |                             |
| 27.                           | Marketing personnel involved in strategic planning                                                                                   | √            |                             |
| 28.                           | Strategic use of IT budget                                                                                                           | √            |                             |
| 29.                           | Marketing decisions important to organization                                                                                        | √            |                             |
| Section C                     |                                                                                                                                      |              |                             |
| Success and Hindrance Factors |                                                                                                                                      |              |                             |
| 30.                           | The MkIS is integrated into the managerial functions.                                                                                | Likert Scale | Success Factors             |
| 31.                           | MkIS is an appropriate information processing technology required to meet the data processing.                                       | √            |                             |
| 32.                           | MkIS focuses on the results and goals.                                                                                               | √            |                             |
| 33.                           | MkIS is an user-friendly design.                                                                                                     | √            |                             |
| 34.                           | MkIS has a basic potential capability to quickly meet new needs of information.                                                      | √            |                             |
| 35.                           | The MkIS concentrates on developing the information support to manager.                                                              | √            |                             |
| 36.                           | MkIS design is modified according to the changing information needs.                                                                 | √            | Hindrance Factors           |
| 37.                           | The MkIS is conceived as a data                                                                                                      | Likert Scale |                             |

|     |                                                                                                                    |   |   |
|-----|--------------------------------------------------------------------------------------------------------------------|---|---|
|     | processing and not as an information processing system.                                                            |   | √ |
| 38. | A belief that the computerized MkIS can solve all the management problems of planning and control of the business. | √ |   |
| 39. | Lack of training to the users of the information.                                                                  | √ |   |
| 40. | Adequate attention is not given to the quality control aspects of the inputs of MkIS.                              | √ |   |
| 41. | The MkIS is an impersonal system.                                                                                  | √ |   |
| 42. | The MkIS does not give perfect information to all the users in the organization.                                   | √ |   |
| 43. | Underestimating the complexity in the business systems.                                                            | √ |   |

### 3.4 Duration of the Study:

The period of data collection was August 2010 to September 2011. On an average, 30-45 minutes were required per respondent for filling up the questionnaire.

### 3.5 Reliability and Validity:

The questionnaire was tested for its validity and reliability. Validity is the property by which a questionnaire measures what it is supposed to measure. The questionnaire was validated by the peers and possesses a good validation score (3.75 on a scale of 5). The changes suggested by experts were incorporated in the questionnaire and responses recorded. Some questions were deleted and some reworded. Reliability applies to a measure when similar results are obtained over time and across situations. When the outcome of the measuring process is reproducible, the measuring instrument is reliable. The two dimensions underlying the concept of reliability are: repeatability and consistency. In the present study, the questionnaire has an overall reliability score of (Cronbach Alpha) 0.702. Hence the questionnaire was found to be valid and reliable to be used for the present research study. Table 3.3 describes the Reliability Statistics.

| <b>Table 3.3:<br/>Reliability Statistics</b>               |             |                |
|------------------------------------------------------------|-------------|----------------|
| Items                                                      | No of Items | Cronbach Alpha |
| Primary Characteristics(Usage of Computers)                | 11          | .829           |
| Design Characteristics/ Capabilities / MkIS Sophistication | 15          | .792           |
| Success Factors of MkIS                                    | 07          | .710           |
| Hindrance Factors of MkIS                                  | 07          | .807           |
| <b>Overall</b>                                             | 40          | .702           |

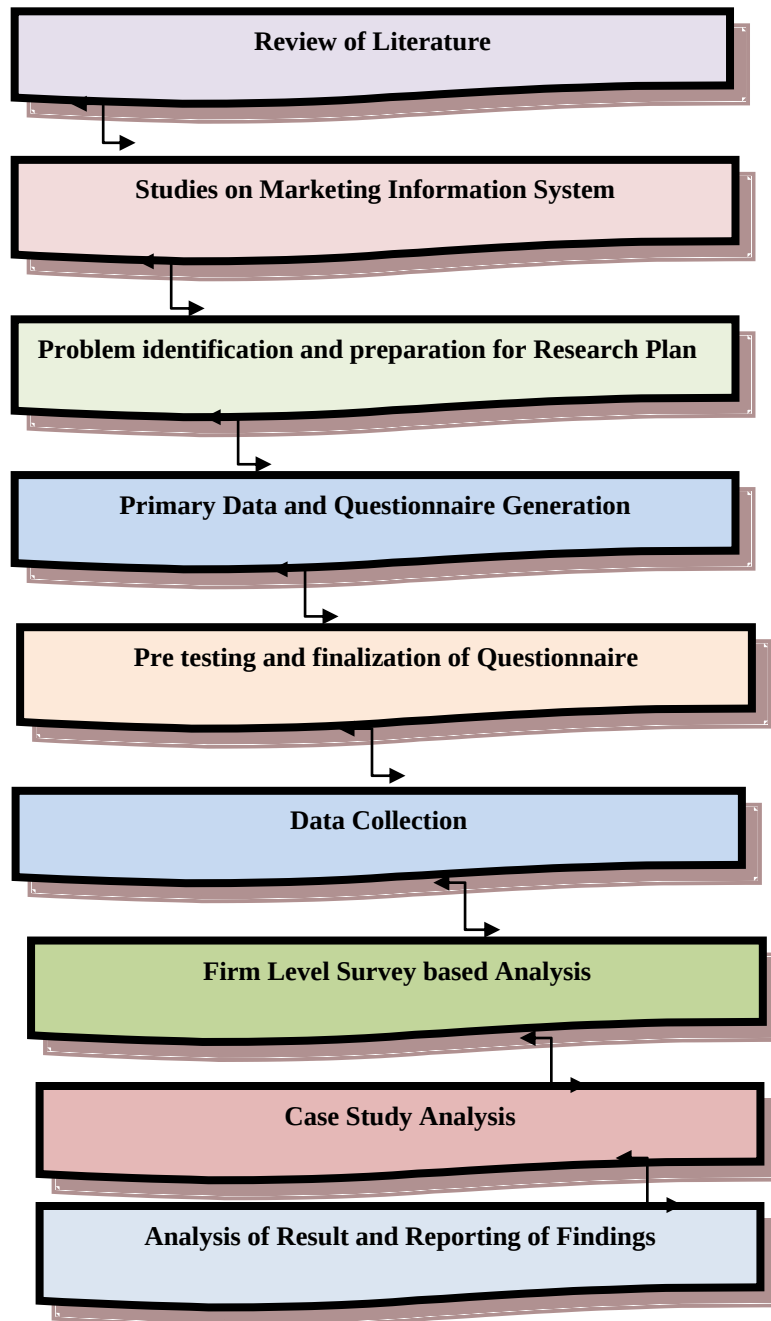
### 3.6 Hypotheses of the study:

Decision making is concerned with assessment of future outcomes and events, which cannot be predicted in advance and as such involves a lot of risks and uncertainties. Information reduces uncertainty and helps the marketing manager to see the likely outcome of various decisions but the information system does not make the actual decisions and it is the function of MKIS function to provide decision makers with timely and accurate data to allow making and implementing the necessary decisions. This is essential for enhancing the effectiveness so that the organizations achieve their defined goals. Thus it is important to consider the design characteristics focusing on information; the capabilities of MkIS to assist in decision making; the primary characteristics covering the operating system, internet and applications; MkIS sophistication dealing with strategic perspectives and customer needs. Along with these any study on MkIS cannot ignore the hindrance factors. Accordingly the hypotheses related with the study are:

- H<sub>1</sub>: Design Characteristics of MkIS are positively associated with success factors of MkIS Model.
- H<sub>2</sub>: Capabilities of MkIS are positively associated with success factors of MkIS Model.
- H<sub>3</sub>: Primary Characteristics of MkIS are positively associated with success factors of MkIS Model.
- H<sub>4</sub>: Hindrance Factors of MkIS are negatively associated with success of MkIS Model.
- H<sub>5</sub>: MkIS Sophistication is positively associated with success factors of MkIS Model.



### 3.7 Research Framework:



### 3.8 Tools and Techniques:

Data has been analyzed with the help of SPSS (Statistical Package for Social Sciences) version 20. Statistical tools like Descriptive Statistics, ANOVA and Step wise Regression analysis have been applied to test the hypotheses.

### **3.8.1 Descriptive Statistics:**

Descriptive statistics provide summary about the sample and about the observations that have been made. Mean and Standard Deviation has been obtained and depicted through tables and figures across the different levels of firms on the basis of nature of Industry across the three sectors, i.e., cutting tools, sports goods and bicycle components. The study also covers the analysis based on types of firms viz. small and medium firms. Descriptive statistics have been also used for case study analysis.

### **3.8.2 The Analysis of Variance (ANOVA):**

Analysis of variance (ANOVA) is a set of techniques for studying cause and effect of one or more factors (independent variables) on a single dependent variable. In the present study one-way ANOVA has been used. F-test under ANOVA has been conducted to understand whether there is a significant difference across the different levels of firms on the basis of nature of Industry across the three sectors, i.e., cutting tools, sports goods and bicycle components and further types of firms are also included.

### **3.8.3 Step Wise Regression Analysis:**

Step-wise Regression technique with Success factors of MkIS as dependent variable has been used to find the important predictors of the MkIS Model. These are: Design characteristics of MkIS, capabilities of MkIS, primary characteristics of MkIS, hindrance factors of MkIS and MkIS sophistication. The study also uses Durbin-Watson index and F-Statistics to check the acceptability for the MkIS model.

## **3.9 Chapter Summary:**

Choice of an appropriate research design and methodology is one of the most important aspects that pave the way for targeted outcomes in the research process. This chapter elaborates the step by step approach employed for the research. Methodology that has been applied for different phases of this study has been explained thoroughly, followed by a research framework. Hypotheses related with the study are also highlighted. Finally, a brief overview of rationale for statistical methods used in the present study like mean, standard deviation, ANOVA and step-wise Regression Analysis has been presented.

## **CHAPTER-IV**

### **DATA ANALYSIS AND INTERPRETATION**

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This chapter deals with data analysis and interpretation of the responses gathered from 140 SMEs through survey from the following districts: Patiala for Cutting Tools (30 Units), Jalandhar for Sports Goods (50 Units) and Ludhiana for Bicycle Components (60 Units) respectively. The main objective of the study is to identify the critical factors for success of an MkIS model for SMEs.

The study tries to examine the relationship between success factors of MkIS and factors influencing MkIS w.r.t. type of sectors viz. cutting tools, sports goods and bicycle components. The analysis has also been done on the basis of nature of firm, i.e., small scale and medium scale.

Section 4.1 covers the analysis of critical factors for the development of MkIS Model. This section deals with Objective 1. Section 4.2 covers the analysis of Success and Hindrance factors of MkIS, This is to achieve Objective 2. Section 4.3 covers Objective 3 and deals with the Development of MkIS Model for SMEs, Section 4.4- 4.6 deals with Objective 4. Section 4.4 covers the Testing of the MkIS Model in the selected SMEs, Section 4.5 covers the Synthesis of Survey Based Results and Case Study Analysis and Section 4.6 covers the framework of MkIS (Marketing Information System) Model.

#### **4.1 (Objective 1) Critical factors for the development of MkIS Model are:**

As explained in chapter two the critical factors for the development of MkIS Model as derived through literature review include:

- MkIS Design Characteristics
- Capabilities of MkIS
- Primary Characteristics of MkIS
- MkIS Sophistication

#### 4.1.1 MkIS Design Characteristics:

Any model on MkIS has to deal with MkIS Design Characteristics. The initial part of questionnaire covers the MkIS Design Characteristics. Inputs for the same have been received focusing on easy and timely availability of Information. Likert scale has been used ranging from 1 for the lowest priority to 5 point for the highest priority. The analysis has been done for three sectors, i.e., cutting tools, sports goods and bicycle components as well as for two categories of firms, i.e., small enterprises and medium enterprises.

MkIS Design Characteristics used in the study are:

1. Broad Scope Information (DC1),
2. Timely Information (DC2),
3. Accurate Information (DC3),
4. Current Information (DC4),
5. Aggregated Information (DC5).

##### 4.1.1.1 MkIS Design Characteristics: Sector wise Analysis

| <b>Table 4.1:</b><br><b>MkIS Design Characteristics in Sectors</b> |      |      |      |      |      |      |
|--------------------------------------------------------------------|------|------|------|------|------|------|
| Type of Sector                                                     |      | DC1  | DC2  | DC3  | DC4  | DC5  |
| Cutting Tools                                                      | Mean | 3.20 | 3.33 | 3.53 | 3.10 | 3.30 |
|                                                                    | N    | 30   | 30   | 30   | 30   | 30   |
|                                                                    | S.D. | 1.27 | .99  | 1.13 | 1.06 | .98  |
| Sports Goods                                                       | Mean | 3.14 | 3.32 | 3.30 | 3.10 | 2.98 |
|                                                                    | N    | 50   | 50   | 50   | 50   | 50   |
|                                                                    | S.D. | 1.24 | 1.26 | 1.05 | 1.35 | 1.31 |
| Bicycle Components                                                 | Mean | 3.05 | 3.38 | 3.40 | 3.43 | 3.26 |
|                                                                    | N    | 60   | 60   | 60   | 60   | 60   |
|                                                                    | S.D. | 1.01 | 1.20 | .94  | .88  | 1.07 |
| Total                                                              | Mean | 3.11 | 3.35 | 3.39 | 3.24 | 3.17 |
|                                                                    | N    | 140  | 140  | 140  | 140  | 140  |
|                                                                    | S.D. | 1.15 | 1.18 | 1.02 | 1.11 | 1.15 |

From the results shown through Table 4.1, it is evident that respondents from all three sectors, i.e., cutting tools, sports goods and bicycle components have given high priority to Accurate Information (DC3) and Timely Information (DC2). Although other design characteristics viz. Broad Scope Information (DC1), Current Information (DC4) and Aggregated Information (DC5) are also rated high, but the highly prioritized design

characteristic is Accurate information followed by Timely information. Thus, in terms of design characteristics, the above two are considered extremely important. The same have been diagrammatically depicted through Figure 4.1.

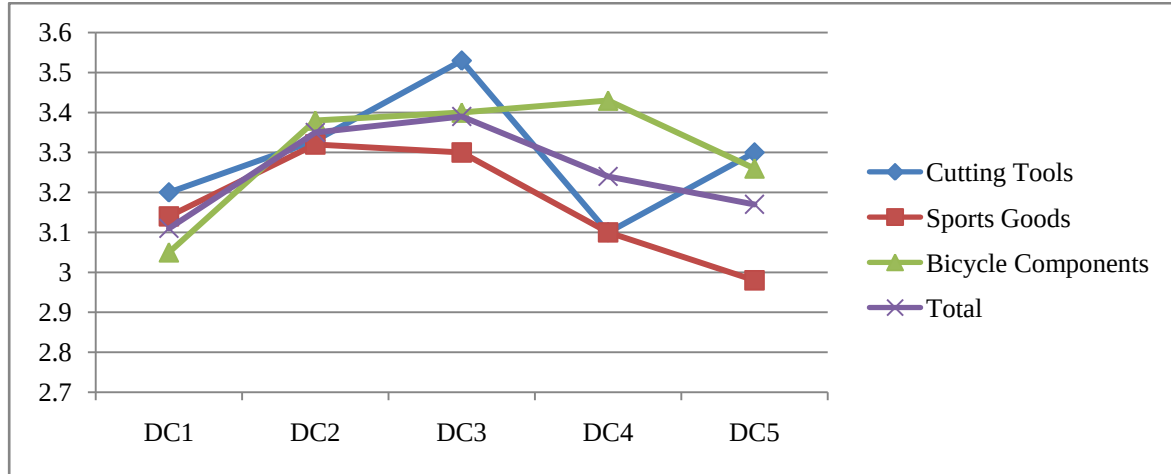


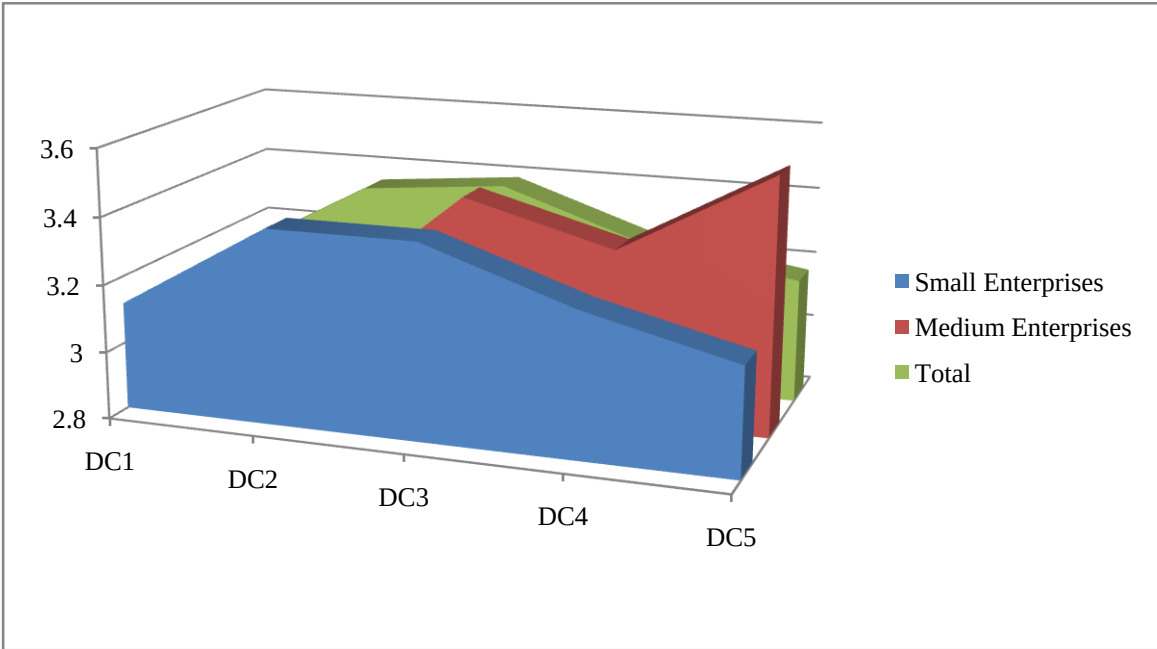
Figure 4.1: Design Characteristics in Sectors

#### 4.1.1.2 MkIS Design Characteristics: Firm wise Analysis

| <b>Table 4.2:<br/>MkIS Design Characteristics in Firms</b> |      |      |      |      |      |      |
|------------------------------------------------------------|------|------|------|------|------|------|
| Type of Firm                                               |      | DC1  | DC2  | DC3  | DC4  | DC5  |
| Small Enterprise                                           | Mean | 3.12 | 3.38 | 3.38 | 3.23 | 3.12 |
|                                                            | N    | 124  | 124  | 124  | 124  | 124  |
|                                                            | SD   | 1.16 | 1.16 | 1.01 | 1.09 | 1.15 |
| Medium Enterprise                                          | Mean | 3.06 | 3.06 | 3.43 | 3.31 | 3.56 |
|                                                            | N    | 16   | 16   | 16   | 16   | 16   |
|                                                            | SD   | 1.06 | 1.28 | 1.09 | 1.30 | 1.09 |
| Total                                                      | Mean | 3.11 | 3.35 | 3.39 | 3.24 | 3.17 |
|                                                            | N    | 140  | 140  | 140  | 140  | 140  |
|                                                            | SD   | 1.15 | 1.18 | 1.02 | 1.11 | 1.15 |

After sector wise analysis, the researcher tried to cover the firm wise analysis on the basis of small scale and medium scale to understand the preference of design characteristics. As shown in Table 4.2, overall results highlight that highest rating has been given to Accurate Information (DC3), followed by Timely Information (DC2). The firm wise analysis also strengthens the viewpoint reflected through sector- wise analysis and it is evident that both

the small as well as medium enterprises have given high priority to Accurate Information and Timely Information. Thus in terms of design characteristics, the above two are considered extremely important. The results have also been diagrammatically depicted through Figure 4.2.



**Figure 4.2: Design Characteristics in Firms**

Further ANOVA was also conducted to find out whether there is a significant difference between small and medium enterprises regarding the design characteristics of MkIS. The results of the same are shown in Table 4.3. On the basis of ANOVA results through, it can be inferred that there is no significant difference between small and medium enterprises regarding the design characteristics of MkIS. Hence, all these sub-factors are included in design characteristic factor.

| <b>Table 4.3:<br/>ANOVA for MkIS Design Characteristics in Firms</b> |                |                |     |             |      |       |
|----------------------------------------------------------------------|----------------|----------------|-----|-------------|------|-------|
| Design Characteristics                                               |                | Sum of Squares | Df  | Mean Square | F    | Sig.  |
| DC1                                                                  | Between Groups | 0.04           | 1   | 0.04        | 0.03 | 0.849 |
|                                                                      | Within Groups  | 184.12         | 138 | 1.33        |      |       |
|                                                                      | Total          | 184.17         | 139 |             |      |       |
| DC2                                                                  | Between Groups | 1.49           | 1   | 1.49        | 1.07 | 0.302 |
|                                                                      | Within Groups  | 192.35         | 138 | 1.39        |      |       |
|                                                                      | Total          | 193.85         | 139 |             |      |       |
| DC3                                                                  | Between Groups | 0.03           | 1   | 0.03        | 0.03 | 0.854 |
|                                                                      | Within Groups  | 145.35         | 138 | 1.05        |      |       |
|                                                                      | Total          | 145.39         | 139 |             |      |       |
| DC4                                                                  | Between Groups | 0.08           | 1   | 0.08        | 0.07 | 0.792 |
|                                                                      | Within Groups  | 173.65         | 138 | 1.25        |      |       |
|                                                                      | Total          | 173.74         | 139 |             |      |       |
| DC5                                                                  | Between Groups | 2.76           | 1   | 2.76        | 2.1  | 0.149 |
|                                                                      | Within Groups  | 181.12         | 138 | 1.31        |      |       |
|                                                                      | Total          | 183.88         | 139 |             |      |       |

Overall results for design characteristics highlight that all sub factors viz. Broad Scope Information (DC1), Timely Information (DC2), Accurate Information (DC3), Current Information (DC4) and Aggregated Information (DC5) should be included in the MkIS model. Another important finding is that Timely Information (DC2), Accurate Information (DC3) have been rated relatively high by small as well as medium scale firms and by all three sectors.

#### **4.1.2 Capabilities of MkIS:**

After in depth analysis of Design characteristics, similar analysis was done for finding the preference for sub- factors in Capabilities of MkIS. Likert scale has been used ranging from 1 for the lowest priority to 5 point for the highest priority. The analysis has been done for three sectors, i.e., cutting tools, sports goods and bicycle components as well as for two categories of firms, i.e., small enterprises and medium enterprises.

Capabilities of MkIS covered in the present study are:

1. Provides data on which decisions are made (CA1),

2. Capability to undertake simple analysis of the data and from this provides information on which decisions are made (CA2),
3. Provides sophisticated analysis of data which provides invaluable decision support information (CA3),
4. Provides sophisticated analysis of data which has the ability to make recommendations, if so required, as an aid to decision making.(CA4)

#### 4.1.2.1 Capabilities of MkIS: Sector wise Analysis

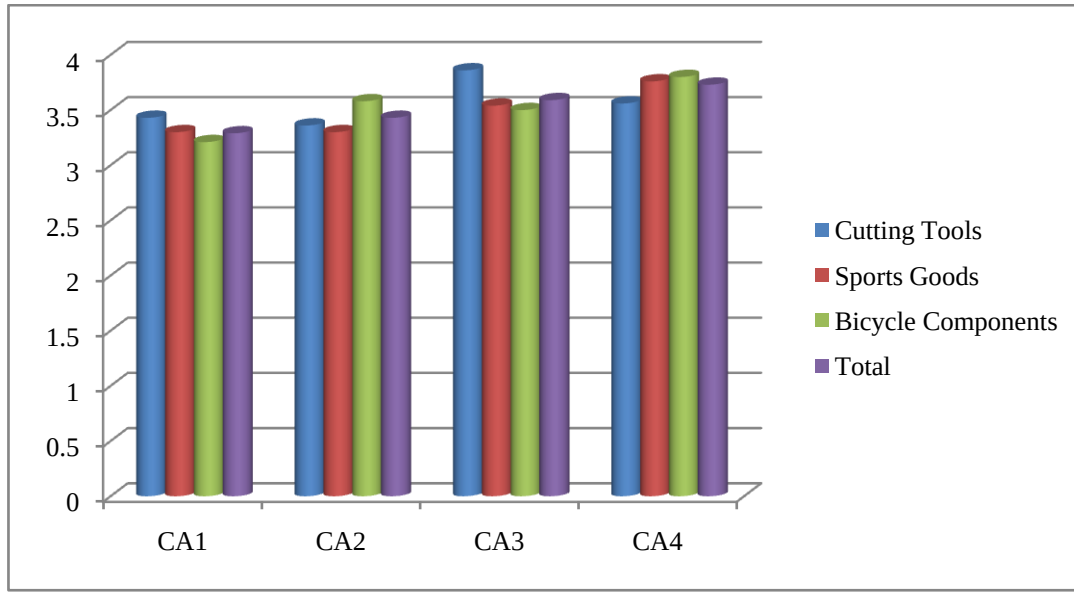
| <b>Table 4.4:<br/>Capabilities of MkIS in Sectors</b> |      |      |      |      |      |
|-------------------------------------------------------|------|------|------|------|------|
| Type of Sector                                        |      | CA1  | CA2  | CA3  | CA4  |
| Cutting Tools                                         | Mean | 3.43 | 3.36 | 3.86 | 3.56 |
|                                                       | N    | 30   | 30   | 30   | 30   |
|                                                       | S.D  | 1.07 | 1.09 | .77  | .81  |
| Sports Goods                                          | Mean | 3.30 | 3.30 | 3.54 | 3.76 |
|                                                       | N    | 50   | 50   | 50   | 50   |
|                                                       | S.D  | 1.18 | 1.18 | .93  | 1.02 |
| Bicycle Components                                    | Mean | 3.21 | 3.58 | 3.50 | 3.80 |
|                                                       | N    | 60   | 60   | 60   | 60   |
|                                                       | S.D  | 1.00 | .99  | .89  | .91  |
| Total                                                 | Mean | 3.29 | 3.43 | 3.59 | 3.73 |
|                                                       | N    | 140  | 140  | 140  | 140  |
|                                                       | S.D  | 1.08 | 1.08 | .88  | .93  |

The results shown through Table 4.4 highlight that for cutting tools sector, highest rating was given to: MkIS provides sophisticated analysis of data which provides invaluable decision support information (CA3). The next preferred sub-factor was: MkIS provides sophisticated analysis of data which has the ability to make recommendations, if so required, as an aid to decision making (CA4). For Sports goods and for bicycle components the top rated sub-factors were similar as for cutting tools sector, but the positions interchanged with CA4 rated higher than CA3.

Overall results indicate that respondents in all three sectors, i.e., cutting tools, sports goods and bicycle components respectively have given highest rating to (CA4) that MkIS provides sophisticated analysis of data which has the ability to make recommendations, if so required, as an aid to decision making. The next on priority has been MkIS provides sophisticated analysis of data which provides invaluable decision support information



(CA3). The pictorial presentation of the results has been done through Figure 4.3. The results signify that capabilities of MkIS is not simply providing data, but to provide sophisticated analysis of data for facilitating decision making and for invaluable decision support information.



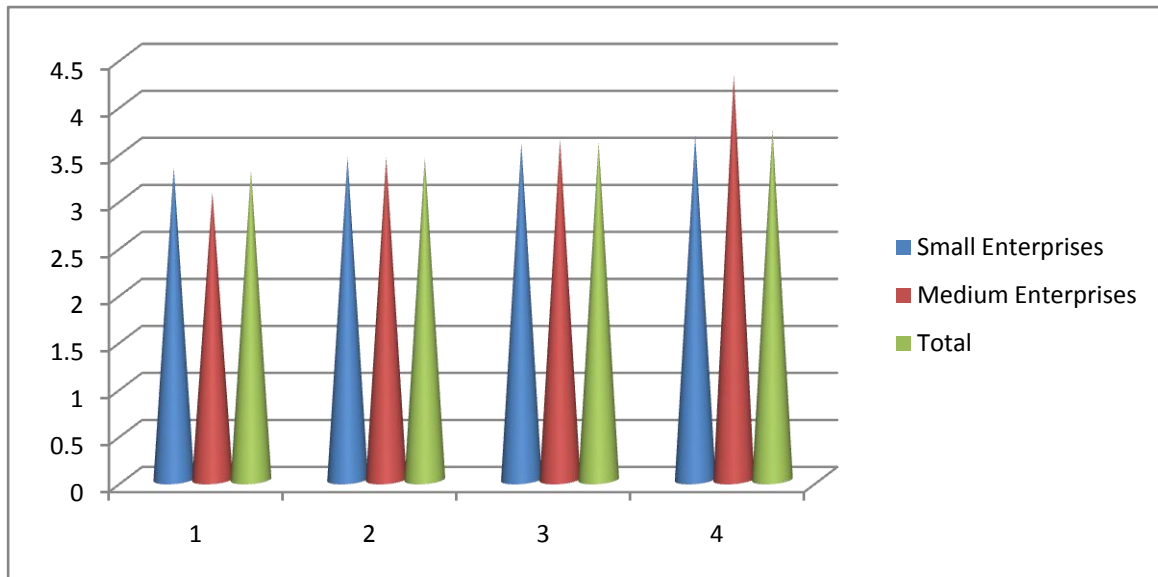
**Figure 4.3: Capabilities of MkIS in Sectors**

#### **4.1.2.2 Capabilities of MkIS: Firm wise Analysis**

The firm-wise analysis (Table 4.5) for capabilities of MkIS are pointers to the fact that small scale firms gave highest priority to: MkIS provides sophisticated analysis of data which has the ability to make recommendations, if so required, as an aid to decision making.(CA4). The next preferred sub-factor has been CA3 viz. MkIS provides sophisticated analysis of data which provides invaluable decision support information. For medium scale firms the mean score of CA4 was quite high, i.e., 4.31 and CA3 had the mean score of 3.62. The lowest priority was given to CA1, i.e., MkIS provides only data for decision making.

| <b>Table 4.5:<br/>Capabilities of MkIS in Firms</b> |      |      |      |      |      |
|-----------------------------------------------------|------|------|------|------|------|
| Type of Firm                                        |      | CA1  | CA2  | CA3  | CA4  |
| Small Enterprise                                    | Mean | 3.32 | 3.43 | 3.58 | 3.66 |
|                                                     | N    | 124  | 124  | 124  | 124  |
|                                                     | SD   | 1.07 | 1.12 | .84  | .91  |
| Medium Enterprise                                   | Mean | 3.06 | 3.43 | 3.62 | 4.31 |
|                                                     | N    | 16   | 16   | 16   | 16   |
|                                                     | SD   | 1.12 | .72  | 1.20 | .87  |
| Total                                               | Mean | 3.29 | 3.43 | 3.59 | 3.73 |
|                                                     | N    | 140  | 140  | 140  | 140  |
|                                                     | SD   | 1.08 | 1.08 | .88  | .93  |

The results have been diagrammatically depicted through Figure 4.4.



**Figure 4.4: Capabilities of MkIS in Firms**

On the basis of ANOVA results depicted through Table 4.6, it can be inferred that there is no significant difference between small and medium enterprises regarding the capabilities of MkIS except the last component which is significant for sophisticated analysis of data which has the ability to make recommendations, if so required, as an aid to decision making.

| <b>Table 4.6:<br/>ANOVA for Capabilities of MkIS in Firms</b> |                |                |     |             |      |      |
|---------------------------------------------------------------|----------------|----------------|-----|-------------|------|------|
| Capabilities of MkIS                                          |                | Sum of Squares | df  | Mean Square | F    | Sig. |
| CA1                                                           | Between Groups | .95            | 1   | .95         | .81  | .368 |
|                                                               | Within Groups  | 162.03         | 138 | 1.17        |      |      |
|                                                               | Total          | 162.99         | 139 |             |      |      |
| CA2                                                           | Between Groups | .00            | 1   | .00         | .00  | .994 |
|                                                               | Within Groups  | 164.42         | 138 | 1.19        |      |      |
|                                                               | Total          | 164.42         | 139 |             |      |      |
| CA3                                                           | Between Groups | .01            | 1   | .01         | .02  | .878 |
|                                                               | Within Groups  | 109.77         | 138 | .79         |      |      |
|                                                               | Total          | 109.79         | 139 |             |      |      |
| CA4                                                           | Between Groups | 6.01           | 1   | 6.01        | 7.19 | .008 |
|                                                               | Within Groups  | 115.21         | 138 | .83         |      |      |
|                                                               | Total          | 121.22         | 139 |             |      |      |

Summing up it can be said that sector wise and scale-wise analysis of firms highlight the following capabilities scoring high:

- MkIS provides sophisticated analysis of data which has the ability to make recommendations, if so required, as an aid to decision making (CA4).
- MkIS provides sophisticated analysis of data which provides invaluable decision support information (CA3),

#### **4.1.3 Primary Characteristics of MkIS:**

Undoubtedly design characteristics and MkIS Capabilities are important, but it is time to focus on Primary Characteristics of MkIS. The operating system, the Internet and applications are very vital. Along with these it also focuses on access, storage and processing of marketing information.

Primary Characteristics of MkIS used in the study are:

1. Windows 98/2000 (PC1) as operating system,
2. Windows XP (PC1) as operating system,
3. E-mail (PC2) as internet,
4. Search Engines (PC2) as internet,
5. Word (PC3) as applications,
6. Excel (PC3) as applications,

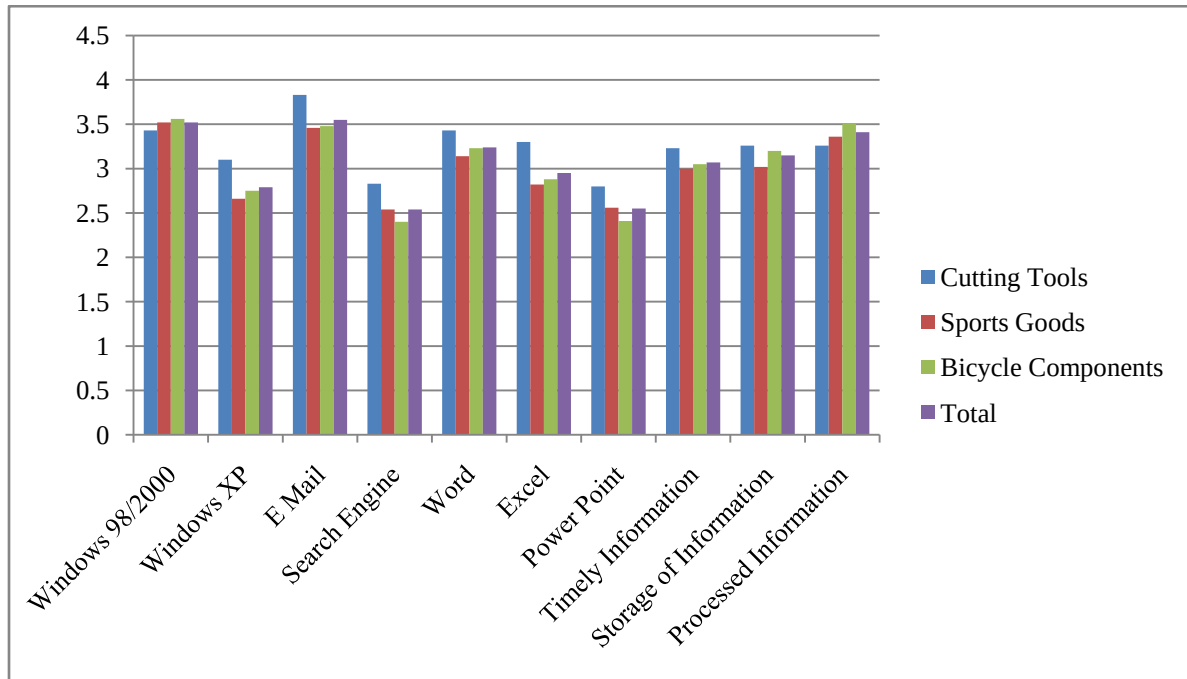
7. Power point (PC3) as applications,
8. Accesses to timely needs of marketing information by the firms (PC4),
9. Storage of marketing information by the firms (PC5),
10. Processed Information maintained in the database (PC6).

#### 4.1.3.1 Primary Characteristics of MkIS: Sector wise Analysis:

The survey results as shown through Table 4.7, indicate that MS Windows 98/2000 as an operating system is preferred to Windows XP amongst the sample firms. Email as an Internet has highest usage. MS Word as an application has highest usage respectively in all the three sectors, i.e., cutting tools, sports goods and bicycle components. Processed information (e.g., sales forecasts, market share, distribution trend, etc) maintained in the database has a good inclination amongst the three sectors.

| <b>Table 4.7:<br/>Primary Characteristics of MkIS in Sectors</b> |      |      |      |      |      |      |      |      |      |      |      |
|------------------------------------------------------------------|------|------|------|------|------|------|------|------|------|------|------|
| Nature of Firm                                                   |      | PC1  |      | PC2  |      | PC3  |      |      | PC4  | PC5  | PC6  |
| Cutting Tools                                                    | Mean | 3.43 | 3.10 | 3.83 | 2.83 | 3.43 | 3.30 | 2.80 | 3.23 | 3.26 | 3.26 |
|                                                                  | N    | 30   | 30   | 30   | 30   | 30   | 30   | 30   | 30   | 30   | 30   |
|                                                                  | SD   | .67  | .92  | .74  | .83  | 1.04 | .65  | .80  | 1.27 | .98  | .82  |
| Sports Goods                                                     | Mean | 3.52 | 2.66 | 3.46 | 2.54 | 3.14 | 2.82 | 2.56 | 3.00 | 3.02 | 3.36 |
|                                                                  | N    | 50   | 50   | 50   | 50   | 50   | 50   | 50   | 50   | 50   | 50   |
|                                                                  | SD   | .64  | .71  | .61  | .61  | .60  | .74  | .61  | 1.42 | 1.40 | .92  |
| Bicycle Components                                               | Mean | 3.56 | 2.75 | 3.48 | 2.40 | 3.23 | 2.88 | 2.41 | 3.05 | 3.20 | 3.51 |
|                                                                  | N    | 60   | 60   | 60   | 60   | 60   | 60   | 60   | 60   | 60   | 60   |
|                                                                  | SD   | .56  | .75  | .62  | .64  | .53  | .64  | .67  | 1.39 | 1.02 | .81  |
| Total                                                            | Mean | 3.52 | 2.79 | 3.55 | 2.54 | 3.24 | 2.95 | 2.55 | 3.07 | 3.15 | 3.41 |
|                                                                  | N    | 140  | 140  | 140  | 140  | 140  | 140  | 140  | 140  | 140  | 140  |
|                                                                  | SD   | .61  | .79  | .66  | .69  | .69  | .70  | .69  | 1.37 | 1.16 | .85  |

Pictorial presentation (Figure 4.5) of primary characteristics clearly indicates that cutting tools sector respondents scored a little higher on all segments than overall average. Bicycle Components sector scores relatively more than overall average on (PC6) processed information maintained in the database. Sports goods sector scores lower than average score on all primary characteristics.



**Figure 4.5: Primary Characteristics of MkIS in Sectors**

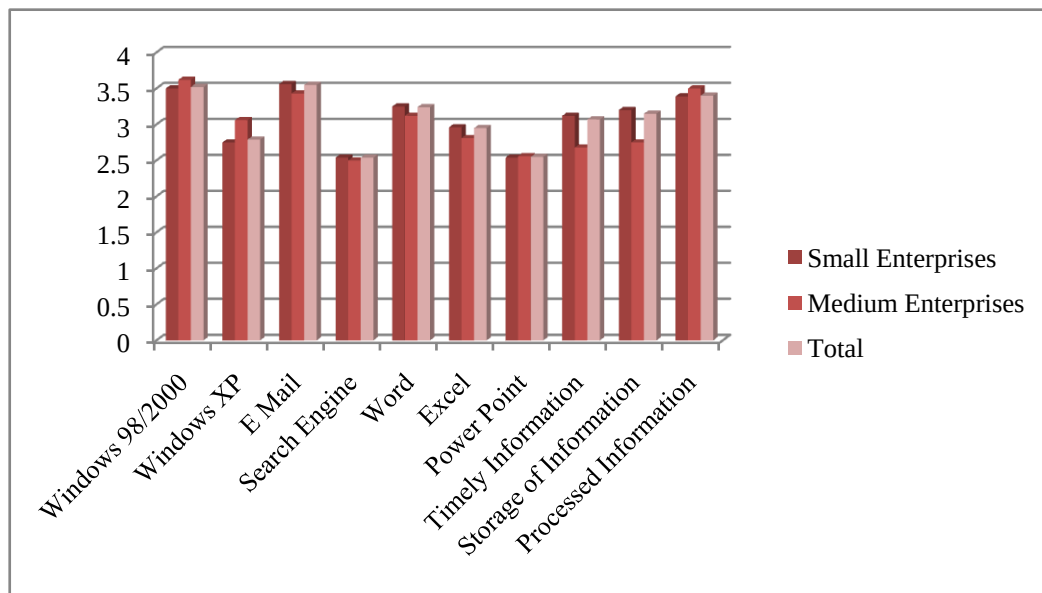
#### **4.1.3.2 Primary Characteristics of MkIS: Firm wise Analysis**

O' Brien (1998) considered marketing information system as a structured, interacting complex of persons, machines and procedures designed to generate an orderly flow of pertinent information collected from both intra and extra-firm sources for use as the bases for decision making. Thus, procedures and machines including operating systems and applications have a significant role which is captured in the present study through primary characteristics of MkIS.

Scale-wise analysis (Table 4.8) has further strengthened that for both small scale as well as for medium scale firms respondent firms preferred windows 98/2000 to Windows XP, used e-mail more often and opted more for MS word.

| <b>Table 4.8:<br/>Primary Characteristics of MkIS in Firms</b> |      |      |      |      |      |      |      |      |      |      |      |
|----------------------------------------------------------------|------|------|------|------|------|------|------|------|------|------|------|
| Type of Firm                                                   |      | PC1  |      | PC2  |      | PC3  |      |      | PC4  | PC5  | PC6  |
| Small Enterprises                                              | Mean | 3.50 | 2.75 | 3.56 | 2.54 | 3.25 | 2.96 | 2.54 | 3.12 | 3.20 | 3.39 |
|                                                                | N    | 124  | 124  | 124  | 124  | 124  | 124  | 124  | 124  | 124  | 124  |
|                                                                | SD   | .61  | .78  | .66  | .70  | .70  | .70  | .70  | 1.35 | 1.11 | .84  |
| Medium Enterprises                                             | Mean | 3.62 | 3.06 | 3.43 | 2.50 | 3.12 | 2.81 | 2.56 | 2.68 | 2.75 | 3.50 |
|                                                                | N    | 16   | 16   | 16   | 16   | 16   | 16   | 16   | 16   | 16   | 16   |
|                                                                | SD   | .61  | .77  | .62  | .63  | .61  | .65  | .62  | 1.49 | 1.48 | .96  |
| Total                                                          | Mean | 3.52 | 2.79 | 3.55 | 2.54 | 3.24 | 2.95 | 2.55 | 3.07 | 3.15 | 3.40 |
|                                                                | N    | 140  | 140  | 140  | 140  | 140  | 140  | 140  | 140  | 140  | 140  |
|                                                                | SD   | .61  | .79  | .66  | .69  | .69  | .70  | .69  | 1.37 | 1.16 | .85  |

The pictorial presentation through figure 4.6 clearly depicts the preferences.



**Figure 4.6: Primary Characteristics of MkIS in Firms**

ANOVA was also applied to study whether there is a significant difference between small and medium enterprises regarding the primary characteristics of MkIS. The results have been depicted through Table 4.9.

| <b>Table 4.9:<br/>ANOVA for Primary Characteristics of MkIS in Firms</b> |                                                                      |                |                |     |             |      |      |
|--------------------------------------------------------------------------|----------------------------------------------------------------------|----------------|----------------|-----|-------------|------|------|
| Primary Characteristics                                                  |                                                                      |                | Sum of Squares | df  | Mean Square | F    | Sig. |
| PC1                                                                      | MS Windows 98/2000                                                   | Between Groups | .19            | 1   | .19         | .50  | .478 |
|                                                                          |                                                                      | Within Groups  | 52.74          | 138 | .38         |      |      |
|                                                                          |                                                                      | Total          | 52.93          | 139 |             |      |      |
|                                                                          | MS Windows XP                                                        | Between Groups | 1.31           | 1   | 1.31        | 2.11 | .148 |
|                                                                          |                                                                      | Within Groups  | 85.67          | 138 | .62         |      |      |
|                                                                          |                                                                      | Total          | 86.99          | 139 |             |      |      |
| PC2                                                                      | E-Mail                                                               | Between Groups | .22            | 1   | .22         | .52  | .471 |
|                                                                          |                                                                      | Within Groups  | 60.42          | 138 | .43         |      |      |
|                                                                          |                                                                      | Total          | 60.65          | 139 |             |      |      |
|                                                                          | Search Engines                                                       | Between Groups | .03            | 1   | .03         | .06  | .794 |
|                                                                          |                                                                      | Within Groups  | 66.71          | 138 | .48         |      |      |
|                                                                          |                                                                      | Total          | 66.74          | 139 |             |      |      |
| PC3                                                                      | MS Word                                                              | Between Groups | .25            | 1   | .25         | .51  | .475 |
|                                                                          |                                                                      | Within Groups  | 67.49          | 138 | .48         |      |      |
|                                                                          |                                                                      | Total          | 67.74          | 139 |             |      |      |
|                                                                          | MS Excel                                                             | Between Groups | .34            | 1   | .34         | .69  | .408 |
|                                                                          |                                                                      | Within Groups  | 68.30          | 138 | .49         |      |      |
|                                                                          |                                                                      | Total          | 68.65          | 139 |             |      |      |
|                                                                          | MS Power Point                                                       | Between Groups | .00            | 1   | .00         | .00  | .939 |
|                                                                          |                                                                      | Within Groups  | 66.64          | 138 | .48         |      |      |
|                                                                          |                                                                      | Total          | 66.65          | 139 |             |      |      |
| PC4                                                                      | Accesses to timely needs of marketing information by the firms (PC4) | Between Groups | 2.66           | 1   | 2.66        | 1.41 | .237 |
|                                                                          |                                                                      | Within Groups  | 260.62         | 138 | 1.88        |      |      |
|                                                                          |                                                                      | Total          | 263.28         | 139 |             |      |      |
| PC5                                                                      | Storage of marketing information by the firms (PC5)                  | Between Groups | 2.89           | 1   | 2.89        | 2.15 | .144 |
|                                                                          |                                                                      | Within Groups  | 184.96         | 138 | 1.34        |      |      |
|                                                                          |                                                                      | Total          | 187.85         | 139 |             |      |      |
| PC6                                                                      | Processed Information maintained in the database (PC6)               | Between Groups | .15            | 1   | .15         | .21  | .646 |
|                                                                          |                                                                      | Within Groups  | 101.63         | 138 | .73         |      |      |
|                                                                          |                                                                      | Total          | 101.79         | 139 |             |      |      |

On the basis of ANOVA results it can be inferred that there is no significant difference between small and medium enterprises regarding the primary characteristics of MkIS.

#### 4.1.4 MkIS Sophistication:

The current study investigates the factors underlying MkIS Sophistication for contribution to the success of marketing information system (MKIS). A marketing information system

(MKIS) is an essential tool for translating raw data to useful information (O'Brien, 1998). MKIS design is important since the quality of marketing information system has been shown to affect the effectiveness of decision- making (Jobber and Fahy, 2006). The marketing information systems increases the number of options available to decision maker and support every element of marketing strategy; MKIS affects marketing interfaces with customers, suppliers, and other partners (Harmon, 2003). Hence these aspects have been covered in MkIS sophistication.

Factors underlying MkIS Sophistication in the study are:

1. Strategic Perspective (SO1),
2. Meeting Customer Needs (SO2),
3. Threat of New Entrants (SO3),
4. Marketing Personnel involved in Strategic Planning (SO4),
5. Strategic use of IT Budget (SO5)
6. Marketing Decisions important to organization (SO6).

#### 4.1.4.1 MkIS Sophistication: Sector wise Analysis

| <b>Table 4.10:<br/>MkIS Sophistication in Sectors</b> |      |      |      |      |      |      |      |
|-------------------------------------------------------|------|------|------|------|------|------|------|
| Type of Sectors                                       |      | SO1  | SO2  | SO3  | SO4  | SO5  | SO6  |
| Cutting Tools                                         | Mean | 3.30 | 3.70 | 3.03 | 3.30 | 2.93 | 3.26 |
|                                                       | N    | 30   | 30   | 30   | 30   | 30   | 30   |
|                                                       | SD   | .91  | .74  | .99  | .87  | 1.04 | .94  |
| Sports Goods                                          | Mean | 2.86 | 3.60 | 3.44 | 3.26 | 3.18 | 3.06 |
|                                                       | N    | 50   | 50   | 50   | 50   | 50   | 50   |
|                                                       | SD   | 1.16 | .83  | 1.09 | 1.10 | 1.24 | 1.09 |
| Bicycle Components                                    | Mean | 2.96 | 3.51 | 3.53 | 3.18 | 3.21 | 3.10 |
|                                                       | N    | 60   | 60   | 60   | 60   | 60   | 60   |
|                                                       | SD   | .97  | .89  | 1.04 | .85  | 1.02 | 1.03 |
| Total                                                 | Mean | 3.00 | 3.58 | 3.39 | 3.23 | 3.14 | 3.12 |
|                                                       | N    | 140  | 140  | 140  | 140  | 140  | 140  |
|                                                       | SD   | 1.03 | .83  | 1.06 | .94  | 1.10 | 1.03 |

As depicted through Table 4.10, in case of cutting tools industry highest priority has been given to meeting customer needs (SO2). The next in priority are: Strategic perspective (SO1) and marketing personnel involved in strategic planning (SO4). Respondents from



sports goods sector have strongly favored meeting customer needs (SO2) and following this is threat of new entrants (SO3). In case of bicycle components sector highest prioritized item is threat of new entrants (SO3) and next on rating is meeting customer needs (SO2). Summing up these three sectors it can be inferred that of all the factors in all the three sectors meeting customer needs (SO2) has received the higher priority and thus is considered more relevant. The presentation through Figure 4.7 shows the comparative picture.

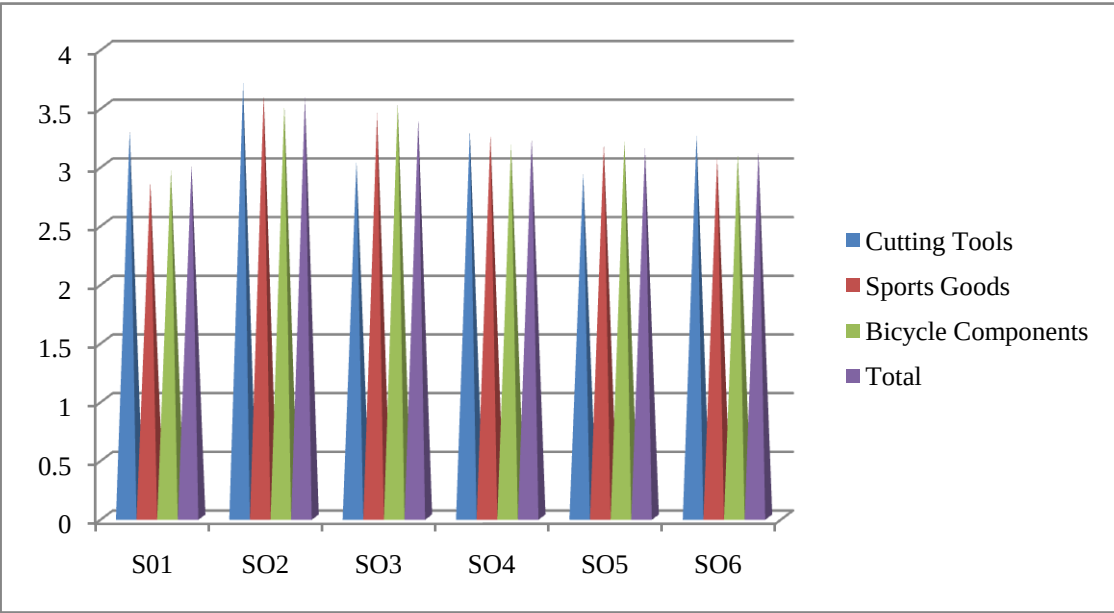


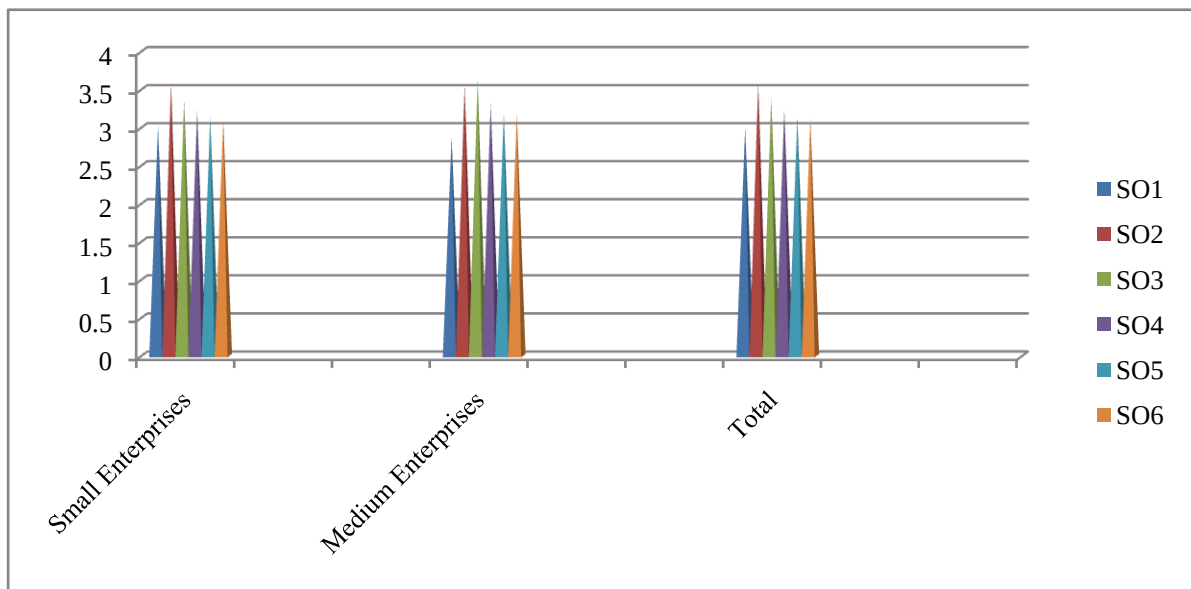
Figure 4.7: MkIS Sophistication in Sectors

4.1.4.2 MkIS Sophistication: Firm wise Analysis

As shown in Table 4.11, for small scale firms meeting customer needs (SO2) with a mean score of 3.58 has been rated highest and threat of new entrants (SO3) has a slightly lower mean score of 3.36. Similar trend has been observed for medium scale firms.

| <b>Table 4.11:<br/>MkIS Sophistication in Firms</b> |      |      |      |      |      |      |      |
|-----------------------------------------------------|------|------|------|------|------|------|------|
| Type of Firm                                        |      | SO1  | SO2  | SO3  | SO4  | SO5  | SO6  |
| Small Enterprises                                   | Mean | 3.01 | 3.58 | 3.36 | 3.22 | 3.13 | 3.11 |
|                                                     | N    | 124  | 124  | 124  | 124  | 124  | 124  |
|                                                     | SD   | 1.06 | .85  | 1.06 | .96  | 1.07 | 1.05 |
| Medium Enterprises                                  | Mean | 2.87 | 3.56 | 3.62 | 3.31 | 3.18 | 3.18 |
|                                                     | N    | 16   | 16   | 16   | 16   | 16   | 16   |
|                                                     | SD   | .80  | .72  | 1.08 | .87  | 1.37 | .91  |
| Total                                               | Mean | 3.00 | 3.58 | 3.39 | 3.23 | 3.14 | 3.12 |
|                                                     | N    | 140  | 140  | 140  | 140  | 140  | 140  |
|                                                     | SD   | 1.03 | .83  | 1.06 | .94  | 1.10 | 1.03 |

The diagrammatic representation through Figure 4.8 shows that both categories of firms, i.e., small and medium enterprises are having higher mean score for meeting customer needs (SO2), and threat of new entrants (SO3) than other factors considered in the study. Thus the value of MKIS extends beyond internal productivity, to enhancing customer relationships,



**Figure 4.8: MkIS Sophistication in Firms**

ANOVA was applied to the sample firms to understand whether there is a significant difference between small and medium enterprises regarding the MkIS sophistication factors.

| <b>Table 4.12:<br/>ANOVA for MkIS Sophistication in Firms</b> |                |                |     |             |     |      |
|---------------------------------------------------------------|----------------|----------------|-----|-------------|-----|------|
| MkIS Sophistication                                           |                | Sum of Squares | Df  | Mean Square | F   | Sig. |
| SO1                                                           | Between Groups | .28            | 1   | .28         | .26 | .611 |
|                                                               | Within Groups  | 149.71         | 138 | 1.08        |     |      |
|                                                               | Total          | 150.00         | 139 |             |     |      |
| SO2                                                           | Between Groups | .01            | 1   | .01         | .01 | .907 |
|                                                               | Within Groups  | 97.96          | 138 | .71         |     |      |
|                                                               | Total          | 97.97          | 139 |             |     |      |
| SO3                                                           | Between Groups | .97            | 1   | .97         | .85 | .356 |
|                                                               | Within Groups  | 156.41         | 138 | 1.13        |     |      |
|                                                               | Total          | 157.39         | 139 |             |     |      |
| SO4                                                           | Between Groups | .10            | 1   | .10         | .11 | .732 |
|                                                               | Within Groups  | 125.11         | 138 | .90         |     |      |
|                                                               | Total          | 125.22         | 139 |             |     |      |
| SO5                                                           | Between Groups | .03            | 1   | .03         | .02 | .865 |
|                                                               | Within Groups  | 171.10         | 138 | 1.24        |     |      |
|                                                               | Total          | 171.14         | 139 |             |     |      |
| SO6                                                           | Between Groups | .07            | 1   | .07         | .07 | .787 |
|                                                               | Within Groups  | 148.85         | 138 | 1.07        |     |      |
|                                                               | Total          | 148.93         | 139 |             |     |      |

ANOVA results as shown in Table 4.12, clearly reflect that there is no significant difference between small and medium enterprises regarding the MkIS sophistication.

In this section, effort was made to find out the importance of MkIS critical factors. The results highlight the importance of all factors for consideration for MkIS model. Although there are inter- factor variations in mean score, but it is high for all factors. Any MkIS model must also analyse the success and hindrance factors. The subsequent section covers the success and hindrance factors for implementation of the MkIS Model.

## 4.2 (Objective 2) Success and Hindrance factors for implementation of MkIS Model:

The present study uses a five point Likert scale to find the prioritization for success factors and hindrance factors of MkIS model. The second objective of the study deals with success and hindrance factors for implementation of the MkIS Model.

### 4.2.1 Success Factors of MkIS:

Success Factors have been used to find the prioritization of each characteristic on the level of 1 to 5, with one for lowest priority and 5 for highest. The analysis has been done on the basis of all three sectors, i.e., cutting tools, sports goods and bicycle components and also on the two categories, viz. small enterprise and medium enterprises.

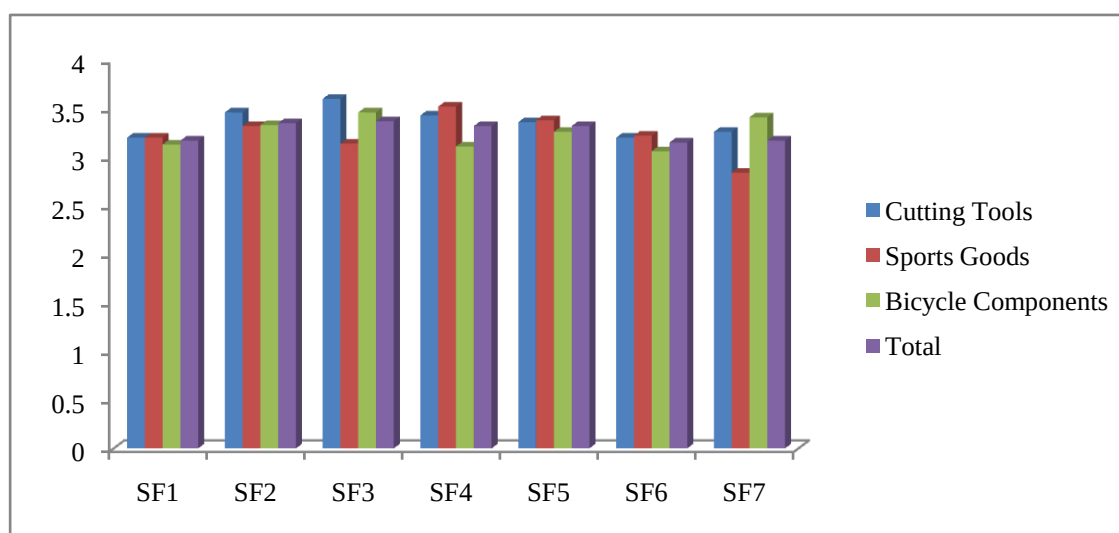
Success Factors of MkIS covered in the present study are:

1. The MkIS is integrated into the managerial functions (SF1)
2. MkIS is an appropriate information processing technology required to meet the data processing (SF2)
3. MkIS focuses on results and goals (SF3)
4. MkIS is a user-friendly design (SF4)
5. MkIS has a basic potential capability to quickly meet new needs of information (SF5)
6. The MkIS concentrates on developing the information support to manager (SF6)
7. MkIS design is modified according to the changing information needs (SF7)

#### 4.2.1.1 Success Factors of MkIS: Sector wise Analysis

| <b>Table 4.13:<br/>Mean of the Success Factors of MkIS in Sectors</b> |      |      |      |      |      |      |      |
|-----------------------------------------------------------------------|------|------|------|------|------|------|------|
| Type of Sector                                                        | SF1  | SF2  | SF3  | SF4  | SF5  | SF6  | SF7  |
| Cutting Tools                                                         | 3.20 | 3.46 | 3.60 | 3.43 | 3.36 | 3.20 | 3.26 |
| Sports Goods                                                          | 3.20 | 3.32 | 3.14 | 3.52 | 3.38 | 3.22 | 2.84 |
| Bicycle Components                                                    | 3.13 | 3.33 | 3.46 | 3.11 | 3.26 | 3.06 | 3.41 |
| Total                                                                 | 3.17 | 3.35 | 3.37 | 3.32 | 3.32 | 3.15 | 3.17 |

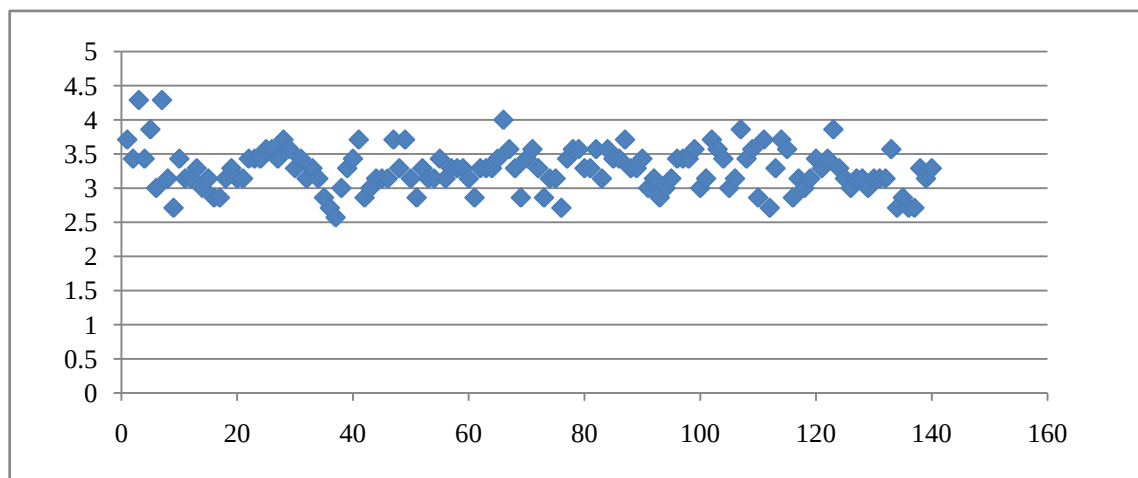
As shown in Table 4.13, mean score for cutting tools is highest for MkIS focuses on results and goals (SF3). The next in priority is that MkIS is an appropriate information processing technology required to meet the data processing (SF2). For sports goods sector the mean score is higher for MkIS is a user-friendly design (SF4) and for MkIS has a basic potential capability to quickly meet new needs of information. (SF5). For bicycle components the success factors rated higher are that MkIS focuses on results and goals (SF3 and MkIS design is modified according to the changing information needs (SF7). Thus, different sectors have different priorities regarding success factors.



**Figure 4.9: Success Factors of MkIS in Sectors**

Comparative analysis of three sectors can be clearly seen in figure 4.9. For the first factor, viz. MkIS is integrated into the managerial functions (SF1), there is almost similar mean score ranging from 3.17 to 3.20. Hence, it has equal priority for all sectors. Regarding the next factor, i.e., MkIS is an appropriate information processing technology required to meet the data processing (SF2) all sectors have rated it high and thus it is considered very important for all sectors. In case of MkIS focusing on results and goals (SF3) cutting tools sector and Bicycle components have rated it with highest score. Regarding the fourth factor, i.e., MkIS is a user-friendly design (SF4), there is a difference in perception of the sample firms. The sports goods sector has rated it with highest score of 3.52, while bicycle components have given the least priority to it. All the three categories of the firm viz. cutting tools, sports goods and bicycle components have similar mean scores for the fifth

and sixth success factors respectively, viz. MkIS has a basic potential capability to quickly meet new needs of information (SF5); and MkIS concentrates on developing the information support to manager (SF6). In the seventh success factor of MkIS, viz. MkIS design is modified according to the changing information needs (SF7) for sports goods category, the mean score is relatively less than the other two categories of firm. In terms of overall average, highest priority has been given to third factor i.e., MkIS focuses on results and goals; followed by second factor i.e., MkIS is an appropriate information processing technology required to meet the data processing.



**Figure 4.10: Average of the Success Factors of MkIS in sectors**

All the success factors have a combined average of 3.27, as depicted through figure 4.10 showing individual average score of all 140 SMEs representing three sectors, cutting tools, sports goods and bicycle components. The firms have a general agreement regarding the success factors for MkIS as there are only a few points on the extreme and those are also towards the higher end.

Next step was to find out whether there is a significant difference in the mean score on the basis of different sectors chosen for the study. For this ANOVA has been used.

| <b>Table 4.14:<br/>ANOVA for the Success Factors of MkIS in Sectors</b> |                |                |     |             |       |       |
|-------------------------------------------------------------------------|----------------|----------------|-----|-------------|-------|-------|
| Success Factors                                                         |                | Sum of Squares | Df  | Mean Square | F     | Sig.  |
| SF1                                                                     | Between Groups | 4.782          | 2   | 2.391       | 2.371 | 0.097 |
|                                                                         | Within Groups  | 138.153        | 137 | 1.008       |       |       |
|                                                                         | Total          | 142.936        | 139 |             |       |       |
| SF2                                                                     | Between Groups | 4.856          | 2   | 2.428       | 2.053 | 0.132 |
|                                                                         | Within Groups  | 162.03         | 137 | 1.183       |       |       |
|                                                                         | Total          | 166.886        | 139 |             |       |       |
| SF3                                                                     | Between Groups | 0.737          | 2   | 0.368       | 0.438 | 0.646 |
|                                                                         | Within Groups  | 115.113        | 137 | 0.84        |       |       |
|                                                                         | Total          | 115.85         | 139 |             |       |       |
| SF4                                                                     | Between Groups | 0.152          | 2   | 0.076       | 0.059 | 0.942 |
|                                                                         | Within Groups  | 175.733        | 137 | 1.283       |       |       |
|                                                                         | Total          | 175.886        | 139 |             |       |       |
| SF5                                                                     | Between Groups | 0.463          | 2   | 0.231       | 0.269 | 0.764 |
|                                                                         | Within Groups  | 117.68         | 137 | 0.859       |       |       |
|                                                                         | Total          | 118.143        | 139 |             |       |       |
| SF6                                                                     | Between Groups | 0.406          | 2   | 0.203       | 0.204 | 0.816 |
|                                                                         | Within Groups  | 136.48         | 137 | 0.996       |       |       |
|                                                                         | Total          | 136.886        | 139 |             |       |       |
| SF7                                                                     | Between Groups | 3.956          | 2   | 1.978       | 1.726 | 0.182 |
|                                                                         | Within Groups  | 156.98         | 137 | 1.146       |       |       |
|                                                                         | Total          | 160.936        | 139 |             |       |       |

The ANOVA results (Table 4.14) highlight that there is not a significant difference in mean score of the three categories of the firm viz. cutting tools, sports goods and bicycle components regarding the success factors. This also justifies that all the success factors of MkIS are considered important by respondent firms in all sectors.

#### 4.2.1.2 Success Factors of MkIS: Firm wise Analysis:

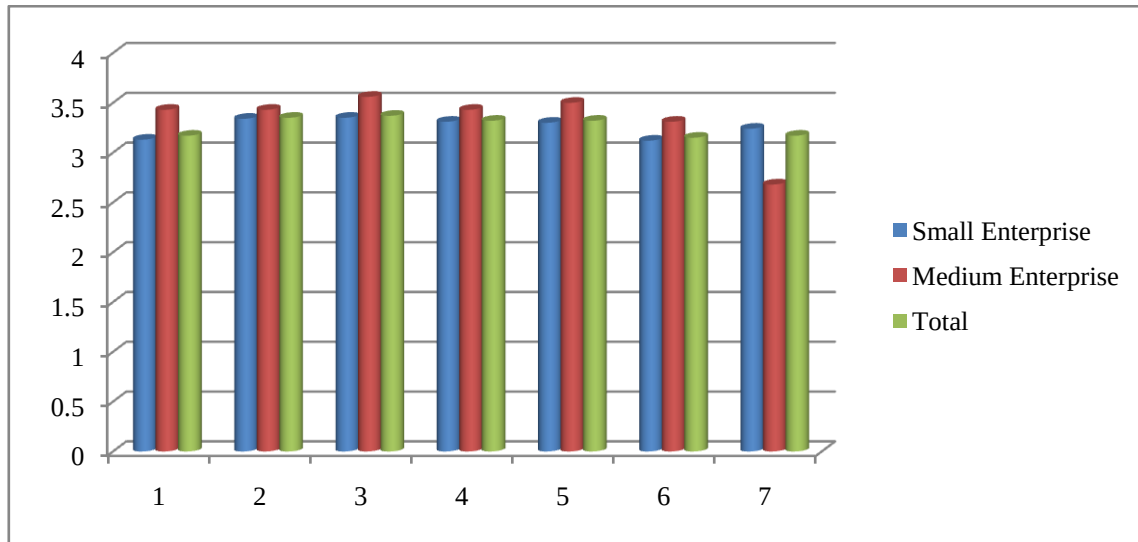
The firm wise analysis of success factors of MkIS on the basis of small and medium scale has also been taken.

| <b>Table 4.15:<br/>Success Factors of MkIS in Firms</b> |      |      |      |      |      |      |      |      |
|---------------------------------------------------------|------|------|------|------|------|------|------|------|
| Type of Firm                                            |      | SF1  | SF2  | SF3  | SF4  | SF5  | SF6  | SF7  |
| Small Enterprise                                        | Mean | 3.13 | 3.34 | 3.35 | 3.31 | 3.30 | 3.12 | 3.24 |
|                                                         | N    | 124  | 124  | 124  | 124  | 124  | 124  | 124  |
|                                                         | SD   | 1.15 | .94  | 1.02 | 1.08 | .99  | .88  | 1.08 |
| Medium Enterprise                                       | Mean | 3.43 | 3.43 | 3.56 | 3.43 | 3.50 | 3.31 | 2.68 |
|                                                         | N    | 16   | 16   | 16   | 16   | 16   | 16   | 16   |
|                                                         | SD   | .81  | .72  | .89  | 1.20 | .96  | 1.13 | .94  |
| Total                                                   | Mean | 3.17 | 3.35 | 3.37 | 3.32 | 3.32 | 3.15 | 3.17 |
|                                                         | N    | 140  | 140  | 140  | 140  | 140  | 140  | 140  |
|                                                         | SD   | 1.12 | .92  | 1.01 | 1.09 | .99  | .91  | 1.08 |

As depicted through Table 4.15, the average score for all success factors for small sized firms ranged from 3.12 to 3.35. The medium scale firms showed wider variation with the lowest score of 2.68 for MkIS design is modified according to the changing information needs (SF7) and the success factor SF3- MkIS focuses on results and goals (SF3) emerges as the topmost factor with a score of 3.56.

Overall results highlight that SF3-MkIS focuses on results and goals and SF2-MkIS is an appropriate information processing technology required to meet the data processing have emerged with higher ratings. Once again the scale wise analysis also highlights the similar trend as has been visible from sector-wise analysis. The pictorial presentation is shown through figure 4.11.





**Figure 4.11: Success Factors of MkIS in Firms**

ANOVA was also used to find out the common success factors , which could be included in MkIS model.

| <b>Table 4.16:<br/>ANOVA for Success Factors of MkIS in Firms</b> |                |                |     |             |      |      |
|-------------------------------------------------------------------|----------------|----------------|-----|-------------|------|------|
| Success Factors                                                   |                | Sum of Squares | Df  | Mean Square | F    | Sig. |
| SF1                                                               | Between Groups | 1.27           | 1   | 1.27        | 1.01 | .316 |
|                                                                   | Within Groups  | 174.60         | 138 | 1.26        |      |      |
|                                                                   | Total          | 175.88         | 139 |             |      |      |
| SF2                                                               | Between Groups | .11            | 1   | .11         | .13  | .712 |
|                                                                   | Within Groups  | 118.02         | 138 | .85         |      |      |
|                                                                   | Total          | 118.14         | 139 |             |      |      |
| SF3                                                               | Between Groups | .61            | 1   | .61         | .59  | .443 |
|                                                                   | Within Groups  | 142.32         | 138 | 1.03        |      |      |
|                                                                   | Total          | 142.93         | 139 |             |      |      |
| SF4                                                               | Between Groups | .21            | 1   | .21         | .17  | .674 |
|                                                                   | Within Groups  | 166.67         | 138 | 1.20        |      |      |
|                                                                   | Total          | 166.88         | 139 |             |      |      |
| SF5                                                               | Between Groups | .53            | 1   | .53         | .53  | .465 |
|                                                                   | Within Groups  | 136.35         | 138 | .98         |      |      |
|                                                                   | Total          | 136.88         | 139 |             |      |      |
| SF6                                                               | Between Groups | .47            | 1   | .47         | .57  | .451 |
|                                                                   | Within Groups  | 115.37         | 138 | .83         |      |      |
|                                                                   | Total          | 115.85         | 139 |             |      |      |
| SF7                                                               | Between Groups | 4.35           | 1   | 4.35        | 3.80 | .051 |
|                                                                   | Within Groups  | 158.17         | 138 | 1.14        |      |      |
|                                                                   | Total          | 162.53         | 139 |             |      |      |

On the basis of ANOVA results (Table 4.16), it can be inferred that there is no significant difference between small and medium enterprises regarding the success factors of MkIS

except the last factor, which is significant for the design which is modified according to the changing information needs. Thus for most of the factors, there is an agreement on the basis of scale of firm as well.

#### 4.2.2 Hindrance Factors of MkIS:

Hindrance Factors are important for any study as these factors have to be controlled to improve overall efficiency of MkIS.

Hindrance Factors of MkIS included in the present study are:

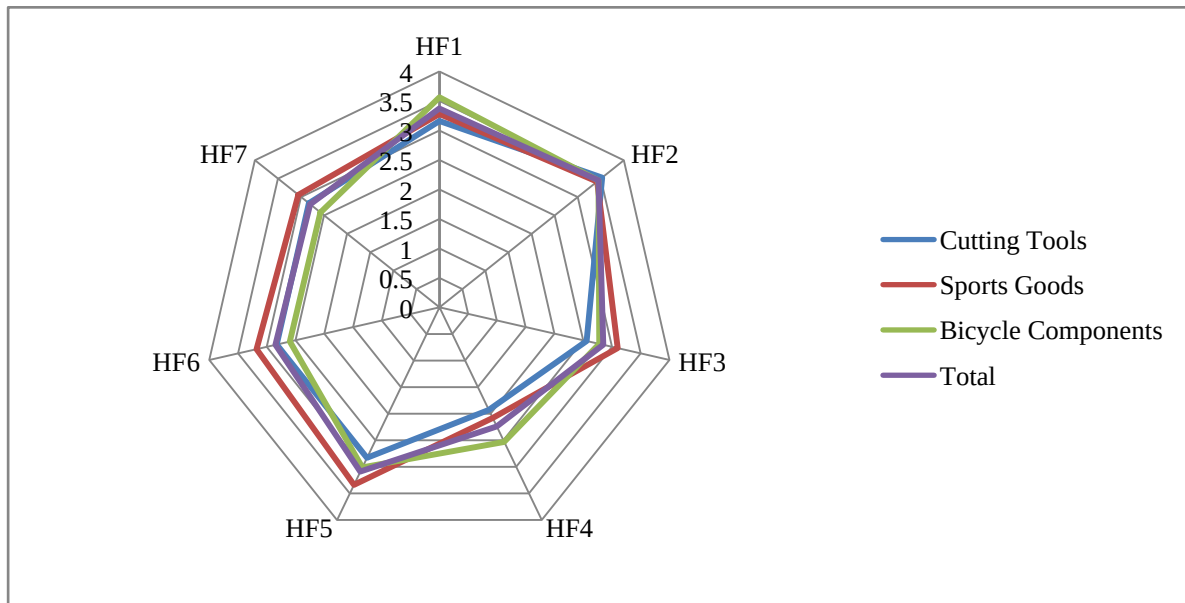
1. The MkIS is conceived as a data processing and not as an information processing system. (HF1)
2. A belief that the computerized MkIS can solve all the management problems of planning and control of the business. (HF2)
3. Lack of training to the users of the information. (HF3)
4. Adequate attention is not given to the quality control aspects of the inputs of MkIS. (HF4)
5. The MkIS is an impersonal system. (HF5)
6. The MkIS does not give perfect information to all the users in the organization. (HF6)
7. Underestimating the complexity in the business systems. (HF7)

##### 4.2.2.1 Hindrance Factors of MkIS: Sector wise Analysis

| <b>Table 4.17:<br/>Mean of the Hindrance Factors of MkIS in Sectors</b> |      |      |      |      |      |      |      |
|-------------------------------------------------------------------------|------|------|------|------|------|------|------|
| Type of Sector                                                          | HF1  | HF2  | HF3  | HF4  | HF5  | HF6  | HF7  |
| Cutting Tools                                                           | 3.16 | 3.53 | 2.56 | 1.93 | 2.83 | 2.83 | 2.83 |
| Sports Goods                                                            | 3.28 | 3.42 | 3.10 | 2.08 | 3.34 | 3.18 | 3.06 |
| Bicycle Components                                                      | 3.56 | 3.45 | 2.78 | 2.53 | 3.01 | 2.60 | 2.58 |
| Total                                                                   | 3.37 | 3.45 | 2.85 | 2.24 | 3.09 | 2.85 | 2.80 |

The results as shown in Table 4.17 indicate that all the obstacles are having a little higher mean score and hence deserve attention, the mean score of bicycle components is higher than other two categories i.e. cutting tools and sports goods for the first hindrance factor of MkIS (HF1). The mean score is similar in all the three categories of the firm viz. cutting tools, sports goods and bicycle components for the second hindrance factor of MkIS (HF2).

Sports goods category is predominant in the third hindrance factor (HF3). Mean score is highest for bicycle components for the fourth factor (HF4). Sports goods category has the highest mean for the fifth hindrance factor of MkIS (HF5). All the three categories of the firm viz. cutting tools, sports goods and bicycle components have similar mean scores for the sixth (HF6) and seventh (HF7) hindrance factors of MkIS respectively. In terms of overall average, MkIS with the highest priority is that the computerized MkIS can solve all the management problems of planning and control of the business in the business systems respectively and followed by that MkIS is not as an information processing system in all the three sectors, i.e., cutting tools, sports goods and bicycle components respectively. The results have been depicted diagrammatically in Figure 4.12.



**Figure 4.12: Hindrance Factors of MkIS in Sectors**

As shown in Table 4.18, the ANOVA results highlight that there is a significant difference between the three categories of the firm viz. cutting tools, sports goods and bicycle components in case of the following three hindrance factors of MkIS: (a) Adequate attention is not given to the quality control aspects of the inputs of MkIS, (b) The MkIS does not give perfect information to all the users in the organization and (c) Underestimating the complexity in the business systems.

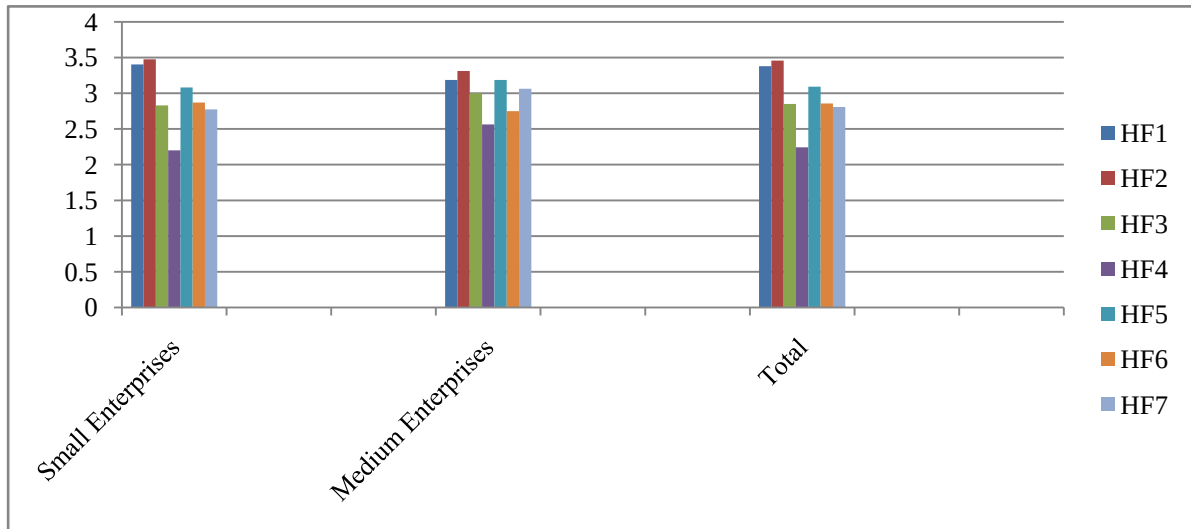
| <b>Table 4.18:<br/>ANOVA for the Hindrance Factors of MkIS in Sectors</b> |                |                |     |             |       |      |
|---------------------------------------------------------------------------|----------------|----------------|-----|-------------|-------|------|
| Hindrance Factors                                                         |                | Sum of Squares | df  | Mean Square | F     | Sig. |
| HF1                                                                       | Between Groups | 3.956          | 2   | 1.978       | 1.726 | .182 |
|                                                                           | Within Groups  | 156.980        | 137 | 1.146       |       |      |
|                                                                           | Total          | 160.936        | 139 |             |       |      |
| HF2                                                                       | Between Groups | .246           | 2   | .123        | .142  | .867 |
|                                                                           | Within Groups  | 118.497        | 137 | .865        |       |      |
|                                                                           | Total          | 118.743        | 139 |             |       |      |
| HF3                                                                       | Between Groups | 5.800          | 2   | 2.900       | 2.047 | .133 |
|                                                                           | Within Groups  | 194.050        | 137 | 1.416       |       |      |
|                                                                           | Total          | 199.850        | 139 |             |       |      |
| HF4                                                                       | Between Groups | 9.263          | 2   | 4.631       | 4.004 | .020 |
|                                                                           | Within Groups  | 158.480        | 137 | 1.157       |       |      |
|                                                                           | Total          | 167.743        | 139 |             |       |      |
| HF5                                                                       | Between Groups | 5.423          | 2   | 2.711       | 2.806 | .064 |
|                                                                           | Within Groups  | 132.370        | 137 | .966        |       |      |
|                                                                           | Total          | 137.793        | 139 |             |       |      |
| HF6                                                                       | Between Groups | 9.196          | 2   | 4.598       | 4.567 | .012 |
|                                                                           | Within Groups  | 137.947        | 137 | 1.007       |       |      |
|                                                                           | Total          | 147.143        | 139 |             |       |      |
| HF7                                                                       | Between Groups | 6.223          | 2   | 3.111       | 3.011 | .050 |
|                                                                           | Within Groups  | 141.570        | 137 | 1.033       |       |      |
|                                                                           | Total          | 147.793        | 139 |             |       |      |

#### 4.2.2.2 Hindrance Factors of MkIS: Firm wise Analysis:

The firm wise analysis of hindrance factors of MkIS on the basis of small and medium scale has also been taken. As shown in table 4.19, all the obstacles are having a little higher mean score and hence deserve attention, but in terms of individual factors the hindrance factor with highest score has been that MkIS can solve all the management problems of planning and control of the business.

| <b>Table 4.19:<br/>Hindrance Factors of MkIS in Firms</b> |      |      |      |      |      |      |      |      |
|-----------------------------------------------------------|------|------|------|------|------|------|------|------|
| Type of Firm                                              |      | HF1  | HF2  | HF3  | HF4  | HF5  | HF6  | HF7  |
| Small Enterprises                                         | Mean | 3.40 | 3.47 | 2.83 | 2.20 | 3.08 | 2.87 | 2.77 |
|                                                           | N    | 124  | 124  | 124  | 124  | 124  | 124  | 124  |
|                                                           | SD   | 1.09 | .91  | 1.18 | 1.08 | 1.00 | 1.03 | 1.01 |
| Medium Enterprises                                        | Mean | 3.18 | 3.31 | 3.00 | 2.56 | 3.18 | 2.75 | 3.06 |
|                                                           | N    | 16   | 16   | 16   | 16   | 16   | 16   | 16   |
|                                                           | SD   | .91  | 1.01 | 1.36 | 1.20 | .98  | 1.00 | 1.12 |
| Total                                                     | Mean | 3.37 | 3.45 | 2.85 | 2.24 | 3.09 | 2.85 | 2.80 |
|                                                           | N    | 140  | 140  | 140  | 140  | 140  | 140  | 140  |
|                                                           | SD   | 1.07 | .92  | 1.19 | 1.09 | .99  | 1.02 | 1.03 |

Diagrammatic representation through Figure 4.13 clearly depicts that HF4-Adequate attention is not given to the quality control aspects of the inputs of MkIS has scored low for small as well as medium enterprises. This reflects that even SMEs have started focusing on quality aspects.



**Figure 4.13: Hindrance Factors of MkIS in Firms**

| Hindrance Factors |                | Sum of Squares | Df  | Mean Square | F    | Sig. |
|-------------------|----------------|----------------|-----|-------------|------|------|
| HF1               | Between Groups | .66            | 1   | .66         | .56  | .452 |
|                   | Within Groups  | 160.27         | 138 | 1.16        |      |      |
|                   | Total          | 160.93         | 139 |             |      |      |
| HF2               | Between Groups | .37            | 1   | .37         | .44  | .508 |
|                   | Within Groups  | 118.36         | 138 | .85         |      |      |
|                   | Total          | 118.74         | 139 |             |      |      |
| HF3               | Between Groups | .40            | 1   | .40         | .28  | .597 |
|                   | Within Groups  | 199.44         | 138 | 1.44        |      |      |
|                   | Total          | 199.85         | 139 |             |      |      |
| HF4               | Between Groups | 1.84           | 1   | 1.84        | 1.53 | .217 |
|                   | Within Groups  | 165.89         | 138 | 1.20        |      |      |
|                   | Total          | 167.74         | 139 |             |      |      |
| HF5               | Between Groups | .16            | 1   | .16         | .16  | .688 |
|                   | Within Groups  | 137.63         | 138 | .99         |      |      |
|                   | Total          | 137.79         | 139 |             |      |      |
| HF6               | Between Groups | .20            | 1   | .20         | .19  | .660 |
|                   | Within Groups  | 146.93         | 138 | 1.06        |      |      |
|                   | Total          | 147.14         | 139 |             |      |      |
| HF7               | Between Groups | 1.17           | 1   | 1.17        | 1.10 | .294 |
|                   | Within Groups  | 146.61         | 138 | 1.06        |      |      |
|                   | Total          | 147.79         | 139 |             |      |      |

On the basis of ANOVA results (Table 4.20), it can be inferred that there is no significant difference between small and medium enterprises regarding the hindrance factors of MkIS. Thus for all the factors, there is an agreement on the basis of scale of firm.

#### **4.3 (Objective 3) Development of an MkIS Model for SMEs:**

The major objective of the present study has been development of an MkIS Model for SMEs, for this the success factors have been taken as the dependent variable. MkIS is the information system which uses information technology to support operations, management and decision-making. Essentially an information system increases productivity and efficiency of an organization. Thus, their function and success rate are very important in day-to-day activity of many organizations.

The success factor in the present study comprises of:

1. The MkIS is integrated into the managerial functions. (SF1)
2. MkIS is an appropriate information processing technology required to meet the data processing. (SF2)
3. MkIS focuses on results and goals. (SF3)
4. MkIS is an user-friendly design. (SF4)
5. MkIS has a basic potential capability to quickly meet new needs of information. (SF5)
6. The MkIS concentrates on developing the information support to manager. (SF6)
7. MkIS design is modified according to the changing information needs. (SF7)

The independent variables for the study have been:

- MkIS Design Characteristics
- Capabilities of MkIS
- Primary Characteristics of MkIS
- Hindrance Factors of MkIS
- MkIS Sophistication

Step-wise Regression Model was applied to find out the relation between dependent and independent variables.

| Table 4.21:<br>MkIS (Marketing Information System) Regression Model |                   |          |                   |                            |                   |          |     |     |               |                 |
|---------------------------------------------------------------------|-------------------|----------|-------------------|----------------------------|-------------------|----------|-----|-----|---------------|-----------------|
| Model                                                               | R                 | R Square | Adjusted R Square | Std. Error of the Estimate | Change Statistics |          |     |     |               | Durbin - Watson |
|                                                                     |                   |          |                   |                            | R Square Change   | F Change | df1 | df2 | Sig. F Change |                 |
| 1                                                                   | .575 <sup>a</sup> | 0.331    | 0.326             | 0.25                       | 0.331             | 68.339   | 1   | 138 | -             | 2.102           |
| 2                                                                   | .641 <sup>b</sup> | 0.41     | 0.402             | 0.23                       | 0.079             | 18.43    | 1   | 137 | .0000         |                 |
| 3                                                                   | .676 <sup>c</sup> | 0.456    | 0.444             | 0.23                       | 0.046             | 11.479   | 1   | 136 | 0.001         |                 |
| 4                                                                   | .702 <sup>d</sup> | 0.493    | 0.478             | 0.22                       | 0.036             | 9.682    | 1   | 135 | 0.002         |                 |
| 5                                                                   | .713 <sup>e</sup> | 0.508    | 0.49              | 0.22                       | 0.016             | 4.255    | 1   | 134 | 0.041         |                 |

\*\*\* p<.001; \*\* p<.01; and \* p < .05

Design Characteristics<sup>a</sup> , Capabilities<sup>b</sup> , Primary Characteristics<sup>c</sup>, Hindrance Factors<sup>d</sup> , Sophistications<sup>e</sup>

The regression model results are highlighted through Table 4.21. The value of correlation is 0.713, co-efficient of determination is 0.508 and adjusted co-efficient of determination is 0.490. Hence, these variables explain 49% of the variation and Durbin-Watson index is 2.102, which is acceptable for the model. The ANOVA results are also significant, which depict the overall significance of the model. Moreover the results of step wise regression depict that value of R<sup>2</sup> has improved from 0.331 to 0.508 with the introduction of all variables. As all variables are significant p≤ 0.01, means the model can include all these predictors with the inclusion of all the factors as the predicting power has improved from 32.6 to 49 percent.

#### 4.3.1 MkIS (Marketing Information System) Model:

| <b>Table 4.22:</b><br><b>Marketing Information System Model</b> |        |           |        |        |         |
|-----------------------------------------------------------------|--------|-----------|--------|--------|---------|
| Predictors                                                      | B      | Std Error | Beta   | T      | P       |
| (Constant)                                                      | 1.624  | 0.398     |        | 4.077  | .001*** |
| Des Characteristics                                             | 0.148  | 0.054     | 0.219  | 2.708  | .008**  |
| Capabilities                                                    | 0.128  | 0.053     | 0.189  | 2.427  | .017**  |
| Primary Characteristics                                         | 0.223  | 0.073     | 0.196  | 3.036  | .003**  |
| Hindrance Factors                                               | -0.176 | 0.06      | -0.214 | -2.956 | .004**  |
| Sophistications                                                 | 0.171  | 0.083     | 0.168  | 2.063  | .041*   |

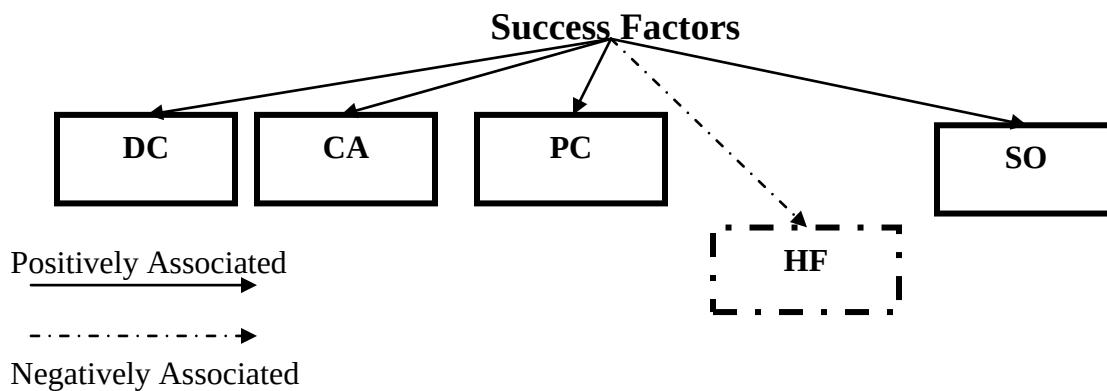
\*\*\* p<.001; \*\* p<.01; and \* p < .05

Table 4.22 depicts the details of independent variables along with B and Beta values. The results verify that success factors of MkIS are positively associated with Design Characteristics, Capabilities, Primary Characteristics and Sophistication. Regarding predicting power Primary Characteristics and Sophistication have higher value of ‘B’ and are relatively more important than other predictors.

As depicted through Table 4.22, the results of regression highlight the following:

1. Value of B for Design Characteristics of MkIS is positive and is 0.148, thus the hypothesis  $H_1$ : *Design Characteristics of MkIS are positively associated with success factors of MkIS Model* has been accepted.
2. Regarding Capabilities of MkIS the value of B is 0.128, and it is positively related with Success Factors of MkIS. Thus the hypothesis  $H_2$ : *Capabilities of MkIS are positively associated with success factors of MkIS Model* has also been accepted.
3. Regarding Primary Characteristics of MkIS the value is 0.223, it is positively associated with success factors of MkIS. Hence, the hypothesis  $H_3$ : *Primary Characteristics of MkIS are positively associated with success factors of MkIS Model* has been accepted.
4. Regarding Hindrance factors as expected the value is negative and is -0.176, thus the hypothesis  $H_4$ : *Hindrance Factors of MkIS are negatively associated with success factors of MkIS Model* has also been accepted.
5. In case of MkIS Sophistication the value of B is positive and is 0.171, thus the hypothesis  $H_5$ : *MkIS Sophistication are positively associated with success factors of MkIS Model* has been accepted.

The Results of the have Regression have been depicted diagrammatically in Figure 4.14.



**Figure 4.14: Results of Regression**



Overall results of regression support the hypothesis assumed for the study. Thus, on the basis of the model, the important predictors of MkIS are :

- MkIS Design Characteristics
- Capabilities of MkIS
- Primary Characteristics of MkIS
- Hindrance Factors of MkIS
- MkIS Sophistications

#### **4.4 (Objective 4) Testing of the MkIS Model in the selected SMEs:**

Case study validation has been done for six firms of which 2 firms producing cutting tools from district Patiala, 2 firms producing sports goods from district Jalandhar and 2 firms producing bicycle components from district Ludhiana respectively. The details and the reasons for inclusion of these firms for validation are given as below:

- Super Hobs from district Patiala. (F1)

The company is with necessary set up to manufacture Cutting Tools. Each Cutting Tool thus manufactured is heat treated by Salt-Bath process which is one of the best methods. It ensures uniform and deep heating, better structure and better Tool life.

- Super Tools from district Patiala. (F2)

The company is formed for manufacture Cutting Tools. The company has developed a mature supply system which has brought them worldwide recognition as a leading Exporter from Patiala in the international market.

- Padmawati Manufacturing from district Jalandhar. (F3)

The company manufacture sports goods by using latest technology. To meet the diverse needs of customers, they export cricket balls in the international markets.

- Dolphin Impex from district Jalandhar. (F4)

The company is formed for the manufacture of sports good, especially cricket bats of international repute.

- Appu International from district Ludhiana. (F5)

The company has a vast range of cycle components. It is manufacturing bicycle handles, frames, forks, carriers and wire baskets and has potential customers like Hero Cycles, Atlas Cycles and many more.

- Omega International from district Ludhiana. (F6).

The company is manufacturing various world class bicycle parts including Freewheels, Bottom Bracket Parts, Pedals and Saddles. The Company has a worldwide recognition and has large number of satisfied customers all over the world.

The basic reason for selecting these firms has been that they are all exporters and specializing in selective products. The basic approach followed here was detailed interview to get inputs on MkIS model. Based on the information collected, a matrix for factors has been prepared. The maximum possible score for any factor of variable is 30 when added for all firms. The average score at a scale of 5 have also been calculated and mentioned against each factor.

As all the factors emerged as important predictors from regression model, so all these factors have been considered for MkIS Model:

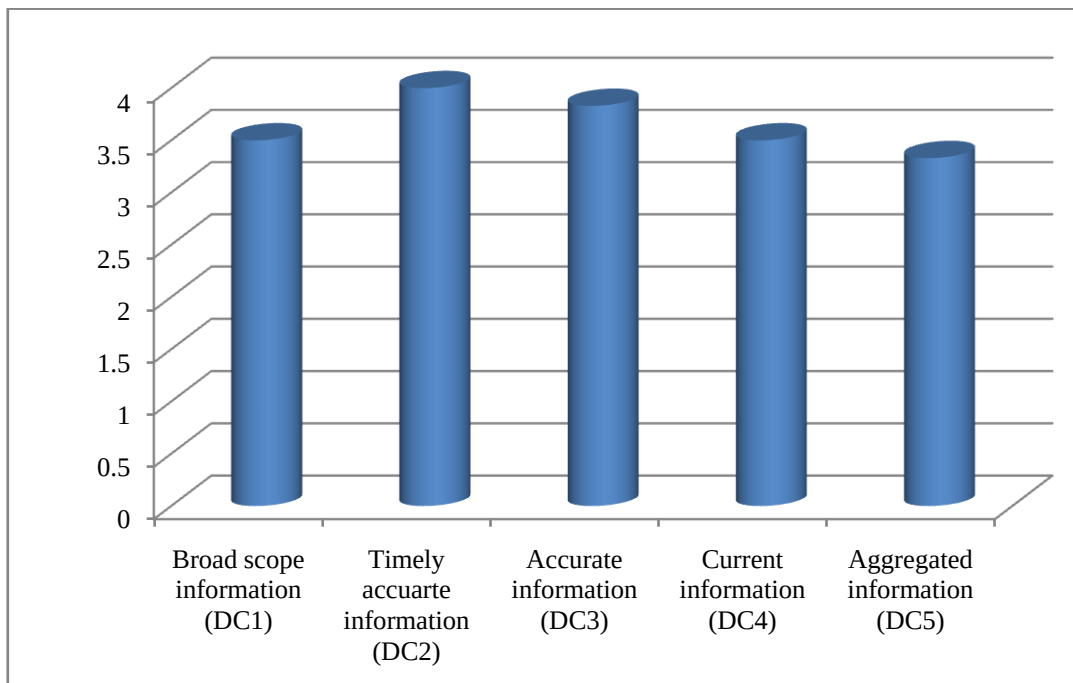
- MkIS Design Characteristics,
- Capabilities of MkIS,
- Primary Characteristics of MkIS,
- Hindrance Factors of MkIS ,
- MkIS Sophistication.

#### **4.4.1 MkIS Design Characteristics:**

As shown through Table 4.23, importance accorded by the firms to different initiatives in context to MkIS Design characteristics with the highest priority is DC2-Timely information and followed by DC3- Accurate information in all six firms representing cutting tools, sports goods and bicycle components respectively.

| <b>Table 4.23:<br/>MkIS Design Characteristics- Study of 6 Manufacturing Firms</b> |    |    |    |    |    |    |                  |                    |
|------------------------------------------------------------------------------------|----|----|----|----|----|----|------------------|--------------------|
| Design Characteristics                                                             | F1 | F2 | F3 | F4 | F5 | F6 | Total of 6 Firms | Average of 6 Firms |
| DC1                                                                                | 5  | 5  | 3  | 2  | 2  | 4  | 21               | 3.5                |
| DC2                                                                                | 4  | 4  | 3  | 5  | 3  | 5  | 24               | 4                  |
| DC3                                                                                | 5  | 4  | 4  | 3  | 3  | 4  | 23               | 3.83               |
| DC4                                                                                | 5  | 3  | 3  | 4  | 4  | 2  | 21               | 3.5                |
| DC5                                                                                | 4  | 3  | 4  | 1  | 5  | 3  | 20               | 3.33               |

Figure 4.15 depicts the Preferences regarding MkIS Design Characteristics based average of these six firms.



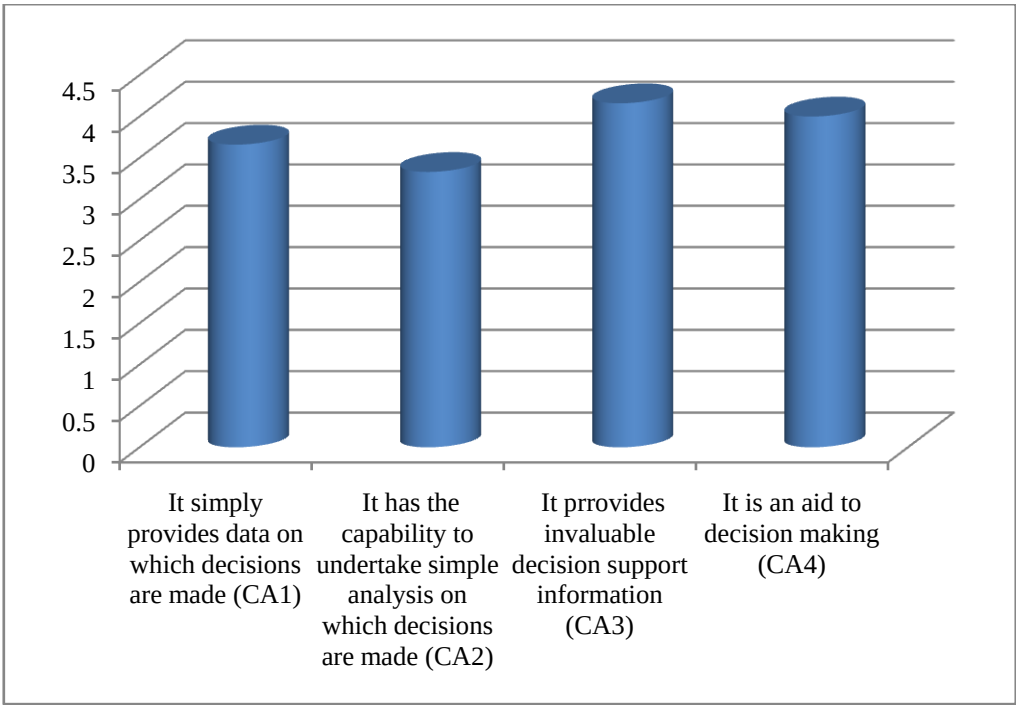
**Figure 4.15: Preferences regarding MkIS Design Characteristics**

#### 4.4.2 Capabilities of MkIS:

| <b>Table 4.24:<br/>Capabilities of MkIS- Study of 6 Manufacturing Firms</b> |    |    |    |    |    |    |                  |                    |
|-----------------------------------------------------------------------------|----|----|----|----|----|----|------------------|--------------------|
| Capabilities of MkIS                                                        | F1 | F2 | F3 | F4 | F5 | F6 | Total of 6 Firms | Average of 6 Firms |
| CA1                                                                         | 4  | 4  | 3  | 5  | 2  | 4  | 22               | 3.66               |
| CA2                                                                         | 4  | 3  | 4  | 1  | 3  | 5  | 20               | 3.33               |
| CA3                                                                         | 5  | 5  | 4  | 3  | 4  | 4  | 25               | 4.16               |
| CA4                                                                         | 4  | 4  | 5  | 4  | 3  | 4  | 24               | 4.00               |

As highlighted through Table 4.24, importance accorded by the firms to different initiatives in context to Capabilities of MkIS, the highest priority has been given to CA3-MkIS provides sophisticated analysis of data, and therefore provides invaluable decision support information. The next on priority is CA4- MkIS has the ability to make recommendations, if so required, as an aid to decision making for all six firms representing the three sectors, viz. cutting tools, sports goods and bicycle components respectively.

Figure 4.16 depicts the Preferences regarding Capabilities of MkIS based average of these six firms.

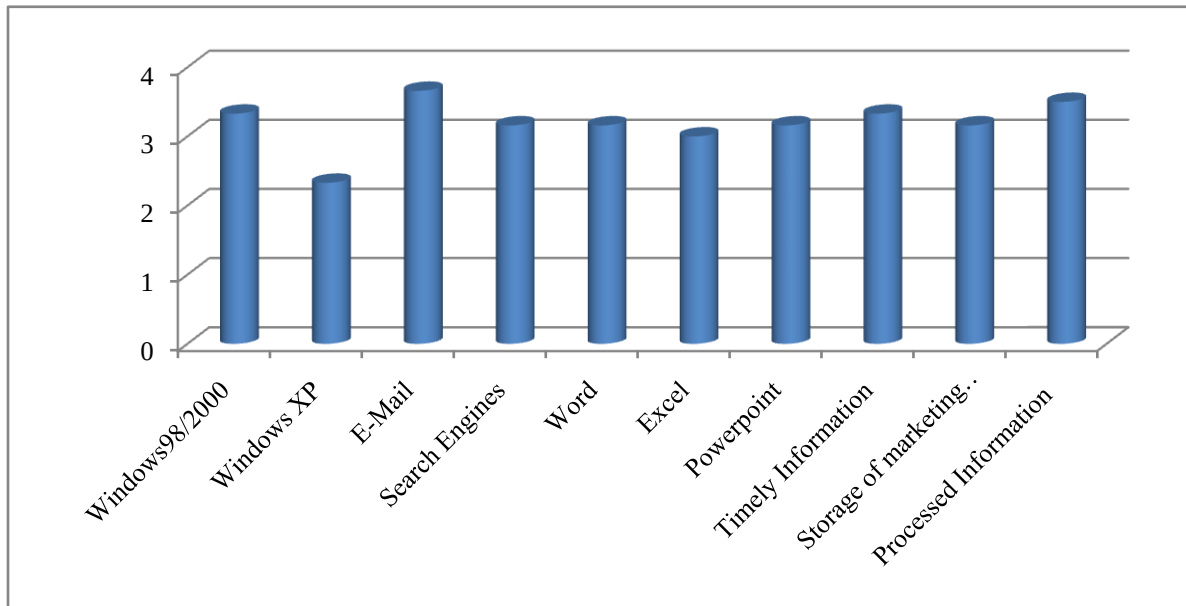


**Figure 4.16: Preferences regarding Capabilities of MkIS**

#### 4.4.3 Primary Characteristics of MkIS:

| <b>Table 4.25:<br/>Primary Characteristics of MkIS – Study of 6 Manufacturing Firms</b> |    |    |    |    |    |    |                  |                    |
|-----------------------------------------------------------------------------------------|----|----|----|----|----|----|------------------|--------------------|
| Primary Characteristics                                                                 | F1 | F2 | F3 | F4 | F5 | F6 | Total of 6 Firms | Average of 6 Firms |
| PC1                                                                                     | 2  | 3  | 3  | 4  | 4  | 4  | 20               | 3.33               |
|                                                                                         | 2  | 2  | 2  | 2  | 3  | 3  | 14               | 2.33               |
| PC2                                                                                     | 4  | 4  | 4  | 3  | 4  | 3  | 22               | 3.66               |
|                                                                                         | 4  | 4  | 3  | 4  | 2  | 2  | 19               | 3.16               |
| PC3                                                                                     | 4  | 4  | 3  | 4  | 2  | 2  | 19               | 3.16               |
|                                                                                         | 4  | 3  | 2  | 3  | 3  | 3  | 18               | 3.00               |
|                                                                                         | 4  | 3  | 3  | 3  | 4  | 2  | 19               | 3.16               |
| PC4                                                                                     | 4  | 4  | 2  | 4  | 4  | 2  | 20               | 3.33               |
| PC5                                                                                     | 2  | 3  | 4  | 5  | 1  | 4  | 19               | 3.16               |
| PC6                                                                                     | 4  | 4  | 4  | 3  | 3  | 3  | 21               | 3.5                |

As suggested through Table 4.25, importance accorded by the firms to different initiatives in context to Primary characteristics of MkIS with the highest priority is that of Emails through internet and followed by processed information which is maintained in the database in all six firms representing cutting tools, sports goods and bicycle components respectively.



**Figure 4.17: Preferences regarding Primary Characteristics of MkIS**

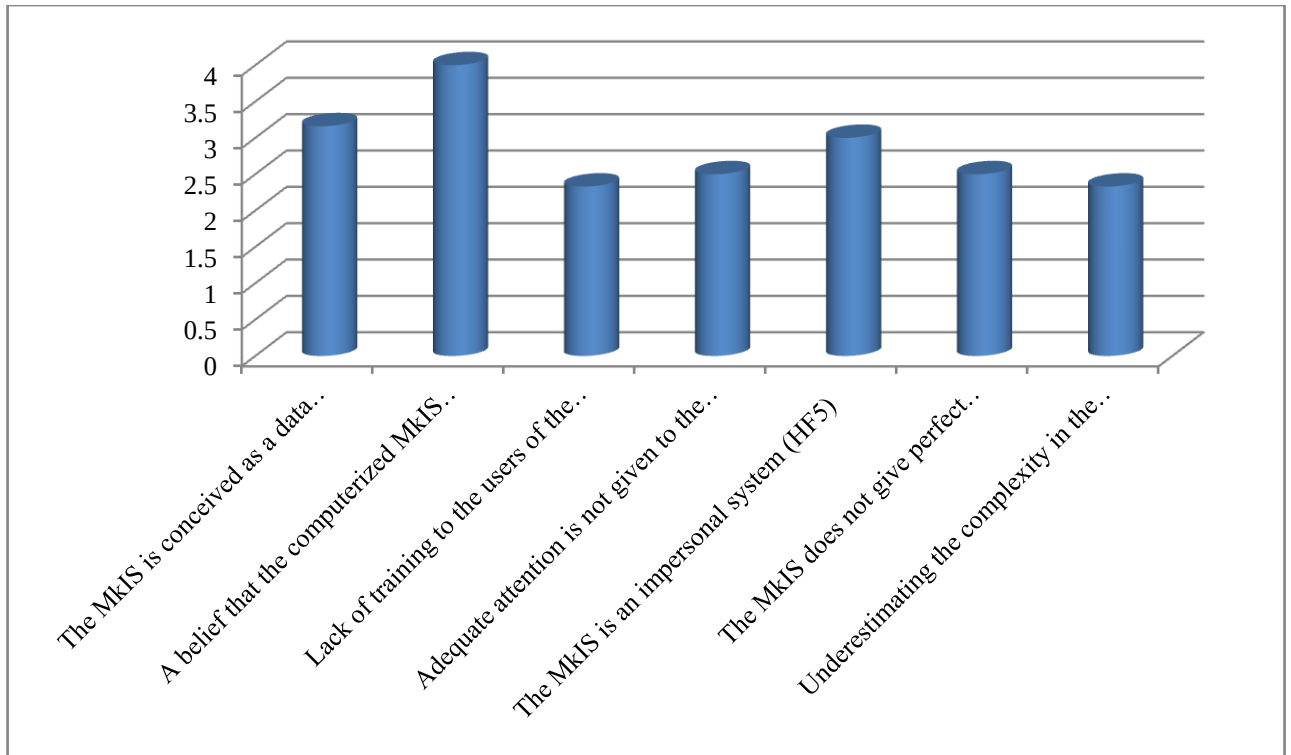
As depicted graphically through Figure 4.17 Windows 98/2000 in PC1-operating system, e-mail in PC2- in Internet and MS word in PC3- Applications possessed high usage and top ranks. In access, storage and processing of information all are important, but processing had higher average and preference.

#### 4.4.4 Hindrance Factors of MkIS:

| <b>Table 4.26:<br/>Hindrance Factors of MkIS – Study of 6 Manufacturing Firms</b> |    |    |    |    |    |    |                  |                    |
|-----------------------------------------------------------------------------------|----|----|----|----|----|----|------------------|--------------------|
| Hindrance Factors of MkIS                                                         | F1 | F2 | F3 | F4 | F5 | F6 | Total of 6 Firms | Average of 6 Firms |
| HF1                                                                               | 3  | 2  | 3  | 3  | 3  | 5  | 19               | 3.16               |
| HF2                                                                               | 4  | 3  | 3  | 5  | 4  | 5  | 24               | 4.00               |
| HF3                                                                               | 1  | 2  | 2  | 2  | 5  | 2  | 14               | 2.33               |
| HF4                                                                               | 2  | 3  | 2  | 1  | 5  | 2  | 15               | 2.5                |
| HF5                                                                               | 2  | 3  | 3  | 4  | 3  | 3  | 18               | 3.00               |
| HF6                                                                               | 2  | 4  | 2  | 3  | 2  | 2  | 15               | 2.50               |
| HF7                                                                               | 1  | 2  | 2  | 4  | 3  | 2  | 14               | 2.33               |

As reflected in Table 4.26, the most critical Hindrance factor of MkIS is HF2-computerized MkIS can solve all the management problems of planning and control of the business in the business systems respectively. Next critical factor drawing immediate attention has been HF1- MkIS is conceived as a data processing and not as an information processing system. This is true for all six firms representing all sectors, i.e., cutting tools, sports goods and bicycle components respectively.

Figure 4.18 depicts the Preferences regarding Hindrance Factors of MkIS based average of these six firms.

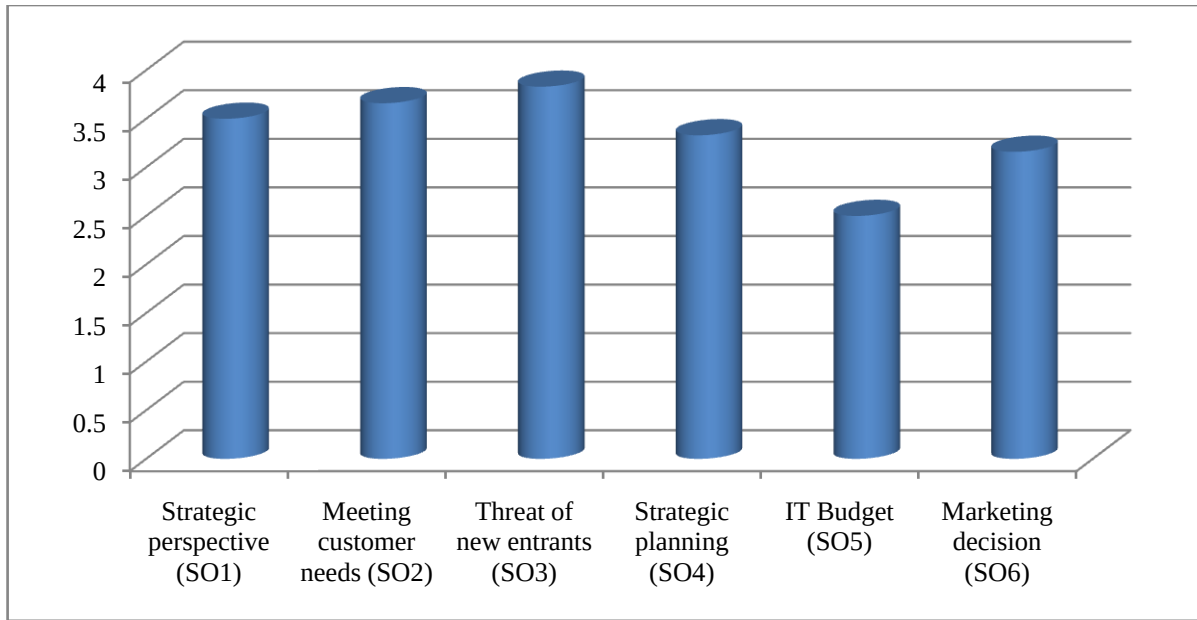


**Figure 4.18: Preferences regarding Hindrance Factors of MkIS**

#### 4.4.5 MkIS Sophistication:

| <b>Table 4.27:<br/>MkIS Sophistication – Study of 6 Manufacturing Firms</b> |    |    |    |    |    |    |                  |                    |
|-----------------------------------------------------------------------------|----|----|----|----|----|----|------------------|--------------------|
| MkIS Sophistication                                                         | F1 | F2 | F3 | F4 | F5 | F6 | Total of 6 Firms | Average of 6 Firms |
| SO1                                                                         | 4  | 3  | 3  | 5  | 3  | 3  | 21               | 3.5                |
| SO2                                                                         | 3  | 4  | 4  | 3  | 4  | 4  | 22               | 3.66               |
| SO3                                                                         | 3  | 3  | 3  | 4  | 5  | 5  | 23               | 3.83               |
| SO4                                                                         | 3  | 4  | 4  | 2  | 4  | 3  | 20               | 3.33               |
| SO5                                                                         | 2  | 2  | 3  | 3  | 2  | 3  | 15               | 2.5                |
| SO6                                                                         | 4  | 3  | 4  | 4  | 1  | 3  | 19               | 3.16               |

Table 27, shows the importance accorded by the companies to Factors Underlying MkIS Sophistication. The factor with the highest priority is SO3- threat to new entrants. Next in priority is SO2- meeting customer needs. The same has been depicted graphically through Figure 4.19



**Figure 4.19: Preferences regarding MkIS Sophistication**

Thus, on the basis of personal interviews of the six firms selected for case study analysis the preferences regarding the critical factors for Success of MkIS were calculated on the basis of matrices for factors. These preferences have been graphically depicted through figures 4.15-4.19. Next step of research is to synthesize survey based analysis with case study analysis. The next section 4.5 deals with this.

#### **4.5 Synthesis of Survey Based Results and Case Study Analysis:**

This section deals with synthesis of the survey based results of 140 SMEs of Punjab from Patiala for Cutting Tools (30 Units), Jalandhar for Sports Goods (50 Units) and Ludhiana for Bicycle Components (60 Units) respectively and also Case study analysis of six firms of which 2 firms producing Cutting Tools from District Patiala, 2 firms producing Sports Goods from District Jalandhar and 2 firms producing Bicycle Components from District Ludhiana respectively. The synthesis is for highlighting success factor of MkIS from the three sectors, i.e., cutting tools, sports goods and bicycle components.

The factors influencing the success of MkIS Model are:

- MkIS Design Characteristics,



- Capabilities of MkIS,
- Primary Characteristics of MkIS,
- Hindrance Factors of MkIS ,
- MkIS Sophistication.

#### **4.5.1 MkIS Design Characteristics:**

According to survey based results for MkIS Design Characteristics for the three sectors, i.e., cutting tools, sports goods and bicycle components have given high priority to Accurate Information; followed by the Timely Information. Thus in terms of design characteristics of MkIS, the above two are considered extremely important.

On the basis of case study analysis, the importance accorded by the companies to different initiatives in context to MkIS Design Characteristics is Timely Information; followed by the Accurate Information in all the three sectors, i.e., cutting tools, sports goods and bicycle components respectively.

Hence, DC3-Accurate Information and DC2-Timely Information are the top priorities amongst the MkIS Design Characteristics in both Survey Based Results and Case Study Analysis respectively.

#### **4.5.2 Capabilities of MkIS:**

Survey result highlights that in terms of Capabilities of MkIS, respondents of all three sectors, i.e., cutting tools, sports goods and bicycle components have accorded high priority to sophisticated analysis of data which has an ability to make recommendations as an aid to decision making; followed by that it provides sophisticated analysis of data, having the ability to provide invaluable decision support information.

Case Study analysis highlights that the importance accorded by the companies to different initiatives in context to Capabilities of MkIS also favored CA3-providing sophisticated analysis of data, and therefore provides invaluable decision support information and CA4-sophisticated analysis of data which has an ability to make recommendations as an aid to

decision making for six firms from cutting tools, sports goods and bicycle components respectively.

It is analysed that CA4-sophisticated analysis of data which has an ability to make recommendations as an aid to decision making and CA3-MkIS provides sophisticated analysis of data, and therefore provides invaluable decision support information are the top priorities amongst the Capabilities of MkIS in the Survey Based Results and Case Study Analysis respectively.

#### **4.5.3 Primary Characteristics of MkIS:**

In Primary Characteristics of MkIS, survey based analysis indicates the Windows 98/2000 as an operating system has higher preference, Email as an Internet has been accorded greater usage and Word as an application found preference in all the three sectors. Also processed information maintained in the database (e.g. sales forecasts, market share, distribution trend, etc.) has a good preference amongst all the sectors.

In terms of Case Study analysis, the importance accorded by the companies to different initiatives in context to Primary Characteristics of MkIS is Windows 98 as an operating system was preferred to Windows XP, Email as an Internet scored higher usage and Word as an application was preferred in all the three sectors. The next prioritized characteristic is processed information (e.g., sales forecasts, market share, distribution trend, etc.) which is maintained in the database in all the three sectors, i.e., cutting tools, sports goods and bicycle components respectively. Thus there was a consensus regarding these factors.

#### **4.5.4 Hindrance Factors of MkIS:**

There has been a consensus regarding the first two critical hindrance factors on the basis of Survey based results and Case study analysis and these two factors are:

- A belief that the computerized MkIS can solve all the management problems of planning and control of the business.
- The MkIS is conceived as a data processing and not as an information processing system.

#### 4.5.5 MkIS Sophistication:

In terms of Survey based results for MkIS Sophistication in three sectors, i.e., cutting tools, sports goods and bicycle components, highest priority has been accorded to SO2-meeting customer needs. The next prioritized factor is SO3- threat to new entrants. Thus in terms MkIS Sophistication, the above two are considered extremely important. Case Study analysis also highlights the same results.

Thus, it is analysed that meeting customer needs and threat to new entrants are the top prioritized factors amongst the MkIS Sophistication.

The synthesis for highlighting success factor of MkIS Model with the top prioritized factors (Mean Score) amongst each variable of MkIS from the three sectors, i.e., cutting tools, sports goods and bicycle components is shown in Figure 4.20.

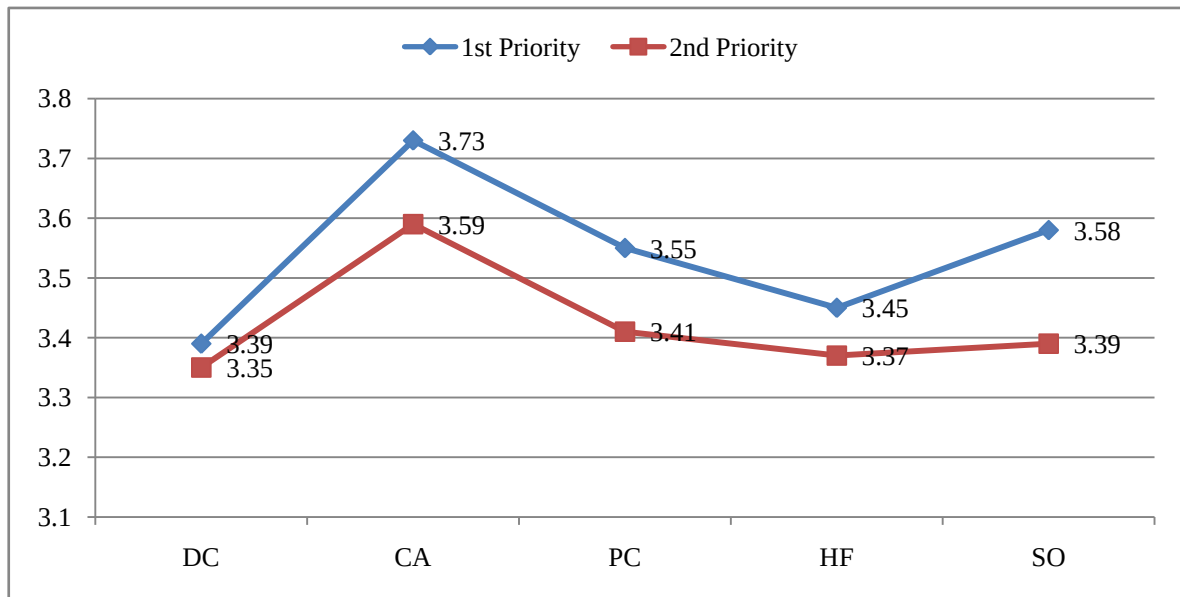
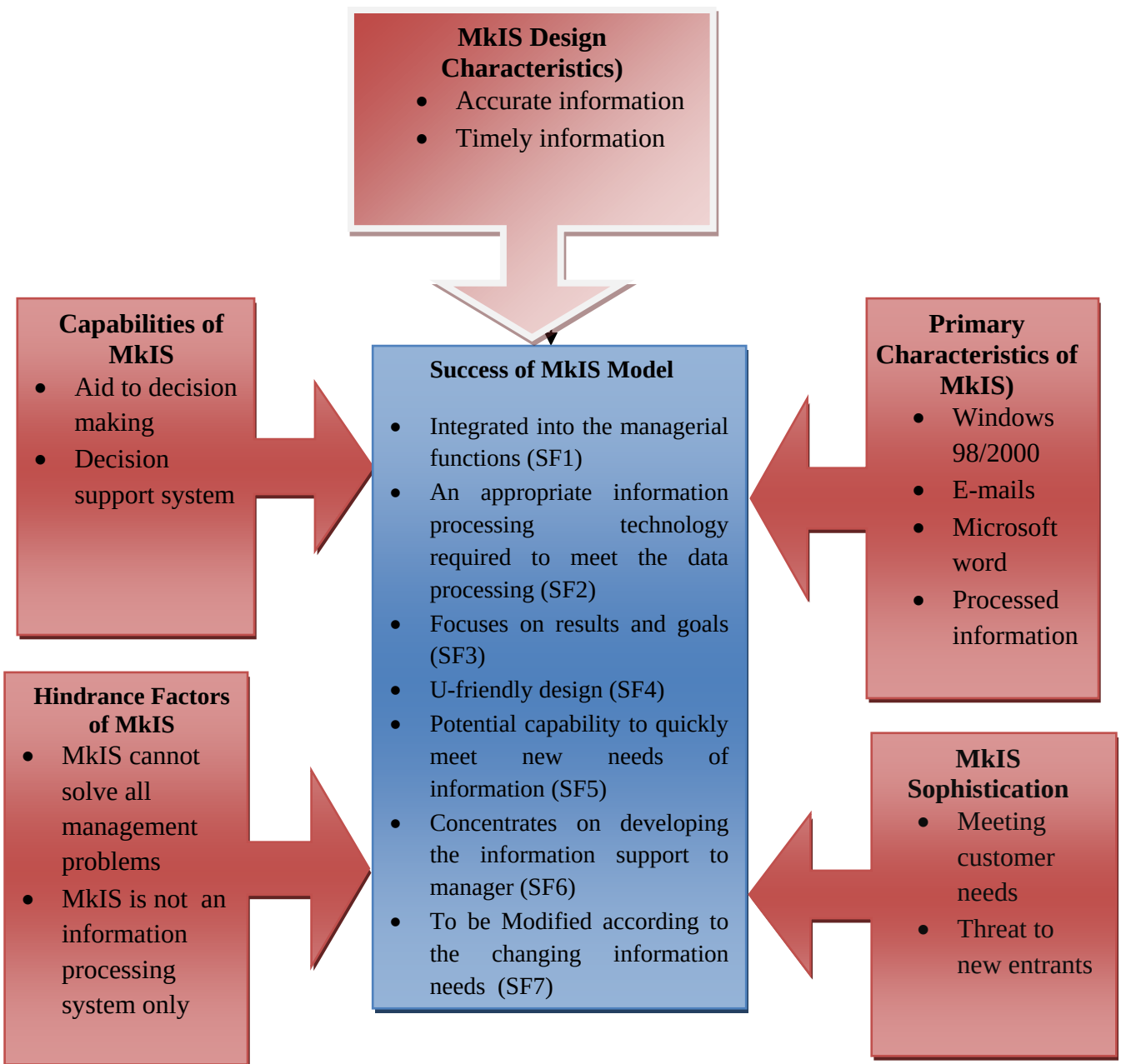


Figure 4.20: Synthesis of Marketing Information System Model

#### 4.6 Framework of Marketing Information System (MkIS) Model:

As depicted through Figure 4.21, Framework of MkIS Model developed with top prioritized factors of each variables of MkIS in three sectors viz. cutting tools, sports goods and bicycle

components based on synthesis of survey based results of 140 SMEs and case study analysis of six firms viz. Super Hobs from district Patiala (F1), Super Tools from district Patiala (F2), Padmawati Manufacturing from district Jalandhar (F3), Dolphin Impex from district Jalandhar. (F4), Appu International from district Ludhiana (F5) and Omega International from district Ludhiana (F6) . The framework highlights the areas where SMEs need to focus for overall Success of MkIS Model.



**Figure 4.21: Framework of Marketing Information System Model**

#### **4.7 Chapter Summary:**

This Chapter is based upon the analysis of research survey for the three sectors, i.e., cutting tools, sports goods and bicycle components and two types of firms, i.e., small and medium enterprises respectively. MkIS Model has been developed and further it is tested with a case study validation and further synthesis of the survey based results and case study analysis has been done for developing a Framework of MkIS Model from the three sectors, i.e., cutting tools, sports goods and bicycle components.

## **CHAPTER-V**

### **CONCLUSIONS, LIMITATIONS AND SCOPE FOR FURTHER STUDY**

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The present chapter aims to recollect the various phases of the study. Summary of the research with the major findings has also been presented. Answers to the research questions have been included in this chapter along with the implications of the study. Research contributions from this work have been listed and limitations of the study have also been pointed out. Recommendations based on the study along with the future work directions have also been incorporated in this chapter.

#### **5.1 Major Findings of the Study:**

The literature review as well as the study has provided an insight into a number of important issues and aspects of MkIS of manufacturing SMEs. The study uses a survey analysis for 140 manufacturing SMEs of Punjab in India to learn about the level of MkIS by firms with the objective to develop an MkIS Model. The study has been conducted in Punjab from the following districts: Patiala for Cutting Tools (30 Units), Jalandhar for Sports Goods (50 Units) and Ludhiana for Bicycle Components (60 Units) respectively. Further the size-wise sample has 124 small enterprises and 16 medium enterprises respectively. Punjab is a progressive state of India with an average growth rate of 10 per cent. Punjab has been ranked as one of the growing states of India.

The major findings of the study are: The critical factors considered for MkIS Model are: Design characteristics of MkIS, Capabilities of MkIS, Primary characteristics of MkIS and MkIS sophistication. The highest priority for the success factors is accorded to SF3- MkIS focuses on results and goals. This has been accepted by sample firms of all three sectors and also by both small and medium enterprises. All the success factors have a combined average of 3.27 considering all 140 SMEs from three sectors. SF3-MkIS is an user-friendly system got the highest priority in case of sports goods category. SF5-MkIS has a basic potential capability to quickly meet new needs of information had the highest rating among success factors considered in the sample medium scale enterprises. ANOVA results highlight that

there is a significant difference between small and medium enterprises regarding only one success factor, i.e., SF7-MkIS design modified according to the changing information needs. For all other six factors there is a consensus. Thus, all seven success factors have been included in MkIS design.

All the hindrance factors have high mean score and hence deserve attention, but in terms of individual factor the highest priority in all the three sectors has been accorded to HF2-SMEs do not believe that computerized MkIS can solve all the management problems of planning and control of the business. ANOVA results highlight that there is a significant difference between the three sectors viz. cutting tools, sports goods and bicycle components in case of the following three hindrance factors of MkIS: (i) HF4- Adequate attention is not given to the quality control aspects of the inputs of MkIS, (ii) HF6-MkIS does not give perfect information to all the users in the organization; and (iii) HF7- Underestimating the complexity in the business systems.

In terms of design characteristics of MkIS sample firms from all sectors and both categories have given high priority to DC3- accurate information and DC2- Timely information. On the basis of ANOVA results, it can be inferred that there is no significant difference between small and medium enterprises regarding the design characteristics of MkIS.

CA4-Analysis of data which has an ability to make recommendations as an aid to decision making has gained the highest preference in case of firms from all three sectors and both small and medium enterprises in terms of capabilities of MkIS. CA1-Providing of data on which decisions are made got the lowest priority in case of capabilities of MkIS amongst all the sectors. ANOVA results highlight that there is a significant difference between small and medium enterprises regarding the capabilities of MkIS for only one factor, viz. CA4-analysis of data which has the ability to make recommendations, if so required, as an aid to decision making.

Sector-wise results and scale-wise analysis yielded that in terms of primary characteristics of MkIS Windows 98 as an operating system, e-mail as an internet and Word as an application

found preference. Processed information (e.g., sales forecasts, market share, distribution trend, etc.) maintained in the database has a higher score than information and storage.

All the factors are having a little higher mean score, but the meeting customer needs (SO2) has the highest priority amongst the three sectors for MkIS sophistication. Strategic perspective (SO1) is the least preferred factor of the MkIS sophistication amongst all the sectors.

The regression model results with success factors of MkIS as dependent variable and Critical factors, viz. Design characteristics, capabilities of MkIS, Primary characteristics, hindrance factors, and MkIS sophistication as independent variable yielded that 49 percent of variation has been explained by these variables. Further in case of regression the ANOVA results are also significant, which depict the overall significance of the model.

Case study validation has been done for six firms of which 2 firms producing cutting tools from district Patiala, 2 firms producing sports goods from district Jalandhar and 2 firms producing bicycle components from district Ludhiana respectively to understand whether the results that emerged from survey could be true for these six firms specializing in products from three sectors included in the sample. Synthesis of the survey based results of 140 SMEs and case study analysis is done, to design a framework for MkIS success, with topmost two factors from each critical factor.

## **5.2 Revisiting the objectives:**

It is necessary to revisit the research objectives to see whether the study has been able to accomplish the same.

The first objective of the present research has been: to identify the critical factors for the development of MkIS Model for the selected manufacturing SMEs of Punjab.



On the basis of literature the following four critical factors have been identified for the development of MkIS Model for the selected manufacturing SMEs of Punjab.

- MkIS Design Characteristics,
- Capabilities of MkIS,
- Primary Characteristics of MkIS,
- MkIS Sophistication.

In the first objective descriptive statistics and ANOVA has been used across the different levels of firms on the basis of nature of Industry across the three sectors, i.e., cutting tools, sports goods and bicycle components. The study also covers scale wise analysis based on two categories viz. small and medium firms.

Overall results for MkIS Design Characteristics highlight that all sub factors viz. Broad Scope Information (DC1), Timely Information (DC2), Accurate Information (DC3), Current Information (DC4) and Aggregated Information (DC5) should be included in the MkIS model. Another important finding is that Timely Information (DC2) and Accurate Information (DC3) have been rated relatively high by small as well as medium scale firms and by firms from all three sectors. These results are corroborated by earlier studies. According to Rolf et al., (1997) all marketing efforts are based on the basic premise that there is a specific consumer audience. Consumers, in the present context, are a set of specific firms within an industry which have needs that can be filled by other firms operating within a specific market. The design of such information, databases, etc. often determines their successful use.

Summing up for Capabilities of MkIS, it can be said that sector wise and scale-wise analysis of firms highlight the following capabilities scoring high: MkIS provides sophisticated analysis of data which has the ability to make recommendations, if so required, as an aid to decision making (CA4). MkIS provides sophisticated analysis of data which provides invaluable decision support information (CA3).

Earlier literature has highlighted this. According to Garry et al., (2007) technology-focused industries are widely viewed as critical to success. Increasingly, in emerging economies technology-focused industries and the management of knowledge are also viewed as important aid to decision making for moving towards emerging markets.

In Primary Characteristics of MkIS, survey based analysis indicates the Windows 98 as an operating system (PC1) has higher preference, Email as an Internet (PC2) has been accorded greater usage and Word as an application(PC3) found preference in all the three sectors. Processed information (PC6) maintained in the database (e.g. sales forecasts, market share, distribution trend, etc.) has a good preference amongst sector wise and scale-wise analysis of firms. According to Margi and Philip (1997) organizations take preemptive action to gain competitive through internet which make them more flexible and able to respond to opportunities in the market and hence enhance their business.

MkIS Sophistication amongst sector wise and scale-wise analysis of firms has given the highest priority to meeting customer needs (SO2). The next prioritized factor is threat to new entrants (SO3). Christopher (2000) expressed that sophisticated technologies are finding needs of customer in an ever-growing number of products. As high-technology applications proliferate, their use and development is no longer associated only with large companies, universities, and national laboratories. Many small companies compete on the basis of high technology products, processes and materials.

The second objective of the present research has been: to analyse the success and hindrance factors for implementation of the MkIS Model.

The present study uses a five point Likert scale to find the prioritization for success factors and hindrance factors of MkIS model. The second objective of the study deals with success and hindrance factors for implementation of the MkIS Model.

Comparative analysis of three sectors as highlighted through figure 4.9 clearly reflects: For the first factor, viz. MkIS is integrated into the managerial functions (SF1), there is almost

similar mean score ranging from 3.17 to 3.20. Hence, it is considered very vital for sample firms in all sectors. Regarding the next factor, i.e., MkIS is an appropriate information processing technology required to meet the data processing (SF2), all sectors have rated it high and thus it is also considered important for all sectors. In case of MkIS focusing on results and goals (SF3) cutting tools sector and Bicycle components have rated it with highest score. Regarding the fourth factor, i.e., MkIS is a user-friendly design (SF4), there is a difference in perception of the sample firms. The sports goods sector has rated it with highest score of 3.52, while bicycle components have given the least priority to it. Sample firms from all sectors viz. cutting tools, sports goods and bicycle components have similar mean scores for the fifth and sixth success factors respectively, viz. MkIS has a basic potential capability to quickly meet new needs of information (SF5); and MkIS concentrates on developing the information support to manager (SF6). In the seventh success factor of MkIS, viz. MkIS design is modified according to the changing information needs (SF7) for sports goods category, the mean score is relatively less than the other two categories of firm.

In terms of overall average, highest priority has been given to third factor i.e., MkIS focuses on results and goals; followed by second factor i.e., MkIS is an appropriate information processing technology required to meet the data processing. According to Terrence et al., (2009) appropriate information processing technology is considered very important for the success of business as it focuses more on results and goals.

All the success factors have a combined average of 3.27, as depicted through figure 4.10 showing individual average score of all 140 SMEs representing three sectors, cutting tools, sports goods and bicycle components. The firms have a consistency regarding the success factors for MkIS, as there are only a few points on the extreme and those are also towards the higher end.

ANOVA results highlight that there is a significant difference between small and medium enterprises regarding the success factor SF7-MkIS for the design which is modified according to the changing information need. For all other factors there is a consensus and hence all the variables have been included in MkIS design.

The results as shown in Table 4.17 indicate that all the hindrance factors are having a high mean score and hence cannot be ignored. The mean score of bicycle components is higher than other two categories i.e. cutting tools and sports goods for the first hindrance factor of MkIS, HF1-MkIS is conceived as a data processing and not as an information processing system. The mean score is similar in all the three categories of the firm viz. cutting tools, sports goods and bicycle components for the second hindrance factor of MkIS, HF2- MkIS can solve all the management problems of planning and control of the business. Sports goods sector is predominantly having higher score for HF3- Lack of training to the users of the information.

Mean score is highest for bicycle components for the fourth factor, HF4-Adequate attention is not given to the quality control aspects of the inputs of MkIS. Sports goods category has the highest mean for the fifth hindrance factor of MkIS HF5- MkIS is an impersonal system. All the three categories of the firm viz. cutting tools, sports goods and bicycle components have similar mean scores for the sixth factor, HF6- MkIS does not give perfect information to all the users in the organization and for the seventh factor, HF7- Underestimating the complexity in the business systems . In terms of overall average, MkIS with the highest priority has been accorded to HF2-Computerized MkIS can solve all the management problems of planning and control of the business in the business systems respectively and followed by MkIS is not as an information processing system in all the three sectors, i.e., cutting tools, sports goods and bicycle components respectively. According to Mario and

Heiko (2010) many problems such as lacking strategy and vision, low educational levels, inadequate social capital, lack of training to the users of the information attribute to the failure of SMEs. All the hindrance factors have high mean score and hence deserve attention but in terms of individual factor the highest belief in all the three sectors is that the computerized MkIS can solve all the management problems of planning and control of the business (HF2).

As shown in Table 4.18, the ANOVA results highlight that there is a significant difference between the three sectors viz. cutting tools, sports goods and bicycle components in case of

the following three hindrance factors of MkIS: (a) HF4- Adequate attention is not given to the quality control aspects of the inputs of MkIS, (b) HF6- MkIS does not give perfect information to all the users in the organization and (c) HF7- Underestimating the complexity in the business systems.

Although ANOVA results highlight that there is a difference of opinion in case of different sectors regarding hindrance factors, but as all these factors have a high mean score, specifying they are considered critical by all sectors, thus all have been included for regression model for MkIS success.

The third objective of the present research was to develop a model for MkIS in the selected SMEs of Punjab.

For the development of an MkIS Model for SMEs, success factors have been taken as the dependent variable. Independent variables included in the present study are:

- MkIS Design Characteristics
- Capabilities of MkIS
- Primary Characteristics of MkIS
- Hindrance Factors of MkIS
- MkIS Sophistication

Step-wise Regression Model was applied to find out the relation between dependent and independent variables.

The regression model results are highlighted through Table 4.21. The value of correlation is 0.713, co-efficient of determination is 0.508 and adjusted co-efficient of determination is 0.490. Hence, these variables explain 49% of the variation and Durbin-Watson index is 2.102, which is acceptable for the model. The ANOVA results are also significant, which depict the overall significance of the model. Moreover the results of step wise regression depict that value of R<sup>2</sup> has improved from 0.331 to 0.508 with the introduction of all variables. As all variables are significant  $p \leq 0.01$ , means the model can include all these

predictors with the inclusion of all the factors as the predicting power has improved from 32.6 to 49 percent.

Table 4.22 depicts the details of independent variables along with B and Beta values. The results verify that success factors of MkIS are positively associated with MkIS Design Characteristics, Capabilities of MkIS, Primary Characteristics of MkIS and MkIS Sophistication. The results also verify that success factors of MkIS are negatively associated with Hindrance Factors of MkIS. Regarding predicting power Primary Characteristics and Sophistication have higher value of 'B' and are relatively more important than other predictors.

The fourth objective of the present research was to test the proposed MkIS Model in the selected SMEs.

Case study validation has been done for six firms of which 2 firms producing cutting tools from district Patiala, 2 firms producing sports goods from district Jalandhar and 2 firms producing bicycle components from district Ludhiana respectively. As depicted through Figure 4.21, Framework of MkIS Model developed with top prioritized factors of each variable of MkIS in three sectors, viz. cutting tools, sports goods and bicycle components based on synthesis of survey based results of 140 SMEs and case study analysis of six firms viz. Super Hobs from district Patiala (F1), Super Tools from district Patiala (F2), Padmawati Manufacturing from district Jalandhar (F3), Dolphin Impex from district Jalandhar (F4), Appu International from district Ludhiana (F5) and Omega International from district Ludhiana (F6). The framework highlights the areas where SMEs need to focus for overall Success of MkIS Model.

### **5.3 Implications of the study:**

The findings of this study have significant implications for the manufacturing SMEs of Punjab. Based on the findings of study, the following policy implications can be offered:

Success of MkIS is accepted by SMEs of Punjab, but still the performance in terms of concentration on developing the information support to manager is low and needs to be improved. Focus has to be concentrated on the MkIS for the integration into the managerial functions. Like any other organization, the managers in the SMEs get an important support in their decision-making, the study would help sensitize the SMEs towards making them aware about the importance and the improvement areas in their MkIS. E-Mail as an internet has a highest usage but more accurate and current information is required to use internets for bridging the time gaps and delays. Meeting customer needs is the highest priority and it is important for manufacturing SMEs of Punjab to fulfill the requirements of those by having advanced processed information system maintained. As the computerization amongst the SMEs of Punjab is fast catching up, awareness of MkIS would enable the adaptation of new technology in general and MkIS in specific. This will help enhance global competitiveness and improve the productivity environment of manufacturing SMEs. The regular and continuous evaluation of MkIS could be done in a regular and positive manner in order to sustain the effectiveness with respect to business needs, and stay ahead of the competitors. The model suggested could be applied or tested for its applicability across various organizations of different domain and could help in setting the standards for others to follow.

#### **5.4 Limitations of the study:**

Like most research, a study can hardly be perfect. As such, this study has limitations. However, these limitations also present opportunities for future research. The main limitation of the study is its limited scope in terms of the coverage, as the present study has focused mainly on the development of a model for the MkIS in selected SMEs. The study covers only three sectors viz. cutting tools, sports goods and bicycle components respectively. Further the study has been carried out only in a few districts of Punjab state in India. The proposed model for MkIS in this study has been validated by taking only six firms representing all the three sectors viz. Cutting tools, Sports goods, and Bicycle components respectively.

### **5.5 Future Scope of Research:**

The present study has covered District Patiala for Cutting Tools, District Jalandhar for Sports Goods and District Ludhiana for Bicycle Components respectively. This research can be extended to include other important manufacturing sectors. This research focuses upon development of a model for MkIS for SMEs and further designing a framework for MkIS. As the technology is advancing day by day, the present study could be extended to meet these by testing the framework and model presented in this study.



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## **ANNEXURE – I**

### **QUESTIONNAIRE**

**On**

### **Development of a Model for Marketing Information System (MkIS) for Small and Medium Enterprises (SMEs) in Punjab**

Dear Sir/Madam,

The present research has been undertaken to develop a model for Marketing Information System (MkIS) for Small and Medium Enterprise (SMEs) in Punjab. The study covers bicycle components industry of district Ludhiana, sports goods industry of district Jalandhar and cutting tools industry of district Patiala. Your valued response would help us understand the marketing and information system scenario of Small and Medium Manufacturing Enterprises in Punjab and help in Developing a Model for Marketing Information System.

The Questionnaire has three sections, Section A covers the organization profile, Section B is about the identifying the factors for development of a model for MkIS and Section C deals with the critical success and hindrance factors of MkIS.

#### **Section A: Organizational Profile.** (Please tick the appropriate option in the box)

|    |                      |                                                             |                                          |                                       |                                         |                               |
|----|----------------------|-------------------------------------------------------------|------------------------------------------|---------------------------------------|-----------------------------------------|-------------------------------|
| 1. | Type of firm         | Small Scale <input type="checkbox"/>                        |                                          | Medium Scale <input type="checkbox"/> |                                         |                               |
| 2. | Type of Organization | Single Proprietary/<br>Partnership <input type="checkbox"/> | Private Limited <input type="checkbox"/> |                                       | Public Limited <input type="checkbox"/> |                               |
| 3. | Number of Employees  | 1 to 3 <input type="checkbox"/>                             | 4 to 10 <input type="checkbox"/>         | 11 to<br>50 <input type="checkbox"/>  | 51 to<br>100 <input type="checkbox"/>   | >100 <input type="checkbox"/> |



**Section B: Factors for the Development of the Model.** (Please tick the appropriate option(s) in the box)

**(I) Primary Characteristics:**

|    |                                                                    |                                                                                                               |                             |           |              |                        |
|----|--------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|-----------------------------|-----------|--------------|------------------------|
| 1. | Is a personal computer available to you in your office?            | Yes <input type="checkbox"/>                                                                                  | No <input type="checkbox"/> |           |              |                        |
|    | If Yes, please indicate the level of experience with each of them. |                                                                                                               |                             |           |              |                        |
|    | Operating System                                                   | Never Used                                                                                                    | Limited Use                 | Able User | Skilled User | Highly Proficient User |
| 2. | MS Windows 98/2000                                                 |                                                                                                               |                             |           |              |                        |
| 3. | MS Windows XP                                                      |                                                                                                               |                             |           |              |                        |
|    | Internet                                                           | Never Used                                                                                                    | Limited Use                 | Able User | Skilled User | Highly Proficient user |
| 4. | E-Mail                                                             |                                                                                                               |                             |           |              |                        |
| 5. | Search Engines                                                     |                                                                                                               |                             |           |              |                        |
|    | Applications                                                       | Never Used                                                                                                    | Limited Use                 | Able User | Skilled User | Highly Proficient user |
| 6. | MS Word                                                            |                                                                                                               |                             |           |              |                        |
| 7. | MS Excel                                                           |                                                                                                               |                             |           |              |                        |
| 8. | MS Power Point                                                     |                                                                                                               |                             |           |              |                        |
|    |                                                                    | Please tick the answers 1-5. 1 for lowest and 5 for highest, i.e. easy and timely availability of Information |                             |           |              |                        |
|    |                                                                    | 1                                                                                                             | 2                           | 3         | 4            | 5                      |
| 9. | Firm has access to timely information of the marketing needs?      |                                                                                                               |                             |           |              |                        |

|    |                                                                                                                      |  |  |  |  |  |
|----|----------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|
| 10 | Firm stores Market information (e.g., customers, competitors etc.)?                                                  |  |  |  |  |  |
| 11 | Processed information (e.g., sales forecasts, market share, distribution trend, etc.) is maintained in the database. |  |  |  |  |  |

## (II) MkIS Design Characteristics

|    | Please indicate the level of experience for collection of marketing information | Please tick the answers 1-5. 1 for lowest and 5 for highest, i.e. easy and timely availability of Information |   |   |   |   |
|----|---------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|---|---|---|---|
|    |                                                                                 | 1                                                                                                             | 2 | 3 | 4 | 5 |
| 1. | Broad Scope Information                                                         |                                                                                                               |   |   |   |   |
| 2. | Timely Information                                                              |                                                                                                               |   |   |   |   |
| 3. | Accurate Information                                                            |                                                                                                               |   |   |   |   |
| 4. | Current Information                                                             |                                                                                                               |   |   |   |   |
| 5. | Aggregated Information                                                          |                                                                                                               |   |   |   |   |

## (III) Capabilities of MkIS

| Please indicate the level of capabilities for MkIS |                                                                                                                               | Strongly disagree | Disagree | Moderately Agree | Agree | Strongly Agree |
|----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|-------------------|----------|------------------|-------|----------------|
| 1.                                                 | It simply provides data on which decisions are made                                                                           |                   |          |                  |       |                |
| 2.                                                 | It has the capability to undertake simple analysis of the data and from this provides information on which decisions are made |                   |          |                  |       |                |
| 3.                                                 | It provides sophisticated analysis of data, and therefore provides invaluable decision support information                    |                   |          |                  |       |                |
| 4.                                                 | It provides sophisticated analysis of                                                                                         |                   |          |                  |       |                |

|  |                                                                                                |  |  |  |  |  |
|--|------------------------------------------------------------------------------------------------|--|--|--|--|--|
|  | data and has the ability to make recommendations, if so required, as an aid to decision making |  |  |  |  |  |
|--|------------------------------------------------------------------------------------------------|--|--|--|--|--|

#### (IV) MkIS Sophistication

|    | Please indicate the level of sophistication for MkIS | Strongly disagree | Disagree | Moderately Agree | Agree | Strongly Agree |
|----|------------------------------------------------------|-------------------|----------|------------------|-------|----------------|
| 1. | Strategic Perspective                                |                   |          |                  |       |                |
| 2. | Meeting customer needs                               |                   |          |                  |       |                |
| 3. | Threat of new entrants                               |                   |          |                  |       |                |
| 4. | Marketing personnel involved in strategic planning   |                   |          |                  |       |                |
| 5. | Strategic use of IT budget                           |                   |          |                  |       |                |
| 6. | Marketing decisions important to organization        |                   |          |                  |       |                |

**Section C: Success and Hindrance Factors.** (Please tick the appropriate option(s) in the box)

| I. | Evaluate the following Success factors in your firm.                                           | Strongly disagree | Disagree | Moderately Agree | Agree | Strongly Agree |
|----|------------------------------------------------------------------------------------------------|-------------------|----------|------------------|-------|----------------|
| 1. | The MkIS is integrated into the managerial functions.                                          |                   |          |                  |       |                |
| 2. | MkIS is an appropriate information processing technology required to meet the data processing. |                   |          |                  |       |                |
| 3. | MkIS focuses on the results and goals.                                                         |                   |          |                  |       |                |
| 4. | MkIS is an user-friendly design.                                                               |                   |          |                  |       |                |
| 5. | MkIS has a basic potential capability                                                          |                   |          |                  |       |                |

|            |                                                                                                                    |  |  |  |  |  |
|------------|--------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|
|            | to quickly meet new needs of information.                                                                          |  |  |  |  |  |
| 6          | The MkIS concentrates on developing the information support to manager.                                            |  |  |  |  |  |
| 7.         | MkIS design is modified according to the changing information needs.                                               |  |  |  |  |  |
| <b>II.</b> | <b>Evaluate the following Hindrance factors in your firm.</b>                                                      |  |  |  |  |  |
| 1.         | The MkIS is conceived as a data processing and not as an information processing system.                            |  |  |  |  |  |
| 2.         | A belief that the computerized MkIS can solve all the management problems of planning and control of the business. |  |  |  |  |  |
| 3.         | Lack of training to the users of the information.                                                                  |  |  |  |  |  |
| 4.         | Adequate attention is not given to the quality control aspects of the inputs of MkIS.                              |  |  |  |  |  |
| 5.         | The MkIS is an impersonal system.                                                                                  |  |  |  |  |  |
| 6.         | The MkIS does not give perfect information to all the users in the organization.                                   |  |  |  |  |  |
| 7.         | Underestimating the complexity in the business systems.                                                            |  |  |  |  |  |

**Name of the company:** \_\_\_\_\_

**Category of the product:** \_\_\_\_\_

**Address of the company:** \_\_\_\_\_

**Name of the respondent:** \_\_\_\_\_

**Thanks for your Valuable Time!**

## **ANNEXURE – II**

### **Primary Data Collected from 140 SMEs**

| S.No | Name of the Firm              | District  | Category      | Type of Firm |
|------|-------------------------------|-----------|---------------|--------------|
| 1    | Super Hobs and Broaches       | Patiala   | Cutting Tools | Small        |
| 2    | Super Tools Corporation       | Patiala   | Cutting Tools | Small        |
| 3    | E S Kay Tool Industries       | Patiala   | Cutting Tools | Small        |
| 4    | S.Lal and Sons                | Patiala   | Cutting Tools | Small        |
| 5    | Lal son and Tools Corporation | Patiala   | Cutting Tools | Small        |
| 6    | Patiala Tools Corporation     | Patiala   | Cutting Tools | Small        |
| 7    | Aro Tech Tools                | Patiala   | Cutting Tools | Small        |
| 8    | Module Tools                  | Patiala   | Cutting Tools | Small        |
| 9    | Star Industries India         | Patiala   | Cutting Tools | Small        |
| 10   | R J Tools                     | Patiala   | Cutting Tools | Small        |
| 11   | Tool Masters                  | Patiala   | Cutting Tools | Small        |
| 12   | ESGI Tools Pvt.Ltd.           | Patiala   | Cutting Tools | Small        |
| 13   | Ferro Tech Tools              | Patiala   | Cutting Tools | Small        |
| 14   | Tiwana Tools                  | Patiala   | Cutting Tools | Small        |
| 15   | Central Tool Corp.            | Patiala   | Cutting Tools | Small        |
| 16   | Aero Tech Tools               | Patiala   | Cutting Tools | Small        |
| 17   | Perfect Engg. Tools           | Patiala   | Cutting Tools | Small        |
| 18   | Aman Enterprises              | Patiala   | Cutting Tools | Small        |
| 19   | Punjab Tools Corp.            | Patiala   | Cutting Tools | Small        |
| 20   | Vishal Tools Co.              | Patiala   | Cutting Tools | Small        |
| 21   | Amar Tools Corp.              | Patiala   | Cutting Tools | Small        |
| 22   | Surya Tools Industry          | Patiala   | Cutting Tools | Small        |
| 23   | Kapson Pvt. Ltd.              | Patiala   | Cutting Tools | Small        |
| 24   | Jiwan Deep Tools              | Patiala   | Cutting Tools | Small        |
| 25   | I M Tools (India)             | Patiala   | Cutting Tools | Small        |
| 26   | Shakti Industries             | Patiala   | Cutting Tools | Small        |
| 27   | Canon Tools Co.               | Patiala   | Cutting Tools | Small        |
| 28   | Surindra Tools                | Patiala   | Cutting Tools | Small        |
| 29   | HMB Tools                     | Patiala   | Cutting Tools | Small        |
| 30   | Marshal Tools Pvt. Ltd.       | Patiala   | Cutting Tools | Small        |
| 31   | Bajaj Enterprise              | Jalandhar | Sports Goods  | Medium       |
| 32   | Sharma Exports                | Jalandhar | Sports Goods  | Small        |
| 33   | Universal Sports              | Jalandhar | Sports Goods  | Medium       |
| 34   | Red Impex                     | Jalandhar | Sports Goods  | Small        |
| 35   | Sunfly Sports                 | Jalandhar | Sports Goods  | Small        |
| 36   | Bihari Lal & Co.              | Jalandhar | Sports Goods  | Small        |
| 37   | Ronin Exports Pvt.Ltd.        | Jalandhar | Sports Goods  | Small        |
| 38   | Sunny Overseas                | Jalandhar | Sports Goods  | Small        |

|    |                                 |           |              |        |
|----|---------------------------------|-----------|--------------|--------|
| 39 | Om Sai Sports                   | Jalandhar | Sports Goods | Medium |
| 40 | Punj's Sports                   | Jalandhar | Sports Goods | Small  |
| 41 | Padmawati Manufacturing Co.     | Jalandhar | Sports Goods | Medium |
| 42 | Promotional Sports Goods        | Jalandhar | Sports Goods | Small  |
| 43 | Vishal Sporting Goods           | Jalandhar | Sports Goods | Small  |
| 44 | Monika Sports Industries        | Jalandhar | Sports Goods | Medium |
| 45 | Leisure Exports Worldwide       | Jalandhar | Sports Goods | Small  |
| 46 | Anand & Anand                   | Jalandhar | Sports Goods | Small  |
| 47 | Sports Syndicate                | Jalandhar | Sports Goods | Medium |
| 48 | Dolphin Impex                   | Jalandhar | Sports Goods | Small  |
| 49 | Vivek International             | Jalandhar | Sports Goods | Small  |
| 50 | Chand Leggurad Works            | Jalandhar | Sports Goods | Small  |
| 51 | Monu Enterprises                | Jalandhar | Sports Goods | Small  |
| 52 | Em Cee Cee Sports               | Jalandhar | Sports Goods | Small  |
| 53 | Manni Enterprises               | Jalandhar | Sports Goods | Small  |
| 54 | Raj Enterprises                 | Jalandhar | Sports Goods | Small  |
| 55 | Hansraj Mahajan Worldwide       | Jalandhar | Sports Goods | Small  |
| 56 | Soccer International Pvt.Ltd.   | Jalandhar | Sports Goods | Small  |
| 57 | Super Sports Goods              | Jalandhar | Sports Goods | Small  |
| 58 | Ajay Industries                 | Jalandhar | Sports Goods | Small  |
| 59 | Karson International            | Jalandhar | Sports Goods | Small  |
| 60 | Bhaseen Sports Pvt. Ltd.        | Jalandhar | Sports Goods | Small  |
| 61 | Kay Gee Sports                  | Jalandhar | Sports Goods | Small  |
| 62 | Magic Sports                    | Jalandhar | Sports Goods | Medium |
| 63 | Ceela International             | Jalandhar | Sports Goods | Small  |
| 64 | Avran Exports                   | Jalandhar | Sports Goods | Small  |
| 65 | Beat All Sports                 | Jalandhar | Sports Goods | Small  |
| 66 | MSM Dians Global Corp.          | Jalandhar | Sports Goods | Small  |
| 67 | Accurate International          | Jalandhar | Sports Goods | Small  |
| 68 | P S Kalra & Co.                 | Jalandhar | Sports Goods | Small  |
| 69 | Manjit Sales Corp.              | Jalandhar | Sports Goods | Small  |
| 70 | Pionner Sports Works Pvt. Ltd.  | Jalandhar | Sports Goods | Medium |
| 71 | Archic International            | Jalandhar | Sports Goods | Small  |
| 72 | P Ram Chand & Co.               | Jalandhar | Sports Goods | Small  |
| 73 | Baporia Sports                  | Jalandhar | Sports Goods | Small  |
| 74 | Ganga Sons                      | Jalandhar | Sports Goods | Small  |
| 75 | National Legguard Works         | Jalandhar | Sports Goods | Small  |
| 76 | Kumar Sports Works              | Jalandhar | Sports Goods | Small  |
| 77 | Brightway Exports International | Jalandhar | Sports Goods | Small  |
| 78 | Nagory India                    | Jalandhar | Sports Goods | Small  |
| 79 | Konika Exports                  | Jalandhar | Sports Goods | Small  |

|     |                              |           |               |        |
|-----|------------------------------|-----------|---------------|--------|
| 80  | R K Overseas                 | Jalandhar | Sports Goods  | Small  |
| 81  | A C Cycles Pvt. Ltd.         | Ludhiana  | Bicycle Parts | Medium |
| 82  | H C Cycles Pvt. Ltd.         | Ludhiana  | Bicycle Parts | Medium |
| 83  | Mandeep Enterprises          | Ludhiana  | Bicycle Parts | Small  |
| 84  | Komal Industries Pvt. Ltd.   | Ludhiana  | Bicycle Parts | Small  |
| 85  | K W Cycles                   | Ludhiana  | Bicycle Parts | Small  |
| 86  | Surpal Cycles Pvt. Ltd.      | Ludhiana  | Bicycle Parts | Small  |
| 87  | Malbros Enterprises          | Ludhiana  | Bicycle Parts | Small  |
| 88  | Gee Pee Exports              | Ludhiana  | Bicycle Parts | Small  |
| 89  | Neelam Cycles                | Ludhiana  | Bicycle Parts | Small  |
| 90  | R K Industries               | Ludhiana  | Bicycle Parts | Small  |
| 91  | Malwa Enterprises            | Ludhiana  | Bicycle Parts | Small  |
| 92  | Diksha Cycle Industries      | Ludhiana  | Bicycle Parts | Small  |
| 93  | S K Behl & Co.               | Ludhiana  | Bicycle Parts | Small  |
| 94  | Shri Ram Krishan Cycles Ind. | Ludhiana  | Bicycle Parts | Small  |
| 95  | Amar Udyog                   | Ludhiana  | Bicycle Parts | Small  |
| 96  | Mohan Industries             | Ludhiana  | Bicycle Parts | Small  |
| 97  | Baz Cycle Industries         | Ludhiana  | Bicycle Parts | Small  |
| 98  | Altus Exports                | Ludhiana  | Bicycle Parts | Small  |
| 99  | Chhabra Cycles               | Ludhiana  | Bicycle Parts | Small  |
| 100 | Azad India                   | Ludhiana  | Bicycle Parts | Small  |
| 101 | Appu International           | Ludhiana  | Bicycle Parts | Medium |
| 102 | Doel Cycles Industries       | Ludhiana  | Bicycle Parts | Small  |
| 103 | Kingsons Exports Pvt.Ltd.    | Ludhiana  | Bicycle Parts | Medium |
| 104 | M T International            | Ludhiana  | Bicycle Parts | Small  |
| 105 | G P Products                 | Ludhiana  | Bicycle Parts | Small  |
| 106 | Puja Industries              | Ludhiana  | Bicycle Parts | Small  |
| 107 | Charu Enterprises            | Ludhiana  | Bicycle Parts | Small  |
| 108 | Dee Bee Cycle Udyog          | Ludhiana  | Bicycle Parts | Small  |
| 109 | Panesar Products             | Ludhiana  | Bicycle Parts | Small  |
| 110 | Fit Right Engg.              | Ludhiana  | Bicycle Parts | Small  |
| 111 | Gagan Engg.                  | Ludhiana  | Bicycle Parts | Small  |
| 112 | R N Impect Pvt. Ltd.         | Ludhiana  | Bicycle Parts | Medium |
| 113 | Prince Ind.                  | Ludhiana  | Bicycle Parts | Small  |
| 114 | Ralson Ind. Ltd.             | Ludhiana  | Bicycle Parts | Medium |
| 115 | Dumax Exports                | Ludhiana  | Bicycle Parts | Medium |
| 116 | Jyoti Singh & Sons           | Ludhiana  | Bicycle Parts | Small  |
| 117 | Union Brothers               | Ludhiana  | Bicycle Parts | Small  |
| 118 | A K Mahajan Industries       | Ludhiana  | Bicycle Parts | Small  |
| 119 | Kular Cycle Ind.             | Ludhiana  | Bicycle Parts | Medium |
| 120 | Wassen Engg. Corp.           | Ludhiana  | Bicycle Parts | Small  |

|     |                           |          |               |       |
|-----|---------------------------|----------|---------------|-------|
| 121 | Omega International       | Ludhiana | Bicycle Parts | Small |
| 122 | Megson Industries         | Ludhiana | Bicycle Parts | Small |
| 123 | Mapco Industries          | Ludhiana | Bicycle Parts | Small |
| 124 | Gogia Enterprises         | Ludhiana | Bicycle Parts | Small |
| 125 | Rajan Industries          | Ludhiana | Bicycle Parts | Small |
| 126 | Madan Industries          | Ludhiana | Bicycle Parts | Small |
| 127 | Weldon Bicycle Components | Ludhiana | Bicycle Parts | Small |
| 128 | Sant Cycles               | Ludhiana | Bicycle Parts | Small |
| 129 | Baljit & Co.              | Ludhiana | Bicycle Parts | Small |
| 130 | Autom Cycle Components    | Ludhiana | Bicycle Parts | Small |
| 131 | Bhushan Enterprises       | Ludhiana | Bicycle Parts | Small |
| 132 | K K Sons                  | Ludhiana | Bicycle Parts | Small |
| 133 | Bansal Steel Products     | Ludhiana | Bicycle Parts | Small |
| 134 | Balvir Sons               | Ludhiana | Bicycle Parts | Small |
| 135 | Gagandeep Traders         | Ludhiana | Bicycle Parts | Small |
| 136 | Navdeep Enterprises       | Ludhiana | Bicycle Parts | Small |
| 137 | J P Cycles Pvt. Ltd.      | Ludhiana | Bicycle Parts | Small |
| 138 | Bagga Cycle Industries    | Ludhiana | Bicycle Parts | Small |
| 139 | Wimco Cycle Industries    | Ludhiana | Bicycle Parts | Small |
| 140 | Om Industries             | Ludhiana | Bicycle Parts | Small |



### **ANNEXURE – III**

#### **Regression Results**

**Model Summary<sup>f</sup>**

| Model | R                 | R Square | Adjusted R Square | Std. Error of the Estimate | Change Statistics |          |     |     |               | Durbin-Watson |
|-------|-------------------|----------|-------------------|----------------------------|-------------------|----------|-----|-----|---------------|---------------|
|       |                   |          |                   |                            | R Square Change   | F Change | df1 | df2 | Sig. F Change |               |
| 1     | .575 <sup>a</sup> | .331     | .326              | .25408                     | .331              | 68.339   | 1   | 138 | .000          |               |
| 2     | .641 <sup>b</sup> | .410     | .402              | .23941                     | .079              | 18.430   | 1   | 137 | .000          |               |
| 3     | .676 <sup>c</sup> | .456     | .444              | .23075                     | .046              | 11.479   | 1   | 136 | .001          |               |
| 4     | .702 <sup>d</sup> | .493     | .478              | .22372                     | .036              | 9.682    | 1   | 135 | .002          |               |
| 5     | .713 <sup>e</sup> | .508     | .490              | .22107                     | .016              | 4.255    | 1   | 134 | .041          | 2.102         |

**ANOVA<sup>f</sup>**

| Model |            | Sum of Squares | df  | Mean Square | F      | Sig.              |
|-------|------------|----------------|-----|-------------|--------|-------------------|
| 1     | Regression | 4.412          | 1   | 4.412       | 68.339 | .000 <sup>a</sup> |
|       | Residual   | 8.909          | 138 | .065        |        |                   |
|       | Total      | 13.321         | 139 |             |        |                   |
| 2     | Regression | 5.468          | 2   | 2.734       | 47.700 | .000 <sup>b</sup> |
|       | Residual   | 7.853          | 137 | .057        |        |                   |
|       | Total      | 13.321         | 139 |             |        |                   |
| 3     | Regression | 6.079          | 3   | 2.026       | 38.059 | .000 <sup>c</sup> |
|       | Residual   | 7.241          | 136 | .053        |        |                   |
|       | Total      | 13.321         | 139 |             |        |                   |
| 4     | Regression | 6.564          | 4   | 1.641       | 32.787 | .000 <sup>d</sup> |
|       | Residual   | 6.757          | 135 | .050        |        |                   |
|       | Total      | 13.321         | 139 |             |        |                   |
| 5     | Regression | 6.772          | 5   | 1.354       | 27.712 | .000 <sup>e</sup> |
|       | Residual   | 6.549          | 134 | .049        |        |                   |
|       | Total      | 13.321         | 139 |             |        |                   |

a. Predictors: (Constant), AV Des Characteristics

b. Predictors: (Constant), AV Des Characteristics, AV Capabilities

c. Predictors: (Constant), AV Des Characteristics, AV Capabilities, Av Primary Characteristics

d. Predictors: (Constant), AV Des Characteristics, AV Capabilities, Av Primary Characteristics, Av Hindrance Factors

e. Predictors: (Constant), AV Des Characteristics, AV Capabilities, Av Primary Characteristics, Av Hindrance Factors, MkIS Characteristics

f. Dependent Variable: AV Success Factors

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

| Model |                        | Unstandardized Coefficients |            | Standardized Coefficients | t      | Sig. |
|-------|------------------------|-----------------------------|------------|---------------------------|--------|------|
|       |                        | B                           | Std. Error | Beta                      |        |      |
| 1     | (Constant)             | 2.009                       | .154       |                           | 13.032 | .000 |
|       | AV Des Characteristics | .388                        | .047       | .575                      | 8.267  | .000 |
| 2     | (Constant)             | 1.591                       | .175       |                           | 9.105  | .000 |
|       | AV Des Characteristics | .280                        | .051       | .415                      | 5.499  | .000 |
|       | AV Capabilities        | .219                        | .051       | .324                      | 4.293  | .000 |
| 3     | (Constant)             | .989                        | .245       |                           | 4.041  | .000 |
|       | AV Des Characteristics | .243                        | .050       | .360                      | 4.833  | .000 |
|       | AV Capabilities        | .199                        | .049       | .295                      | 4.026  | .000 |
|       | Av Pers Inf            | .257                        | .076       | .227                      | 3.388  | .001 |
| 4     | (Constant)             | 1.906                       | .378       |                           | 5.038  | .000 |
|       | AV Des Characteristics | .182                        | .052       | .271                      | 3.482  | .001 |
|       | AV Capabilities        | .171                        | .049       | .253                      | 3.493  | .001 |
|       | Av Pers Inf            | .235                        | .074       | .207                      | 3.180  | .002 |
|       | Av Hindrance Factors   | -.187                       | .060       | -.228                     | -3.112 | .002 |
| 5     | (Constant)             | 1.624                       | .398       |                           | 4.077  | .000 |
|       | AV Des Characteristics | .148                        | .054       | .219                      | 2.708  | .008 |
|       | AV Capabilities        | .128                        | .053       | .189                      | 2.427  | .017 |
|       | Av Pers Inf            | .223                        | .073       | .196                      | 3.036  | .003 |
|       | Av Hindrance Factors   | -.176                       | .060       | -.214                     | -2.956 | .004 |
|       | MKIS Characteristics   | .171                        | .083       | .168                      | 2.063  | .041 |

a. Dependent Variable: AV Success Factors

### **Papers Published:**

- Hakhu, R., Kiran, R., & Goyal, D.P. (2012). Critical Success Factors for Marketing Information System (MkIS) in Small and Medium Enterprises (SMEs) of Punjab. *Technics Technologies Education Management*, 7 (3/4). (SCI Listed Journal with an Impact Factor of 0.351).
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- Goyal, D.P., Kiran, R., & Hakhu, R. (2012). Knowledge Sharing Culture (KSC) and Corporate Performance (CP): A Theoretical Discussion. *Journal of Management Science*, 3(1), 34-46. Indexed with "Index Copernicus (2011, ICV-5.22)", "Indian Science Abstract", "Indian Citation Index" and "Google Scholar".
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- Hakhu, R., Kiran, R., & Goyal, D.P. (2013). Success of Marketing Information System (MkIS) Model for (SMEs) of Punjab: Validation of Survey Based Results and Case Study Analysis for 13th International Technology Conference (IETC) at Kuala Lumpur, Malaysia, May 13-15, 2013, and referred for the review for The Turkish Online Journal of Educational Technology (SSCI Listed Journal of International Repute) 12(3/4)
- Hakhu, R., Kiran, R., & Goyal, D.P. (2012). Impact of Hindrance Factors for Marketing Information System in SMEs of Punjab , Paper selected for Third Biennial Supply Chain Management Conference jointly organized by EADS-SMI Chair, IIM Bangalore, at Indian Institute of Management Bangalore on December 14-15, 2012, IIM Bangalore, India.
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