PERCEPTION OF DEMAND, MARKETS AND INNOVATION: A CASE STUDY ON INDIAN MSMEs

Thesis

Submitted in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

by

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DECLARATION

I hereby ***declare*** that the Research Thesis/Synopsis entitled **"Perception of Demand, Markets and Innovation: A case study on Indian MSMEs"** which is being submitted to the **National Institute of Technology Karnataka, Surathkal** in partial fulfillment of the requirements for the award of the Degree of **Doctor of Philosophy** in **Management** is a *bonafide report of the research work carried out by me*. The material contained in this Research Thesis/Synopsis has not been submitted to any University or Institution for the award of any degree.

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CERTIFICATE

This is to ***certify*** that the Research Thesis entitled **"Perception of Demand, Markets and Innovation: A case study on Indian MSMEs"** submitted by **Shrisha Srinivasan** (Register No. 165144SM16P02) as the record of the research work carried out by him, is ***accepted as the Research Thesis submission*** in partial fulfillment of the requirements for the award of degree of **Doctor of Philosophy.**

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ABSTRACT

The Micro, Small and Medium enterprises today constitute a very important segment of the Indian economy. The development of this sector came about primarily due to the vision of Government policies framed right after independence which stressed to develop small enterprises. MSMEs sector has emerged as a dynamic and vibrant sector of the economy. As per the fourth census of MSMEs report published in 2012, the total numbers of MSMEs in India are 36 million employing over 80 million people. It is the second largest employer after agriculture accounting for 72% services and 28% manufacturing jobs. It also accounts for 45 % of total industrial production, 40% of total exports and contributes very significantly to the GDP.

Manufacturing segment within the MSME contributes to 7.09% of GDP. The benefits of the MSMEs have created a special status and importance in the Five-Year Plans right from its inception. In recent years, the MSME sector has consistent higher growth rate compared to the overall industrial sector. Despite its commendable contribution to the country's economy, MSME Sector is not getting the required support and faces numerous problems. This research aims at developing a framework taking into account efficient demand marketing and innovation strategy performances by addressing three fundamental objectives of the study which is to develop models to study relationship between demand marketing and innovation performance and generate pivotal findings that validates the model and will offer robustness to the policymaking with respect to the MSME sector going forward. The research showcases specific methodologies to effectively measure the reliability and the validity of the questionnaire. The research also presents the result of the study undertaken by showcasing the factors such as technology management and brand equity that play key roles in driving contribution towards innovation performance of an organization.

Keywords: *Demand Marketing, Innovation Performance, Product Innovation, MSME, Technology Management*

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LIST OF ABBREVIATIONS

MSME	: Micro, Small and Medium Enterprises
DM	: Demand Marketing
NITK	: National Institute of Technology, Karnataka
NCSI	: National Center for Science Information
SWOT	: Strength, Weakness, Opportunity, Threat
CEO	: Chief Executive Officer
CFA	: Confirmatory Factor Analysis
ANOVA	: Analysis of Variance
GDP	: Gross Domestic Product
DW	: Durbin Watson
Q&A	: Question and Answer
IISc	: Indian Institute of Science
IV	: Independent Variable
DV	: Dependent Variable
VIF	: Variance Inflation Factor
JRD	: Jehangir Ratanji Dadabhoy
TM	: Technology Management
SME	: Small and Medium Enterprises
MSMED	: Micro, Small and Medium Enterprises Development
R&D	: Research and Development
IBM	: International Business Management

CHAPTER 1

INTRODUCTION

Demand is influenced by strategies adopted by MSME which requires the MSME tailor a strategic management based approach to demand marketing. A definition of demand marketing is a collection of business ideologies that an enterprise observes to fulfil the needs of its clienteles and realize profitability. Demand Marketing (DM) is keeping an enterprise in track and aligned to its' goals while Innovation is boosting the firm's ability of doing better. Hence, DM and Innovation become the fundamental components that ought to be embraced by any establishment.

It is of paramount importance to analyze the importance of the perception of demand on the firms' approach to realizing innovativeness and thereby pull off greater growth. This research is an attempt to find how Demand Marketing is affecting the organizations performance in adopting innovation.

The highlight of our study will be the Indian MSME's which also get a nod of approval post the literature review. Bearing this in mind, the below mentioned unambiguous objectives are framed for the study:

1. Develop a research framework that captures the relationship between the constructs of demand marketing and innovation performance.
2. Analyze the impact of dimensions of demand on innovation and determine the scope of each of the constructs with respect to an organization.
3. Capture the reliability and the validity of the study by developing an evaluating instrument.
4. Propose appropriate recommendations to ensure higher growth for an Indian organization and provide a direction for the future of policymaking for the government.

DM and Innovation Performance constructs are determined for further analysis. Post the identification of the concepts, a set of paradigms or hypothesis is created in tandem with an abstract framework.

The primary data for the study is gathered using a well-defined questionnaire based on Likert scale. The study includes those organizations classified as Micro, Small and Medium

scale and the information is collected through the MSME Development Institute of India, Bangalore.

The study has been administered to the senior managers of the organization who have an awareness of the company's vision and share responsibilities that charter the future growth program for the company. The information collected through the questionnaire enables us to tap into the management's definition of demand marketing and how the performance of the organization is impacted through Innovation.

The validity and reliability of our work is demonstrated using a measuring instrument at the time of the pilot study. The conclusions and the research findings are summarized post the analysis of the main study.

We have extensively contacted organizations fitting the MSME description and received a response rate of 60.6%. We have data accumulated for a total of 91 organizations from a list of 150 for our final study. The responses collected constitute for about 6% of Micro, 41% of Small and 53% of Medium Industries.

We have been very thorough with our analysis of the collected data. We look at examining different relationships between the data and look into data reduction based on the concept of latent factor analysis. Further, we have created a summated scale to measure the impact of each construct, this enables a deep insight into identifying which of the factors do the management believe plays a crucial role in their day-to-day operations.

The independent variables for the study are arrived at from the factors of Innovation Performance while the dependent variables are the factors of Demand Marketing. Multiple Regression methodology has been adopted to arrive at our conclusive results. Each of the regression assumptions have been tested for and five unique regression models are developed. The model fit is evaluated, and hypothesis tested.

Our study indicated that the measures of DM and Innovation Performance enjoy a strong relationship representing an enormous impact on the performance of the organization. We further establish that practicing the DM concepts enables success in terms of innovation for an organization. The model unmistakably identifies certain factors of DM such as Business Landscape, Marketing Mix to have a massive influence on the functioning of

innovation at an organization. The study further outlines how an organization can define a clear roadmap towards performance led success by following the principles of DM and understanding the impact on innovation.

1.1 PREAMBLE AND RATIONALE FOR RESEARCH

Multiple studies firmly cements the advantage an organization has if it practices Demand Marketing. According to numerous literature that has been reviewed, firms are achieving a higher level of performance by embracing the concepts of DM and this is where Indian firms can gain a competitive edge as well.

Indian Organizations have been more traditional in their approach towards innovation and the company has primarily aimed at satisfying current consumer needs and their approaches are centered around it which has been exploited by multiple organizations setting the pace by implementing the concepts of DM. This has never been as evident as the Indian organizations were left exposed to a world of competition; cost pressures etc. from the global players post the economic reforms viz. liberalization, privatization, and globalization, which are forcing organizations to rethink their investments on innovation.

It is therefore of cardinal importance to validate and demonstrate the association between DM and Innovation Performance. Preliminary studies indicate that since India opened her economy, only a handful of research has been attempted to quantify the relationship between DM and the performance of Innovation at Indian firms. The lack of studies in the area are not a direct reflection of the lack of progress made during the past thirty years from an organization perspective. The initial decade of liberalization bought in competition and drove price downwards for products that are produced efficiently by Multination Companies, which set up shop owing to the flow of Foreign Direct Investments.

Competition is healthy for an economy and this forced the dormant Indian Organizations to adopt standard practices and set up benchmark metrics for delivering high quality products.

The latent needs of the consumer expressed a desire to be wooed to buy the products. Increasing competition meant that a consumer had a plethora of choices and wanted to be

associated with a brand that is willing to innovate on its' products and position themselves as an organization that goes the extra mile by producing quality products and services with a flavor for innovation. This facilitated a pro-active approach from the organization to rejig their thinking across all activities in terms of innovation, be it with respect to product, process, system etc.

Research has been carried out and studies have been identified where the relationship between the variables of DM and Innovation Performance have been explored with establishments outside India, this study is a successful attempt to demonstrate the impact of the variables with indigenous organizations.

Innovation Performance is seen as the crucial link for continuing competitive advantage in a cutthroat marketing environment. The importance of innovation is best captured by an organization by integrating its' short term approach and enabling long term planning to stay in line with the vision of the business. This enables an organization to remain dynamic in an ever changing unprecedented market and continue to thrive by offering exceptional quality products and services to its' consumers.

The study aims to investigate a series of inquiries as part of the research to avail a better understanding of the variables of DM with respect to Indian organizations. The queries that we are seeking answers to are:

- How do the variables of DM promote the performance of innovation for an organization?
- What is the nature of the relationship between Demand Marketing and Performance of Innovation?
- To what extent do the constructs of Demand Marketing remain significant for the performance of innovation?
- Which measures of DM are pertinent to successfully improve organizational efficiency with respect to performance of innovation?
- Using the measures of DM as part of the policy making program, can an organization achieve higher than benchmark levels of excellence?

- What are the factors hindering an organization from adapting the practices of Demand Marketing?
- What is the role of DM in enablement of Continuous Innovation and Continuous Development?
- Can an organization play a balancing act with continuous innovation and continuous development?
- Can the concepts of DM re-energize an organization to move towards innovation?
- What is the role of DM with respect to seeking and maintaining competitive advantage?
- Can the adoption of the practices of DM lower the perceived variation between the alleged and the offered quality?
- Can the adoption of DM impact innovation without harming the throughput of the company?

The only way for an organization to seek answers to these thought-provoking questions are through a research. Our work aims to facilitate easy implementation of the practice of DM by accounting for some of the questions raised here.

1.2 OUTLINE OF THE RESEARCH PROCESS

A typical research process has the following stages: research area identification, research problem definition, theoretical framework (that is, identification of variables and development of hypothesis or model), research design, data collection, analysis of data and reporting. A broad outline of the adopted research practice is presented below:

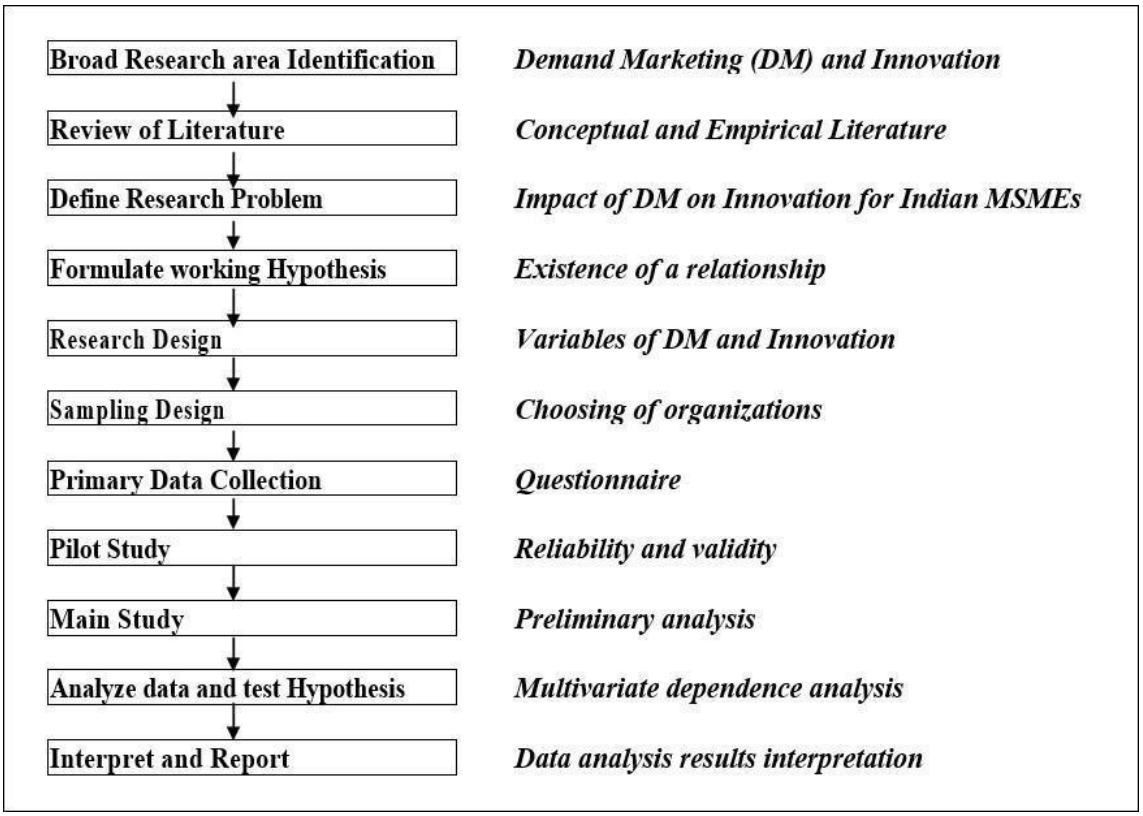

Figure 1.1: The Research process

CHAPTER 2

REVIEW OF LITERATURE

2.1 REVIEW OF LITERATURE FOR THE RESEARCH

Conceptual literature and **empirical literature** are the two types of literature reviewed in our work. For the context of our work, we have rephrased the problem to remain as specific as possible to the current scenario.

We have gathered information from multiple sources such as journals, be it abstract indexed or academic, bibliographies, reports from the government, conference proceedings, publications to ensure we have captured relevant information. Further, we have held discussions with representatives from the concerned organizations to direct us to more resources for the study.

For the proposed research, the methodology adopted was making references from the NITK departmental library, IISc-JRD Tata Memorial library (http://library.iisc.ernet.in) and the E-journals through National Centre for Science Information (NCSI) Scigate (http://ncsi.iisc.ernet.in). The references were carried out mainly for finding out the publications related to the area of research – Demand Enabled Marketing Management and related aspects. By browsing through the information available, articles and publications, pertaining to the following area was selected:

- Concepts of Demand Marketing
- Concepts of Innovation Performance
- Impact of Demand Marketing on organizations
- Evaluation of Innovation Performance of organizations

A number of articles have been identified from the journals of Emerald, Ebsco, Science direct, and Proquest. Exhaustive library resources related to business research methods, Demand Marketing Management, Innovation etc. were referred to. The summary of the literature review is provided in the following sections.

2.2 REVIEW OF CONCEPTUAL LITERATURE

2.2.1 Concepts of MSMEs

MSMEs' are the backbone for a country's economic growth. They are vital as they offer a source of employment and are crucial for enhancing competition and quality. The definition of MSMEs is clearly defined under MSMED Act 2006 as mentioned below:

Sector\Enterprises	Micro	Small	Medium
Manufacturing	Not more than ₹ 1 Crore	Not more than ₹ 10 Crore	Not more than ₹ 50 Crore
Service	Not more than ₹ 5 Crore	Not more than ₹ 50 Crore	Not more than ₹ 250 Crore

Source: https://msme.gov.in/know-about-msme

The prominence accorded for the MSME sector has never been as much as it is currently. The government with initiatives such as Make in India and the modified act of MSMED, 2006, has acknowledged the importance of MSME to the Indian growth context as the impact of globalization becomes more and more visible. Since MSMEs act as ancillaries to larger organizations, their contribution to the economic growth is significant. This situation will only improve if India opens the door for global players to join hands with the smaller ones in the supply chain. The need for innovation and adoption of various DM strategies have never been higher for and Indian MSME. The Working Group report has recently published several bottlenecks faced by the MSMEs. The report identifies several factors which the Government is concentrating on:

2.2.1.1 Reduce transaction costs of technology upgrades

2.2.1.2 Improve the performance through Innovation

2.2.1.3 Improve market penetration

2.2.1.4 Adopt various Marketing strategies.

2.3 CONCEPT OF DEMAND MARKETING (DM)

The concept of Demand Marketing during the last two or three decades is not same as it is now, earlier importance was given for producing goods on a mass scale exceeding the demand and thereby the role of Marketing was diverted. The concept of marketing was that the products would be sold without putting additional effort. Owing to advances in technology, the demand side was more than the supply side and as a result of this; the firms

started using as many innovative ways of selling the products. As demand started increasing, the companies began hiring good people who are smart in selling the products. This type of strategy adopted to sell the products still exists in the market. In 80's the organizations started adopting the policies of exceeding the needs and wants of the customer rather just satisfying them. This situation made the Marketing to evolve itself as an important tool to be adopted even in this present era of global competition. The process of analyzing and executing the marketing mix to realize both, the individual/consumer and the objectives of the company took focus.

Soon after, the concept of marketing started orienting towards societal needs and wants largely as a result of the opposition faced due to the degradation of environment, population explosion and other obligations related to the society. This gave birth to the concept of societal marketing, which focused on the long-term societal goals in addition to fulfilling the desires of the individual. Profits, customer demands and public interest are the three components to be balanced by the companies of today.

2.4 CURRENT DEMAND MARKETING THINKING

Demand marketing orientation towards the future is very much essential for today 's company. The organizations need to adopt corporate approach rather just meeting the short-term objectives. A policy towards meeting the customer demands would be an ideal situation for any company adopting the strategic orientation. The long-term strategy is the need of the hour for any company to meet both the local and global demands. An integrated approach of meeting individuals, companies and societal objectives is adopted by the present business community.

2.5 DEMAND MARKETING STRATEGY

Adopting the principles of Demand Marketing requires utilization of an optimal strategic approach. An organization that achieves profit by utilizing a set of business principles is defined as Demand Marketing (Kotler 2003). There is a close link found between the demand marketing strategy and Product innovation.

Currently, the focus of an Indian MSME is to formulate a vision-mission statement. The shortcoming here is the lack in developing a roadmap for themselves. Long-term objectives of MSMEs are realized by formulating an action plan in accordance with its mission and vision statements. Value drivers need to be suitably identified using the principles of demand marketing by the firms to develop the business matrix. MSMEs should start using the creative component to demonstrate its strategic capability and as well its continuous monitoring (Friedman, S. 2000) (Gootee, B. H., 1998).

Typically, an enterprise makes use of SWOT analysis to develop strategies which will be most effective. It is observed that the new product strategies adopt product design as the strategy (Crawford, 1994). It is also observed that Product design as a strategy can be used to realize the objectives of the firm (Olson, 1994). Thus innovation can be achieved by means of design strategy. Design teams use the firm‘s R&D capabilities to meet customer needs and make its firm achieve the performance goals(Hsu, 2006).

Owing to technology led development, organizations are able to perform various predictive analytics to forecast various possible future scenarios. With this power, it is now possible to comprehend the impact of demand marketing as it predominantly deals with long-term implications of using a particular methodology and exploit potentially promising scenarios (Anderson M.1999).

2.6 HISTORICAL PERSPECTIVE

All organizations need to ensure the profitable growth and to achieve so its business needs to consider the Demand Marketing as an important player. The historical development of Demand based Strategic Marketing is summarized below:

2.6.1 Prior to 1940

Strategy means the long-term implications of adopting the wide direction needed for the company to achieve excellence. The other commonly referred word is tactics, which is dealing only towards achieving short-term goals. The broader plan of action is the outcome of any strategy by any organization to gain the competitive advantage. This will empower

the firm to compete successfully in the existing scenario. Tactics refers to the process of how the broader plan of action has to be carried out. These two concepts are clearly explained by ―military analogies.

2.7 IMPORTANCE OF DEMAND MARKETING

The importance of the demand/strategic marketing has been clearly highlighted over the last decade by several companies achieving the high growth (Brooksbank et al., 2001). In fact, Day and Montgomery (1999), Thomas (2002) and others have highlighted the relevance of such research, arguing the fact that how many companies are adopting demand marketing and how it positively impacts on growth potential for an organization.

David and Brown (1992) opine that despite the key role played by the SMEs as the force that propels progress in a nation, it is riddled with numerous challenges and are prone to high failure rates. The sector is under immense pressure from competition, dramatic technological shift, a dynamic market, and governmental policies skewing the tide in favor of bigger corporates. Culkin and Smith (2000) and Lepnurum and Bergh (1995) feel that there exists no appropriate governmental involvement to resolve the situation.

The major downfall is due to lack of finance (Corman and Lussier, 1996), lack of understanding of demand marketing decision by small players (Kotler,2000; Corman and Lussier,1996).

Micro, Small and Medium Enterprises (MSMEs) are major employers (Audretsch et al., 2002). It is also a fact that small firms do not adopt marketing concepts to the same scale as adopted by the large organizations (Pollard and Jemicz, 2006), and those practices in SMEs are based on requirements, and varies with respect to the levels of sophistication and effectiveness (Hill, 2001).

Kotler (2004) defines demand marketing as a set of principles for adapting marketing concepts to changing circumstances. All firms aim to survive and compete in the market through different business models. Its success may be through internal capabilities or through external differentiation. Business performance is achieved by providing value added products to the customers. This value creation happens to be the marketing strategy

for most of these firms. A firm achieving competitive advantage and maintaining it consistently results in the creation of value based products (Saloner et al. 2001). Today's product, technology or even life cycle of an organization is becoming shorter and therefore necessitates a serious thought to create and disseminate the innovation required to succeed. Creativity and innovation are the two components responsible for maintaining the firms competitiveness during today's knowledge-based economy.

Marketing activities of the firm is normally established with the customer through proper communication. This communication happens through the exchange of information. This type of strategy will be effective for a firm, when the competition is considerably low. Now the scenario is entirely different, since the customer expects value added products for the money, which he pays for and they are more of demanding type with respect to the quality (Roy and Chattopadhyay, 2010, p. 69). There is a higher tendency of changing brand among the customers as a result of higher sensitivity to price as ever before. On one side, customer 's preferences are highly dynamic and on the other side, it is a challenging job for a firm to offer those features. Intense competition, higher customer expectations and multiple variants have made it a problematic job for the firm to retain the customer throughheffective marketing communication. Several advertising tools are employed by the firm tomarket the product to customers.

2.8 CONCEPTS OF INNOVATION

Innovation is the process of coming up with a new method, idea, product that conforms to be desires of the consumers. The process has to be technologically achievable and economically practical. To achieve this, an organization has to be flexible enough to continuously improve on their attributes. There is strong evidence to suggest that organizations that are focusing on technology driven innovations are successfully growing in terms of profit and paving the way for betterment of the nation.

An innovation first attitude stems from a deep expertise in their field and is independent from the data. A strong proficiency in the sphere of influence of the concerned organization

together with practical assumptions develop a suitable innovation practice (Nonaka and Takeuchi, 1995).

An experience can be learnt from the lessons of Japanese when innovation lagged continuous improvement and this resulted in a collapse of their economy (Crawford,1998). Innovation is achieved by multiple methods, be it making visible changes to the end product or redesigning how the system that processes the product is to be aligned.Technology is at the heart of innovation today and it was the same when Shingo spoke about delighting consumers through improvements in technology in 1986. A visionary whoelaborated on the need for refining and redefining mechanisms to bring out process and product innovation and proactively counter the fluctuations in the market.

Adjusting to the trends is a clear approach for an organization to end up lagging behind the market; as an alternative, during these times of unprecedented competition, organizations should focus on exceling through innovation (Kay, 1993; Patel, 1999).

The role of the management to provide adequate support and an environment that supports the growth and performance through continuous and conscious disruptive measures through innovation. (Ahmed and Abdalla, 1999).

A lot of emphasis has been placed on technological innovation but according to Drucker (1994) that is simply just one among the seven techniques that can be adopted to innovate. Over the course of the years, a strong theoretical foundation is presented prior to having an innovation. This ensures that knowledge is not consumed without a full practical implication of the risks and exposures (Sundbo, 1998; Bright, 1969).

An innovation can be a minor change to an existing product/process etc. or a deviation from the known standard practices. They are commonly referred to as incremental and radical forms of innovation (Green et al., 1995). It is the role of the management to ensure that the administration is engaged in absorbing the policies of innovation and adoption of these guiding rules to bring about a change in the output process (Cooper, 1998).

The market today demands organizations to be flexible to absorb the fluctuations and implement revolutionary innovation practices (Leifer, 2001), and yet, only a few number

of firms follow disruptive innovations and enhance their capability of doing the same for their survival.

Despite benchmarking innovation practices across many an organization, only a handful are aware of the key driving factors for successful innovation (Christensen, 2003). To innovate is to succeed, to succeed is to strive where many organizations are fighiting to be alive. A powerful tool in the hands of a few firms that have used innovation to create an ambience for themselves to attack the market head on and capture consumers showcasing their ability to capture the latent desires of the marketing environment (Damanpour, 1996; Higgins, 1995)

Small industries are the backbone of the Indian economy. The regional development is well balanced by these small sectors and hence it is one of the main concerns for any government, which makes several policies for its enhancement.

It is very clear from the available literature that the small industries contribute remarkably in terms of innovation, though it may be varying from country to country (Lall, 1992; Rothwell, 1991). Studies done till date is mainly on the large scale industries which are technology based (Brenner, 1987), and small sectors are relatively neglected (Hausman, 2005).

2.9 MSMEs AND THEIR INNOVATIONS: THEORY AND TRENDS

Most of the economic literatures gives crucial information about innovation. Both macro and microeconomic determinants and issues related to innovation are studied by most of the economists and managerial studies normally concentrate on the variables, which are making firm innovative (Fagerberg and Verspagen, 2009). The basic research is applied into developing product, which is useful for a market. The transition happens from the university lab to the real market field (Godin, 2006).

Many practitioners firmly believe in continuous innovation wherein they can explore, experiment, build, imitate and achieve new breakthrough by setting up unique production process (Dosi, 1998). Innovation is the result of converting ideas into real tangible products or process, marketing or service or technology (Amabile, 1988).

2.10 INNOVATION IN MSMEs

MSMEs exhibit non-linear innovation process. This technological development is affected by the several socio cultural factors. Social relation guides these small firms in implementing the innovation process (Cooke and Wills, 1999; Murphy, 2002).

The firm's performance and innovation dimensions are having a relationship in case of small-scale industries (Verhees, 2005). It is noted that, in general, MSMEs innovation is not formal but it happens as a result of experimentation and research highlights the informal process adopted by MSMEs (Abereijo et al. 2009). The drive for innovation arises out of the motivation and the vision of an entrepreneur (Kristiansen, 2003).

The environment becomes a source of inspiration for innovation in the MSME sector (Harmaakorpi, 2006). Firms that are small in nature subscribe to the custom of having innovation activities internally (Subrahmanya et al. 2002). Organizations that are practicing a continuous approach to innovation are involved in incremental innovation rather than organizations not subscribing to it on a regular basis (Klomp and Van Leeuwen, 1999). Product innovation is the result of in-house R&D and Process innovation happens due to the installation of machines.

Most of the Innovation happens due to the quick decision making of entrepreneurs who will be more flexible as compared to the firm run by government agencies. Normally it is found that most of the small scale entrepreneurs are less qualified (technocrats are an exception) and less informed about acquiring patents for their innovation. These small sector also lack in planning for the long term (Clancy, 2001).

2.11 INDIA AND HER EXPERIMENTS WITH INNOVATION

Indian CEOs firmly believe that innovation is the key to unlocking success in the present day context (IBM, 2004). India is in the middle of a growth trend with new entrepreneurs setting up show and a recent survey indicates the affinity shared by the entrepreneurs to incorporate innovation as part of their vision for attaining a competitive edge (Berger, 1998). India depends on these skilled assets to power her economy by translating

knowledge into a viable product that puts her on the world map with an importance never before accorded to her. Despite the desire to innovate, Indian firms are lagging behind developed countries like US, Germany, Japan etc. and the emerging economies such as Brazil, China and Russia (Pillania, 2007).

Europe is leading the way followed by Japan, as the firms are gaining momentum by utilizing the concepts of innovation and prioritizing R&D despite facing financial limitations (METI, 2005). The relationship between R&D and SME performance are undeniably positive based on the study done in Taiwan (Shieh, 1992). R&D orientation has resulted in increased productivity and brought to life many products from conception owing to innovation (Chiao et al., 2006).

Organizations open themselves up for newer market needs and desires when innovation practices are adopted and strive not only to meet consumer demands but also exceeds them. Innovation is a fundamental aspect for a firm that wants to tap the length and breadth of opportunities and also explore new markets owing to the products that they have created and thriving in an ever dynamic market (Han et al., 1998).

Innovation welcomes novelty; novelty leads to how a consumer views progress implying a huge perception change towards the company, which enables an organization to take advantage of the new market that is created (Dewar and Dutton, 1986). The same when captured from the view of the firm, means that radical changes made capture the desire for converting knowledge to a commercial product. (Damanpour, 1991).

Radical innovation therefore takes competition head on and increases the arsenal of knowledge possessed by an organization, which is in contrast to incremental innovation where the expansion of knowledge is limited (Johne and Davies, 2000). The productivity of a firm directly depends on the methodology adopted to bring process innovation to life at the company.

The different dimensions of innovation are not mutually exclusive. Weerawardena (2003) defines innovation as creating and coming up with new ideas to create products/services to customers and ensure growth for an organization. Despite this comprehensive definition,

it is important to analyze each kind of innovation as proper innovation management techniques can be recommended.

The key factors for success of an organization can be broadly categorized into internal and external orientation (Salavou et al, 2004). External factors are those that define the level of rivalry in the market, presence of similar goods/presence of heterogeneity and affordability to create a technological turbulence.

Other factors that are predominantly as detriments to innovation in the literature are industry concentration and barriers to entry (Kraft, 1989). Internal factors are measured from the point of view of strategic decisions and organizational failure to to provide an innovation platform to the company (Gatignon and Xuereb, 1997).

A firm in order to be seen as innovative must orient itself to the market and this has led to a positive impact on performance (Matsuno et al., 2002). A market-oriented firm can therefore thrive as it is able to anticipate the needs of the market and develop unique products/services (Day, 1994). Implicit need is identified through effective usage of market knowledge and converted into a concrete response. This will be effective only if the firm is capable of utilizing the resources effectively. It can be seen how important it is for a firm to be aligned both internally and externally balancing between the technological needs owing to the external factors and also positioning itself as a platform for innovation on the inside.

2.12 SMALL ENTERPRISE AND IMPACT OF INNOVATION

Innovation is the key for a firm making or breaking in todays' cutthroat market. Majority of the organizations understand the importance to be innovative whilst only a few actually implement the principles that guides innovation (Ahmed, 1998).

Today, firms many firms view innovation as a risk as they do not know how to approach innovation to be successful. It is firmly established that only those firms that appreciate how to optimally utilize innovation are largely successful while the other small players continue to lag (Ahmed, 1998). An organization has to play a balancing act between flexibility and rigidity, between freedom and control to promote innovative practices at the

organization and have a culture of openness, autonomy, and empowerment. (Martins and Terblance, 2003).

Today, innovation is seen mostly at the level of organizations. This is highly encouraging as it talks about how the organizations continue to strive to create new ideas and bring them to life. Although, the cost of innovation is higher today than before, so has the availability of technology and knowledge. We are living in unprecedented times, efforts must be made to innovate through a collaborative determination of individual knowledge, and the awareness of technology know how.

(Paul Trott, 2002).

2.13 RESEARCH GAP BETWEEN DM AND INNOVATION PERFORMANCE

It is evident that there is very limited work done with respect to identifying how the factors of DM influences the performance of innovation in an organization. The MSME sector empowers many to lead dignified life by facilitating many to come out of the poverty line. Our research is now more important than ever to realize the dream of a self-reliant India. The MSME sector continues to be nurtured through policies and money inflow and the research aims to determine how an MSME can become India's dark horse against global powers to catapult India's growth to greatness.

2.14 PROPOSED RESEARCH METHODOLOGY

The purpose of our research is to determine how the overall functioning of a firm will progress using DM and Innovation Performance in tandem. The thought has led us to develop a unique framework that captures the four dimensions of DM and the five dimensions of Innovation Performance.

Our research proposes to develop four models that capture the effect of the dimensions of DM on each of the factors of performance of innovation. The framework that we will be developing through our research will fill a crucial void in identifying those set of factors that are hampering the growth and development of an MSME. WE further explore those

variables, which are crucial in the progress and maturity of an MSME and how the tool is to be used to improve efforts to achieve a more sustainable growth.

2.15 SUMMARY OF REVIEW OF EMPIRICAL LITERATURE

Available sources of literature indicate that the majority of the research conducted were aimed at defining the performance of organizations outside India who have incorporated DM practices. Minimal efforts have been to capture the impact of DM on Indian MSMEs and the research is an attempt to mend the gap. The research study can be narrowed down to a particular sector/industry/region.

The analysis gives details on methodology adopted, variables taken into consideration and the context of the study. The various dimensions of DM were explored and measures were determined to identify the impact for Indian MSMEs. Different studies have adopted various methodologies of multivariate analysis techniques. The sum and substance of the review of literature along with the major gaps which can be further investigated are identified as follows:

2.15.1.1 Concept of newness with respect to industry boundaries, which could be investigated by incorporating objects as part of the measures of innovation.

2.15.1.2 Business Landscape effect on performance of innovation could be investigated.

2.15.1.3 The time gap between DM implementation and innovation performance realization, which could be investigated by incorporating matter related to speed of adoption and organizations responsiveness to changes.

2.15.1.4 Multidimensionality of DM and its influence on Innovation, which could be well brought out through DM constructs.

2.15.1.5 Extent of compatibility could be explored by understanding the relationship between DM and Innovation Performance.

A research may be carried out for addressing some of these research gaps though not all. Considering all the above and the feasibility of research, the problem formulation and the objectives are discussed in the next chapter.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 THE APPROACH

Our research work is a survey based quantitative research done by taking a sample of manufacturing firms claiming to be adopting Demand Marketing and Innovation.

Considering the Indian business scenario post liberalization, as discussed in chapter 2 under section preamble and rationale for research', it is observed that innovation has become basic requirement for any organization to achieve competitive advantage. Demand Marketing is a means of organization achieving excellence through meeting both short term and long-term goals. Our work investigates and brings out the relationship between the dimensions of DM and innovation performance enabling firms to gain a competitive advantage.

3.2 FORMULATING THE RESEARCH PROBLEM

A research problem requires an exploration of the identified problem. Such exploration includes surveying literature, observing and studying the system, discussion with experts, attending conferences and seminars and creatively reflecting on the problem area (Krishnaswamy, K. N, *et al.*, 2006). The components of a research problem and the corresponding factor with respect to the current research are:

- An individual or group – which is the manufacturing organization in India.
- Objectives to be attained – Improving profitability and attaining competitiveness through the Demand Marketing, and thereby improving the innovation performance.
- Alternative courses of action – Different dimensions and approaches of Demand Marketing as alternatives.
- Choosing a course of action, which helps achieving the objectives – Which dimensions of Demand Marketing need to be emphasized?
- Environment – The environment consisting of all the stakeholders of the manufacturing industry.

In our current study, considering the availability of resources and the aspect of costs and co-operation of multiple parties, we identify a course of action to achieve

organizational effectiveness and objectives. It is important to develop a thorough understanding of the business domain and phrase the problem in a manner that benefits the organizations in the end.

3.3 WORKING HYPOTHESES

The goal of any hypothesis is to be stated in as specific a manner as possible to ensure an accurate evaluation can happen (Krishnaswamy K N, *et al.,* 2006). In our study, the hypothesis is an evocative statement that draws relationship between two variables. We have come at this hypothesis to ensure it reflects the area of research and captures our tentative notions. Another purpose of declaring our hypothesis is to ensure we are on the right track during the course of the research and keep an optimal level of productivity in line with our goals.

Some examples are:

- There exists a relationship between Demand marketing and innovation performance within manufacturing organizations.
- Demand Marketing is helping organization to improve innovation performance and attain competitive advantage.
- Demand Marketing is promoting the innovation performance in Indian organizations

3.4 TYPE OF RESEARCH

We arrive at specific answers to our questions by applying principles of scientific procedures. The objective of research is to investigate and bring to light the information, which is unknown.

We will be utilizing the principles of a descriptive research for our study. The goal of the research is to investigate and report the events that have happened or is currently taking place. We do not aim to control the variables but only report our findings on the relationship between our variables. We collect the information through survey and arrive at a logical consensus using predictive analysis. We further look into the correlation amongst the

variables to explain if the data exhibits patterns of multi-collinearity and the approach taken to keep the most relevant factors.

3.5 RESEARCH OBJECTIVES

Considering the vast number of sectors and industries in India, it becomes a necessary to evaluate our research trying to evaluate specific industries as part of the scope of the research. We have defined our objectives based on the gap identified and attempt to study the impact of DM with respect to Innovation Performance from the point of view of an Indian MSME. The studies in this segment are few, far, and very limited from the scope of an Indian context. The research objectives are developed keeping these in mind.

3.5.1 Capture the relationship between DM and Innovation Performance by developing a research framework.

3.5.2 Determine a measuring instrument to ensure the reliability and the validity of the study.

3.5.3 Conclude on the role of the importance of the concepts of DM on the perception of innovation performance in an Indian organization.

3.5.4 Report on the key aspects of DM and their significance on the parameters of Innovation Performance to identify those features that require immediate focus and can provide with long-term impact.

3.5.5 Provide apt recommendations that are to be applied to enhance the adoption of DM and enable Indian MSMEs to achieve sustainable growth.

3.6 PROBABLE OUTCOME OF THE RESEARCH

The aim of this research is to increase the awareness for the need of DM and analyze how it influences Innovation Performance. The work gives insights into the minds of the Indian organizations who are looking for forming suitable strategies to remain relevant in the globalized era. The work also details how organizations can increase their own competitive edge to thrive in a dynamic market. The research also looks to aid those organizations in

defining the vision and mission statements keeping in mind the concepts of DM and the relevance of Innovation Performance to attain a sustainable growth.

3.7 RESEARCH DESIGN

3.7.1 Ex Post Facto Research

Post the formulation of a research problem, it is important to express the same in terms of a research design. The research design lays out the methodology that would be followed over the course of the study to gather data. The design document informs on the relevant data that would be focused on for the study (Kothari, 2006). The research, which is planned, is an ex post facto research, which is carried out with regard to event or influences in a phenomenon after they have occurred or as they are occurring. It is concerned with non-manipulated variables of a phenomenon. Ex post facto research is classified into three categories – exploratory, historic and descriptive.

The research undertaken for the current investigation is the descriptive research, which is fact-finding with interpretation. It is the tool to develop analysis of data, which helps in developing tentative generalizations and hypothesis based on the understanding of patterns hidden in the data.

There are two kinds of descriptive studies viz., Cross-Sectional and the second being Longitudinal. Cross sectional studies are common and cut across large sample. In longitudinal studies, panels are employed for several periods and sample elements are fixed. The cross sectional study can be a field study or survey. In field study, the depth of study is greater with a small sample; on the contrary, in field survey there is greater coverage of population and greater scope due to large samples and summary statistics being the majorly useful for generalizations (Krishnaswamy K N, *et al*, 2006). In our study, we have used a cross sectional study, cutting across a large number of elements, which is a field survey at a point of time.

Field survey covers large heterogeneous populations; it covers hypothesis formulation which follows testing and analysis of the non-manipulated variables. Information about past occurrences, opinions about current events, thinking about future happenings etc., can

be effectively captured by this method. Information on beliefs, expectations, or attitudes can be accurate provided the questions are direct or indirect, appropriate to the information sought. The choice of survey method adopted in current research is the self-administered survey. These have become universal and used in almost every information gathering area. We have incorporated a rigid research design making incorporating multiple precautionary measures to counter bias and to improve reliability. The data is collected to ensure a truthful portrayal of the state of affairs is captured to study the relationship amongst the factors of Demand Marketing and Innovation Performance. This approach also enables us to tackle bias owing to the grid based rigid research design. To ensure reliability, we pre-test the measuring apparatus. Further, we have invoked a non-experimental hypothesis design for the current study.

3.7.2 Research Design Decision

Only by seeking the right questions can we arrive at the desired answers. In our attempt to establish the relationship amongst the various factors, we are pursuing answers to select questions. The table below provides an idea regarding the different sets of Q&A that are identified for the research.

Table 3.1: Research Design Decision Q&A

Questions	Answers
What is the research related to?	To quantify the relationship between the factors of DM and Innovation Performance
What is the purpose of carrying out the research now?	In a globalized economy, Innovation can enable an MSME to thrive in a dynamic environment
Where will we be conducting our study?	Our study will be focusing on the Manufacturing Organizations of the Indian MSMEs.
What is the kind of data that is required for the study?	For the research, we need primary data.
Where will we find the information for the study?	We will be conducting a survey to capture information's from companies of Indian origin that are following the principles of Demand Marketing
What time period is the study concerned with?	We aim to look at the Indian market post 1991.
How will the sample be designed?	The samples are designed through a non-probability sampling technique.
What is the data collection procedure?	To collect the data, we will be designing a questionnaire
What is the proposed method to evaluate the data?	We will be evaluating the study through an array of Multivariate Statistical Techniques.
What is the nature of the report?	In our study, we will be conducting an ex post-facto research.

3.7.3 APPROACHES FOR GATHERING AND ANALYZING DATA

The objectives of the research are identified in the previous chapter. These objectives guide the path for performing suitable analysis on the data. The following approach has been adopted for arriving at a suitable research design:

3.7.3.1 References taken from the published journals and literature to search for the constructs of both demand marketing and innovation performance.

3.7.3.2 Investigating the feasibility of the development of a measuring instrument through demand marketing, innovation, research methodology references.

3.7.3.3 Discussions with the managers of MSMEs who have adopted demand marketing and innovation performance.

3.7.3.4 Discussions with fellow researchers for getting their viewpoint and feedback. Viewpoints and feedback were obtained from 10 fellow researchers.

3.7.3.4.1 Discussions with the senior authorities at the Board of MSME Development Institute, Bangalore regarding the issues related to MSMEs

3.7.3.4.2 Feedbacks obtained from the MSMEs Trade fairs organized by Small Scale Industries Association.

It is important to understand how the results are going to be interpreted if statistical methods are used for data analysis. This interpretation is the contribution of the researcher.Hence, utmost care was taken while collecting data so that the required dimensions of demand marketing and innovation performance are covered and devoid of bias. The constructs of measuring instruments are developed by considering this aspect in mind.

The primary aim of Demand Marketing is to successfully accomplish lasting goals of business landscape be it with or without innovation. It facilitates in identifying the relationship between business landscape and innovation. Demand Marketing is subject to measurement based on the aspect of customer focus, competitors focus and suppliers focus. Innovation aims to bring out something new within the organization. Some of the innovation measures like speed of innovation and newness vary drastically for organizations belonging to various industry groups.

All types of innovations that usually happen in an organization are taken into account during its classification here.

Hence, all the innovations are classified under different categories. Overlaps occurring in definitions have been avoided as much as possible. Efforts are taken to ensure that the connotations and the measures are clearly defined in a way that it enables managers to distinguish between the types of innovations.

The studied literature refers to organizations outside India and the present study is from the point of view of Indian organizations. In order to understand in detail about demand marketing and innovation, organizations were visited to study the cases. The additional activities carried out in this connection are detailed as follows.

In manufacturing sector, organizations were visited and discussions were carried out with senior managers of the organization on the research objectives. These discussions were fruitful in the sense that, it gave a clear idea about the various Demand Marketing practices

followed within their organization. The organizations visited were mainly manufacturing firms where the Demand Marketing practices are made in some or other form though they are not formally called like that. Regarding innovation performance, organizations informed that they have a continuous improvement program to bring out new products. Some organizations reported that they have a committed top management who give importance to quality.

3.7.4 IDENTIFYING CONSTRUCTS FOR EVALUATION

A construct is a concept that is captured in a unique manner to suit a specific argument or a premise. Theoretical constructs are those that are linked unequivocally towards a particular notion or idea (Krishnaswamy K N, *et al*., 2006).

The identified factors for our study are developed keeping in mind the literature survey and our objectives. The primary data collected and the creation of the measuring instrument is on the basis of the identified factors for Demand Marketing and Innovation Performance. Innovation is a concept that can be explored by a firm across units. It can invest in innovation through the concepts of process and product innovation. Each of these acts by a company is an attempt to change the current methodology and drive changes that enable competitive advantage. A company can invest in technology led innovation or systems first innovation. Considering the number of approaches an organization has at its' disposal to try to be innovative, it is important to determine metrics that can capture the efficiency and success of these innovation practices. A generic are of measurement to look at first is the profitability. For an organization, this only reveals half the story of innovation success as it is necessary to evaluate key outcomes such as consumer satisfaction, time to scale up the volume of production be with speed of output or the ease of setup for operations. Hence, capturing the performance of a firm in the light of the above mentioned parameters reveal the innovation tolerance of an organization.

To evaluate how an organization fares with respect to Innovation Performance, we have determined five key constructs while we have developed four key constructs as the factors of Demand Marketing.

Demand Marketing constructs:

3.7.4.1 Business Landscape

3.7.4.2 Marketing Mix

3.7.4.3 Brand Equity

3.7.4.4 Technology Management

Innovation Performance Constructs:

3.7.4.5 System

3.7.4.6 Product

3.7.4.7 Technology

3.7.4.8 Process

3.7.4.9 Innovation Management

The following is the basis for selection of the four constructs of Demand Marketing and five constructs of innovation performance:

3.7.4.10 The identified factors capture the multiple facets of DM that enable an organization to be successful.

3.7.4.11 The identified factors of Innovation Performance capture the multiple facets that a firm can assimilate to be considered innovative.

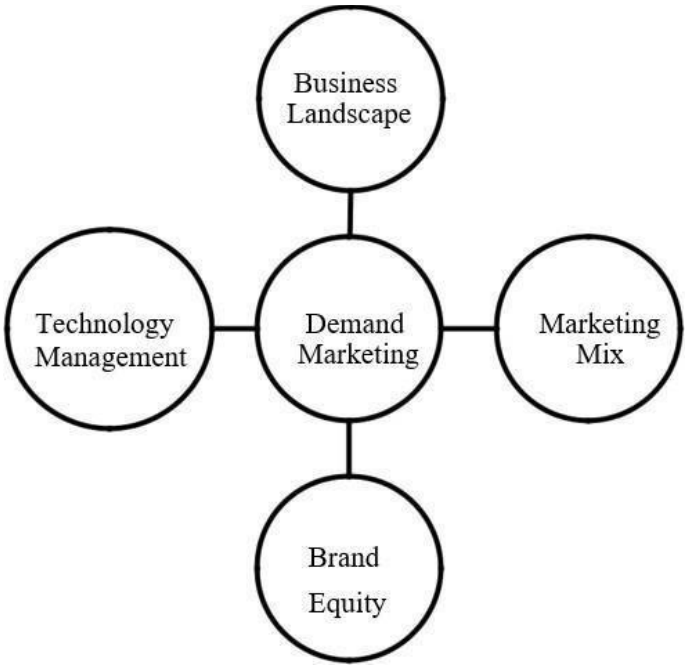

Figure 3.1: Factors of DM

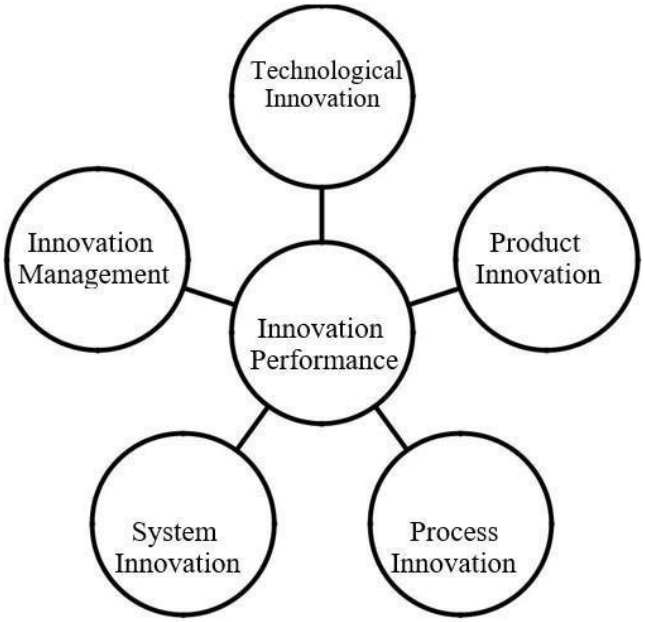

Figure 3.2: Innovation Performance Factors

3.7.5 Defining the Constructs

Business Landscape: The purpose of this construct is to depict how an organization can be profitable by analyzing how the managers in the firm take decisions based on the competitive environment around the business. Business Landscape also captures how an organization conducts itself in the eyes of the law and how the firm establishes internal authority through policies and guidelines.

Marketing Mix (4P's): The key concepts of DM are acknowledged through the understanding of the product the organization produces, the price at which it aims to sell to realize profit potential, the place and the market research around the place to ensure the product is positioned and promoted optimally to achieve long term growth.

Brand Equity: The ability of a firm to sell its' products become easier once the consumer has a positive image associated with the brand. The brand equity construct aims to identify how an organization positions itself in the minds of the consumers and also the importance it provides to be an eminent brand in the market.

Technology Management (TM): At the heart of an organization, lies technology and how it is managed can play a incredibly substantial role in accomplishing a competitive advantage and the same is encapsulated in the TM construct.

Technological innovation: The construct captures the process of how an organization embarks on a journey where the importance of technology as a source of innovation has been determined to be a critical factor for market success.

Product innovation: The construct measures how an organization reacts to the dynamic needs of the market by adopting development of new products, changes in design of established product line, or use of new materials/components in the manufacture of existing products.

Process innovation: The construct assesses how adept an organization is in the creation and subsequent introduction of a product that is either new, or an improved version of an established product.

System innovation: The construct aims to quantify the importance of dialogue amongst senior leaders in an organization to refine and adopt strategies swiftly and thereby enabling the journey of an idea to a product/process transition faster and smoother.

Innovation management: The construct aims to analyze how an organization reacts to an opportunity in the market and use it to create and introduce new ideas, processes or products. The construct helps determine how open an organization is to change and how it manages change within the organization.

3.7.6 Development of The Research Framework

Conceptual framework is a precursor to hypothesis generation. A conceptual framework identifies the relevant variables, discusses relationships amongst variables, indicates the nature and direction of relationship, explains the expected relationships and develops a schematic diagram (Krishnaswamy, K N, *et al*, 2006).

The goal of our study is to determine and quantify the relationship between the factors of DM and the factors of Innovation Performance. The study throws light on how an organization views the roles of DM and how Innovation Performance are a key for the organization to sustain in a dynamic market environment. The below framework captures the objectives of the research and findings are highlighted based on the measurement of the said constructs.

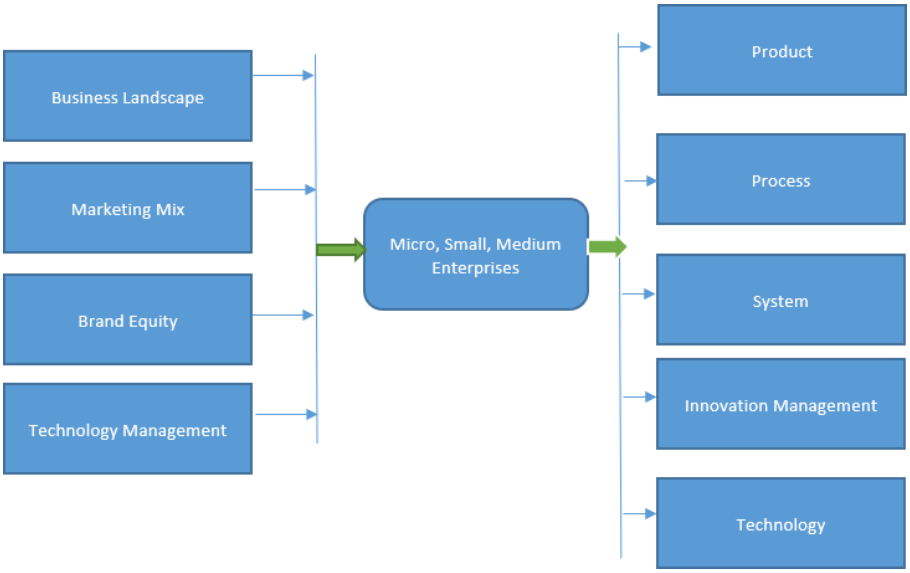

Figure 3.3: Research Framework

This Research framework schematically depicts the

3.7.6.1 The basic objectives of research

3.7.6.2 The scope of research

3.7.6.3 The relationship between the variables that are to be investigated

3.8 RESEARCH DESIGN METHODOLOGY

3.8.1 Development of Measuring Instrument

In research hypothesis, theories are tested using empirical data that is readily available. Good control is exercised in those situations where data is collected for the study to ensure good quality data. Data measurement is crucial when quantitative analysis is carried out as part of hypothesis testing.

The means of measuring data for a management research are as follows:

- A standard measuring instrument which is already developed, tested and validated can be administered.
- Developing a new measuring instrument which is specifically designed for a purpose can be administered.

- Using the data which is already measured.

We are adopting the second way of administering the instrument that requires testing, validating and then operationalized. The technique of developing the measuring instrument involves a four-stage process. The four stage processes – concept maturity, dimensionality design of the concepts, collection of indicators, and index development score are detailed below.

3.8.2 Concept Maturity

Once we have our variables defined, it is important to ensure that we have developed a grasp over the factors. Towards this extent, we define our hypothesis that narrates the relationship between an independent and a dependent variable.

Dependent variables are those that are affected by changes to the nature of the independent variables. The framework for the research is developed in manner to ensure that our study captures all the relevant variables that bring about fluctuations in the dependent variable and not due to any external/superfluous factors.

Independent variables are not manipulated here and hence this is non-experimental hypothesis testing. In the current research, the variables are identified as given below:

The constructs of Demand Marketing (DM) are considered as independent variable. The level of DM implementation varies from organization to organization. The significance given for each of the constructs of demand marketing varies from one company to another and its evaluation indicates the level of its implementation in each organization.

In the current research, the constructs of DM are the independent variables:

Business Landscape	X_1
Marketing Mix	X_2
Brand Equity	X_3
Technology Management	X_4

It is attempted to explore whether the innovation variables are dependent on the independent variables. Organizations can be innovative in many ways. Say, if one

organization is lagging in process innovation, it may be doing well in system innovation. The assessment of these constructs indicates the extent of the performance of an organization with respect to innovation. This value is a measure of the dependent variable. In the current research, five dependent variables are the variables of innovation pertaining to:

Technology	Y_1
Product	Y_2
Process	Y_3
System	Y_4
Innovation management	Y_5

To evaluate and determine the nature of the relationship between the variables, we gather data from specific MSME organizations through our measuring instrument i.e., questionnaire.

3.8.3 Dimensionality Design of the Concept

The dimensionality design is the stage of the research where we measure the concepts that have been developed as part of the prior steps. This is achieved by following the idea of item analysis. The goal is to determine how well a layer of differentiation is seen between those organizations that are performing well and those that are not on the basis of the summated score through the measuring instrument.

To better understand this, let us consider the set of statements for Marketing Mix, which are used to evaluate DM:

3.8.3.1 We aim to engineer a product with excellent quality

3.8.3.2 We provide unique attributes that enhance our competitive advantage in the market

3.8.3.3 We offer a wide variety of choices for our consumers to select from

3.8.3.4 We prioritize on the outward look and feel of the merchandise

3.8.3.5 We aim to increase customer satisfaction by offering excellent service.

and the like.

Similarly, to measure DM, suppose the items, which are a set of statements, which describe the construct Brand Equity, are as given below:

- Brand Equity plays a crucial role in consolidating the product image
- We consciously work to increase our brand equity
- Products and services that offer functionalities that are innate to our offerings increases brand
- Segmenting, Targeting and Positioning is willfully performed to increase brand equity.
- and the like

Innovation is measures using parameters such as the ability of the firm to be in a position to use the first mover advantage, the inclination to newness, previous intellectual property applications etc. that can be included in the items of the dependent variable construct. Consider the case of Process Innovation, a series of statements that depict the role of the variable are:

- As an organization, we keep updating our practices to reflect the latest trends in the market
- Our technology adoption rate is high owing to our innovate mindset and change management
- We prioritize to creatively disrupt the flow of the system in the organization to update our technology stack
- The products and services are delivered using the latest methodologies to increase cost optimization
- We have a history of taking an idea from inception to commercialization
- and the like

Similarly, the set of statements that aim to determine the value attributed by an organization to innovation management are:

- Our senior leaders have an innovation mindset

- As an organization, we have programs and policies that bring out the creativity in our employees
- The firm has a culture of openness and receives new ideas positively
- The latest practices are made aware for the employees and programs are in place to ensure learning is a continuous process
- and the like

The items identified become the elements of questionnaire. The Annexure presents the detailed questionnaire.

3.8.4 Collection of Indicators

The primary aim of defining the indicators is to create a scale that can capture the awareness, viewpoint, expectations etc. of the respondent.

The metrics of quantifying the opinions expressed by the concerned person is achieved by scaling. The scales are classified into nominal, ordinal, interval and ratio scale. We are using interval and ratio scales for collecting metric data. The collected data for the current research is an interval type data.

One of the most widely adopted decision metrics is the Likert Scale. The scalepossesses a series of questions to which the responded can agree or disagree with to a certain degree. These reactions are captured and are quantified in a pre-defined manner.The mean of each of the measures are considered as a representation of the viewpoint of the organization towards a particular subject or construct.

The Likert scale is not independent from having a downside, yet despite the limitations, the measures that are captured on the scale can be correlated against other factors to understand the extent of agreement or disagreement of a view from the firms' perspective. (Kothari, 2006).

The extent to which the organizations recognizes the impact of DM and Innovation Performance can be captured by measuring the opinions expressed by the firm. The number of statements (items or sub variables) for each variable of DM and innovation performance is given in the table below. The initial count of the items is intentionally

kept high bearing in mind The number of items is kept at a higher level considering the following characteristics:

- The need for an element of redundancy, which is desirable and will minimize the bias and errors while responding
- The possibility of elimination of items while going for reliability and validity assessments by appropriate methods

3.8.5 Rationale For Selection Of Items – Selected Illustrations

While developing the items/statements, which describe a particular construct, utmost care was taken to see that sufficient redundancy is built in as well as overlaps are avoided for a more meaningful analysis. The following illustrations indicate that care has been exercised while considering the inclusion of items for the various constructs.

An item of the product innovation construct (item 2) which although seems inappropriate, has been included to evaluate an indirect relationship with reference to change in technology, which is required in the new product development process. For example, a tire manufacturer while developing a new product like a steel belted tubeless radial tire may require latest technology for its testing.

The above reasoning is further expanded to include the concept of Process Innovation through which new products and services are announced to the market. This can happen due to innovative processes also, which are changing. Here the item (item 6) is indirectly investigating whether any such process innovation are there or not.

Many of the troubles related to appropriateness and redundancy are suitably resolved, during the questionnaire analysis as well as during the validity establishment by the *confirmatory factor analysis wherein the most inappropriate items are deleted.*

3.8.6 Questionnaire Development

Questionnaire is a tool to collect primary data via survey for a huge quantity of samples. The purpose of adopting a questionnaire is to ensure we can provide a fresh explanation to our study.

The tool enables us to collect the opinions of the leaders of the organization regarding specific matters of the study. The table below highlights the initial number of items across each construct that are considered:

Table 3.2: Number of items across constructs

Demand Marketing Variables	Items	Innovation Performance Variables	Items
Business Landscape	12	Technological	10
Marketing Mix	12	Product	10
Brand Equity	12	Process	10
Technology Management	12	System	10
		Innovation Management	10
TOTAL	48		50

The nature of the questionnaire has been developed by paying appropriate care to the sentence formation, the arrangement of the questions, the structure that the questions follow etc. The survey is developed keeping in mind our target audience, i.e. leaders/top management in the organization who are involved in taking key strategic functionalities and make decisions that are geared to make the firm profitable. As a standard practice, prior to the start of the survey, each participant is made aware of the information shared would benefit the research and seek support and cooperation.

The structure and the flow of the questions are designed in such a manner that initially, we collect the information related to the nature of the organization such as the name, the products that are developed, location of the organization, the employee strength and the awareness regarding DM initiatives of the organization.

Once we have the basic info, the next two parts of the survey capture the metrics that are required to quantify DM and Innovation Performance. As seen in the table above, against each construct, we have developed specific assertions. The leaders/participant in the survey is expected to indicate the extent to which they either concur or oppose

against the assertions. The leaders can invoke the support of other leaders in the organization and the response can be made once all the leaders have been consulted. To simplify the task of providing the extent to which the leaders in the organization agree with a particular assertion, we have provided a comprehensive instruction to help facilitate the decision-making process.

The data is collected using Likert Scale. The range of the scale is from 1 to 5 with:

- Indicates a strong disagreement
- Indicates a mild disagreement
- Neutral
- Indicates a mild agreement
- Indicates a strong agreement

The annexure provides for more details on the questionnaire development methodology adopted for the study.

3.8.7 Index Score Development

The initial part captured by the questionnaire captures the description of the nature of the organizations involved in the study and has been published in subsequent chapters.

Specific characteristics, like organization breakup, industry breakup and DM initiatives are explored in the first part. The second and third parts are used for the development of an index of DM and innovation for the organization and for doing a detailed statistical analysis.

The index score is developed by combining multiple indicators which relate to the measure of a concept.

In the current research, the concept of DM has four variables and each variable has different measurements from the different statements. It is essential to combine them into a single score. The methodology adopted for getting an overall score for each dimension is the summation of the scores of different measurement statements and taking its average. More details on the creation of such a summated data are discussed in subsequent chapters.

For example, the score for the marketing mix for which twelve statements (items) are there wherein the respondent has given response values ranging from 1 to 5, the score is given by

Score for $X_2 = \Sigma$ (response values for the statements) / 12

Where $1 \leq X_1 \leq 5$

The remaining constructs of DM and Innovation Performance are summated along the same lines.

3.8.8 Data Acquisition Methodology – Justification

In the current research, the responses are taken from interested and involved parties' rather than from stakeholders. The clarification and justification for the exercise of taking responses from the interested and involved parties is given below:

3.8.8.1 The evaluation methodology adopted is a self-assessment process

3.8.8.2 Literature survey had indicated that similar methodology has been adopted for similar research.

3.8.8.3 The organizations from whom the responses are collected belong to manufacturing sector who have adopted demand marketing in one or the other way.

In this context, the stakeholders of one organization are entirely different from the stakeholders of another organization and their comparison adds to complexity.

3.8.8.4 Sufficient redundancy has been incorporated in the questionnaire to ensure that chances are less likely for giving a completely affirmative reply to the statements.

3.8.8.5 The current research gives an initial insight into the relationship between DM and Innovation as perceived by the management of the organization.

3.8.8.6 The intention of the study is to describe the nature of relationship amongst the features of DM and those of Innovation Performance.

The research is not greatly concerned about the absolute level of DM achievement or innovation performance but investigates into the relative levels of these. The absolute value of the response though may be affected since the responses are taken from interested and involved parties; the relative values are not affected. What are looked into are the relative scores between DM and innovation.

Moreover, the error due to this is minimized since the reliability and validity of the questionnaire was ensured through appropriate techniques, which are discussed in later chapters.

3.9 SAMPLING DESIGN

3.9.1 Sampling Design for Proposed Research

The term population in a research represents the totality of items that are being considered for the study. From the overall population, few items are selected for the research, which is justified by a number of reasons and these items are termed as sample.

For our study, we have utilized the concept of a non-probability sampling. Non-probability sampling is characterized as a technique wherein the samples are selected based on the subjective opinion of the researcher. Non-probability sampling unlike probability sampling is a method wherein the samples in a population do not have an equal chance of being part of the study. (Kothari, 2006).

In judgment sampling procedure, a sample is obtained based on sound judgment or experience on the part of the sampler who adopts a particular data collection strategy. The intention is that typical representative subjects should be chosen. Purposive sampling is similar to judgment sampling, except that the sample is chosen so that a particular research purpose is served and is adequate for it.

Purposive sampling fits our study better as our population is limited to set of MSME organizations, and it is required to study a characteristic like Demand Marketing (DM) or innovation performance intensively. The sample is typical rather than representative. The non-probability sampling in the current research is a restricted sampling and the restrictions imposed on the population are as given below:

3.9.1.1 Should be Micro or Small or Medium manufacturing organization of Indian origin.

3.9.1.2 Should be practicing DM in one way or another way, by adopting any of the Demand Marketing practices as mentioned in literature

3.9.1.3 To ensure the reliability of the sample, impartiality was ensured by working without any bias for choosing the sample elements. The details on how the organizations were identified are given below.

3.9.2 Identification of Organizations

The procedure to collect primary data from selected organizations is to get feedback from the senior managers/top management for the items on the questionnaire.

The identification of organizations where the questionnaire has to be applied is achieved through the support of the following organizations in Bangalore:

3.9.2.1 MSME Development Institute

3.9.2.2 Peenya Industries Association

We visited these two organizations and discussions were carried out with the heads of the organizations. The objective of the visit was to acquaint these organizations about the research in the area of Demand Marketing (DM) and Innovation Performance, and to seek support for data collection by leveraging the database available with these organizations.

3.9.3 Selection of Organizations for the Sample

We have identified a hundred and fifty organizations that meet the criteria to be eligible to participate in our study as part of the primary data collection. The selection of organizations were made possible owing to the database of MSME development institute. Details relevant to the study such as product, process, organization structure, contact details, and other relevant information were obtained by visiting the websites of the organizations. These organizations were contacted first through email and were given introduction on the research. Later the organizations were visited and discussions were carried out in person with the senior management.

A typical problem associated with the questionnaire survey is the response rate. In addition, is the need for probing and correcting the misdirected responses through intervention.

To ensure accurate information, we have personally visited as many an organization as possible to capture the necessary information. Thereby, we are able to provide the respondent a detailed clarification on the information sought and misdirected responses are eliminated to a large extent. To improve the general response rate the following methodology was adopted in addition.

- Respondent was given previous notification before visiting to get the response for the questionnaire
- Researcher visited the organization and gave personal appeal. Well timed multiple follow-up reminders were sent
- The questionnaire was made simple to answer
- The research sponsorship details, recommendations etc. were communicated
- The usefulness of the research was explained to the respondents to motivate them

The respondent was assured a feedback on the research findings. A strong appeal for co-operation was made in the covering letter. Thus, all the efforts were made to get the maximum response from the organizations. Chapter four gives the particulars of complete data collected, response rate etc. in detail. Descriptive statistics on the details of responses obtained are discussed in the subsequent chapters.

CHAPTER 4

DATA ANALYSIS METHODOLOGY

4.1 MULTIVARIATE ANALYSIS OF DATA

The Multiple-Variable Analysis procedure is designed to capture the relationship in the form of summary statistics such as the correlation and covariance between two or more records of numeric data.

For our study, we examine the impact of DM on the constructs of Innovation Performance. In our study, we capture the data using an interval scale using a Likert Scale as detailed out in the section Collection of Indicators (6.4). In the current research, each of the dependent variable is considered separately for model building.

This model develops a relationship of the form, dependence of one dependent variable to four independent variables. All the five dependent variables are considered separately. Hence, five different types of relationships emerge.

The methodology to be adopted is the multiple regression analysis. The narrowing down of methodology has been carried out is depicted in table 4.1.

Table 4.1: Narrowing down of data analysis methodology

Research characteristics	Data analysis methodology
Several variables of DM and Innovation Performance involved	Multivariate analysis techniques
Exploring the dependency of some Variables on other variables.	Dependence techniques
Exploring relationship b/w each of our innovation performance variables against the combination of the factors of DM.	One dependent variable and several independent variables
Quantitative data collected in an approximate interval scale (Likert Scale).	Metric data analysis
Analysis methodology	Multiple regression

4.2 DEPENDENCE ANALYSIS OF DATA

When more than two variables are considered in a relationship that is being studied, multivariate analysis techniques are used.

Regression analysis quantifies the degree of association between a dependent variable (often called ‘outcome variable’, in our case Innovation Performance) and one or more independent variables (often called ‘predictors’, in our case DM factors).

The summary of the regression table provides information on the extent of the relationship between the factors of DM on the independent variable being considered. It also provides statistics on the significance of the regression coefficient with respect to the target variable. We therefore get a linear combination of how the independent variable responds to fluctuations in the dependent variable. This change can either be positive or negative (indicated by the sign of the regression coefficient) implying that each of the variables can be considered in isolation to predict the targetvariable apart from the collective predictive power of the model (Joseph F. Hair, *et al*, 2007).

4.3 MULTIPLE REGRESSION ANALYSIS OF DATA

The goal of multiple regression is to assess the relationship between multiple independent variables with each of the dependent variables.

Assuming that Y is a variable which is dependent on X_1, X_2, $X3$… .....Xn, and the relationship between Y and X_i's is linear, then a mathematical relationship between Y and X_i can be represented by the following equation.

$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \_\_\_\_ + \beta_n X_n + \mu$

Where

β_0= constant derived from the analysis (parameter)

β_i= coefficient of association with the explanatory variable (parameters) X_i= explanatory variables that influence the criterion variable Y

μ = error component or random component to account for sources of errors. A large number of other factors influences the dependent variable and hence errors are likely to occur while estimating the parameters

The sources of errors are:

- Omission of certain variables from the function
- Errors of aggregation
- Errors of measurement

The variable *"μ"* is introduced into the equation in order to compensate the above mentioned sources of errors (Krishnaswamy, K N, *et al*, 2006). The above equation is

an exact relationship explaining the variations in Y as fully attributed to the changes in X_i. The variables that are considered for the study are mentioned below:

Table 4.2: Variables Considered for the study

Demand Marketing (Independent variables)		**Innovation performance** (Dependent variables)	
Business Landscape	X_1	Technology	Y_1
Marketing Mix	X_2	Product	Y_2
Brand Equity	X_3	Process	Y_3
Technology Management	X_4	System	Y_4
		Innovation management	Y_5

The nature of association amongst the independent variable against each of the dependent variable is considered to identify the senior leaders' perception towards performance of organization. The parameters are estimated by ordinary least squares (OLS) procedure. The following assumptions are checked before the interpretation of results:

- μ_i is a random variable
- The mean of the random variable u_i is zero for all X_i
- The variance of the μ_i is the same (constant) for all the X_i values (homoscedasticity)
- The values of μ_i (corresponding to X_i) are independent of any other μ_j (corresponding to X_j) (absence of autocorrelation).
- The explanatory variables are not perfectly linearly correlated (absence of multi-collinearity).

R-squared is used to capture the goodness of fit of our model. R-squared evaluates the behavior of the data points in and around the regression line. Therefore, R-squared captures the differences in performance between the actual and the predicted values.

$$R^2 = \frac{\text{Variance explained by the model}}{\text{Total variance}}$$

R-squared ranges from 0 to 100% with:

- 0% represents a model that fails to capture any relationship between the variables.
- 100% represents a model that is able to capture the relationship amongst the variables in it's' entirety.
- To ensure we only have those variables that contribute to increasing the predictive power of the model, we use the Adjusted R^2 metric.

Adjusted R^2 = $1-[(1-R^2)* (n-1) / (n-k-1)]$

Where

n = Number of samples

k = Number of predictor variables

The criteria used for assessing the reliability of the estimates are the coefficients of R^2, standard errors of the estimates and the t and F statistics.

The t-test measures the least square estimates of the β coefficients. The overall accuracy of the model is determined using the F-test in combination with the *R-Squared.*

Residual analysis, the deviations of the actual values of residuals from predicted values are used to determine the presence of autocorrelation, non-linearity of regression relationship, outliers and heteroscedasticity.

Homoscedasticity is said to exist, if a sequence of random variables have the same finite variance. If this assumption is violated, it said that each μ_i is not the same. In thatcase, μ_i's are heteroscedastic.

Autocorrelation checks the extent to which the values of the variables across observations are correlated. If autocorrelation exists, then the output of the model is no longer competent.

Multi-collinearity is a problem in multiple regressions. It indicates that several independent variables are nearly perfectly correlated. This renders the regression coefficients indeterminate and regression equation cannot be used for prediction purposes.

The measures generally derived in multiple regressions can be summarized as follows:

- A least squares function fitting the data, the regression equation is obtained
- An *F*-test for establishing the variables that are significant as part of the modeling process
- R^2, the coefficient of multiple determinations (both sample based and population adjusted) is obtained
- Standard errors of regression coefficients are computed
- Partial hypothesis regarding the significance of the regression coefficients β_j (parameters) are tested using the *t* test
- A selection of a subset of variables is made if required

4.4 HYPOTHESIS FORMULATION

Our research aims to determine the hypothesis concerning the impact of DM on Innovation Performance of an organization. For example, consider a hypothesis as given below:

H_0: The multiple constructs of DM have no tangible influence on Product Innovation competency of the organization.

H_a: At least one variable of Demand Marketing (DM) has an influence on Product Innovation competency of the organization

Then in the above, *Product* innovation becomes the dependent variable and the function capturing the relationship is expressed as:

Product innovation, Y_1 = function of (X_1, X_2, X_3, X_4)

Assuming the relationship between Y and X_i is linear, (verified during the assumption verification stage) the mathematical relationship between Y and X_i can be represented as:

$\boldsymbol{Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \mu}$ and the

$\boldsymbol{Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \mu}$ and the

hypothesis becomes

$\boldsymbol{H_0: \beta_0 = \beta_1 = \beta_2 = \beta_3 = \beta_4 = 0}$

And

$\boldsymbol{H_a: One\ of\ the\ \beta i \neq 0}$

We further use the F-Statistic as follows:

If $F < F_{cr}$ *for stated* α*, do not reject* H_o

If $F > F_{cr}$ *for stated* α*, reject* H_o

In an inference about population regression slope coefficients and overall regression, the slope coefficients β's are tested using the *t* test. For four variables case if,

t_1, t_2, t_3 *and* $t_4 > t_{cr05}$

Then the null hypothesis is rejected.

A similar approach can be developed for each of the dependent variables across the independent variables to develop the below hypothesis.

Model I – Product Innovation and DM

$Y_1 = \beta_{10} + \beta_{11}X_1 + \beta_{12}X_2 + \beta_{14}X_3 + \beta_{14}X_4 + \mu$

Hypothesis

H_0*: The multiple constructs of DM have no influence on Product Innovation competency of the organization*

H_a*: At least one variable of DM has an influence on Product Innovation competency of the organization*

i.e.

H_0: $\beta_{10} = \beta_{11} = \beta_{12} = \beta_{13} = \beta_{14} = 0$

H_a: One of the $\beta i \neq 0$

Model II – Technological Innovation and DM

$Y_2 = \beta_{20} + \beta_{21}X_1 + \beta_{22}X_2 + \beta_{23}X_3 + \beta_{24}X_4 + \mu$

Hypothesis

H_a: At least one variable of DM has an influence on Technological Innovation competency of the organization

i.e.

H_0: $\beta_{10} = \beta_{11} = \beta_{12} = \beta_{13} = \beta_{14} = 0$

H_a: One of the $\beta i \neq 0$

Model III – Process Innovation and DM

$Y_3 = \beta_{30} + \beta_{31}X_1 + \beta_{32}X_2 + \beta_{33}X_3 + \beta_{34}X_4 + \mu$

Hypothesis

H_0: The multiple constructs of DM have no influence on Process Innovation competency of the organization

H_a: At least one variable of DM has an influence on Process Innovation competency of the organization

i.e.

H_0: $\beta_{10} = \beta_{11} = \beta_{12} = \beta_{13} = \beta_{14} = 0$

H_a: One of the $\beta i \neq 0$

Model IV – System Innovation and DM

$Y_4 = \beta_{40} + \beta_{41}X_1 + \beta_{42}X_2 + \beta_{43}X_3 + \beta_{44}X_4 + \mu$

Hypothesis

H_0: The multiple constructs of DM have no influence on System Innovation competency of the organization

H_a: At least one variable of DM has an influence on System Innovation competency of the organization

i.e

H_0: $\beta_{10} = \beta_{11} = \beta_{12} = \beta_{13} = \beta_{14} = 0$

H_a: One of the $\beta i \neq 0$

Model V – Innovation Management and DM

$Y_5 = \beta_{50} + \beta_{51}X_1 + \beta_{52}X_2 + \beta_{53}X_3 + \beta_{54}X_4 + \mu$

Hypothesis

H_0: The multiple constructs of DM have no influence on System Innovation competency of the organization

H_a: At least one variable of DM has an influence on System Innovation competency of the organization

i.e.

H_0: $\beta_{10} = \beta_{11} = \beta_{12} = \beta_{13} = \beta_{14} = 0$

H_a: One of the $\beta i \neq 0$

4.5 SAMPLE SIZE

The key to obtaining results that can be generalized lies in creating an optimal sample size.

Sample size refers to the number of participants involved in a study.

Determining the sample size determines both the precision of our predictions and the ability of the study to generalize and provide relevant conclusions.

A general observation is that for each independent variable, there should a minimal of five observations made to ensure the study can make appropriate generalization (Joseph F. Hair, *et al*, 2007).

To satisfy this criteria, we have obtained feedback from twenty organizations , i.e. (4 response variables * 5). We have taken into consideration this aspect while sampling which is discussed ahead.

4.6 PILOT STUDY

4.6.1 Data Compilation

A hundred and fifty organizations, belonging to either micro, small or medium manufacturing sectors were selected as part of the study in the sampling design stage. Prior to reaching out to the organizations, it is essential to consider the relevant features that are necessary to measure the instrument. The necessary prerequisites with respect to the questionnaire are to evaluate:

- Reliability

- Validity
- Receptiveness

Once the evaluation metrics are captured, it enables us to strategize and design the main study.

4.6.2 Evaluation of the Questionnaire Receptiveness

A pilot study aims to act as a precursor to the main study. The pilot enables us to identify potential problem areas and if any flaws exist in the research instrument prior to a full scale implementation. The pilot study empowers us to test the data collection instrument, and other research techniques in preparation for a larger study.

The measuring instrument, i.e. the questionnaire has been structured with minimal ambiguity comprising of questions that are relevant to the organization.

The target audience for the instrument are the leaders in the organizations who oversee the day to day activities and have a practical knowledge of the concept of Demand Marketing and Innovation Performance.

The instructions provided on the questionnaire are well-defined with the instrument carrying an organized flow of questions which ensures the respondents can answer in an apt manner.

As part of the pilot study, we have visited select organizations with the questionnaire being administered to the leaders of the organization. The research instrument was handed over in person to clarify any doubts with the instrument and also develop a first-hand working knowledge of the operations of the MSME in India. Another key reason for presenting the survey in person is to ensure the participation of the leaders of the organizations in a crisp manner. Though the data collection was time consuming, majority of the leaders obliged upon realization of the rationale behind the research.

The data has been collected from fifteen organizations as part of the pilot phase. The questionnaire primarily involves two elements:

- Information on the nature of the organization

- Data (collected through the questionnaire) on the impact of various factors of DM on Innovation Performance as comprehended by the organization.

4.6.3 Data Preparation

Raw data such as questionnaires that are answered, the observations recorded of different types during interviews can be used for analysis only after following certain specific preprocessing steps. This is done to ensure we get the data into a shape that is ready for analysis. In our case, we convert the data into a matrix format such as Organizations * Variables with the values being the responses given by the organization against those respective variables. A sample of how the preliminary database is represented is visualized below:

Table 4.3: Database Sample

	X 1-1	*X 1-2*	*X 1-3*	*X 1-4*			*Y 5-8*	*Y 5-9*	*Y 5-10*
O_1	4	3	5	5			4	3	4
O_2	5	4	5	4			2	2	3
O3	4	4	5	5			4	3	4
O_4	4	3	4	4			4	4	3
on									

To prepare the preliminary database, we undertake the following measures:

4.6.3.1 Data Cleaning – Data quality check by accounting the number of missing data, vague or unclear data, etc. in the questionnaire.

4.6.3.2 Data Encoding– The goal of this step is convert categorical data into numerical format that can be taken as an input for analysis.

4.6.3.3 Data transcription – The data from the questionnaire is manually assigned to the database.

4.6.4 Measurement of Validity and Reliability

Validity refers to how accurately a method measures what it is intended to measure. If a study has a high validity, then the study can produce output that capture behavior of the physical world.

A result is said to be reliable, if the results of the research can be reproduced under same conditions by multiple researchers. It is of utmost importance to understand that a reliable instrument despite not being valid can produce reproducible results although they're not necessarily truthful.

Practicality refers to the economy of time, effort and money in testing. In other words, a test should be easy to design, easy to administer, easy to mark, and easy to interpret the results (Krishnaswamy, K N, *et al.*, 2006).

The three (validity, reliability, practicality) together form the evaluation criteria for a research and these are done to keep a check on the errors that tend to creep into practice. Initial analysis of the data that was collected was conducted to determine the reliability and validity of the study.

There are primarily three forms of validity that are considered:

- Content
- Criterion
- Construct (Krishnaswamy, K N, *et al*, 2006)

Content validity refers to the degree to which the items in the study capture the domain under consideration in its' entirety through the use of the measuring instrument.

Content validity has a requisite of having judges as panel members who evaluate the research based on the definition of the topic provided. Content validity is primarily judgmental in nature. In the context of our research, content validity has been accounted for in the stage of literature survey and research design. Furthermore, prior to the

construction of the measuring instrument, we have reached out to industry experts for opinions for an accurate definition of the topic under consideration.

Criterion validity is an estimate of the degree to which a measure conforms to the benchmark in the area of the study.

Construct validity refers to the degree to which inferences can legitimately be made from the operationalization in the study to the theoretical constructs on which those operationalization were based. The aim of a construct validity is to determine what factors capture the variance in measurement and understand the underlying relationship amongst the variables involved.

Likewise, it enables us to develop summated scales to measure the presence of these innate relationships for which empirical validation is not practical. Validation of the measuring instrument is a necessity despite the complexity involved to develop an satisfactory degree of validity.

The methodology adopted to evaluate construct validity in our study is through convergent and divergent validity. Convergent validity refers to the relationship between two measures to show that their indeed is a relationship amongst the measured construct. Conversely, **discriminant validity** shows that two measures that are unrelated are indeed not related.

The Multitrait Multimethod matrix (MTMM) is a method widely adopted to measure convergent and divergent validity and establish an excellent construct validity. The key hypothesis of MTMM is that the measures of correlation amongst the same constructs are the highest (Krishnaswamy, K N, *et al*., 2006).

The data collected as part of the pilot study is analyzed and the results are tabulated below. It can be seen that the measures of correlation for each of the DM constructs and the constructs of Innovation Performance are calculated.

The notion of convergent and divergent validity is supported here as the values display the highest correlation amongst the same construct and the average cross construct correlations are low indicating that the variables are therefore significantly different

from each other. The table below addresses both convergent and divergent validity and thereby establishes a reliable construct validity.

Table 4.4: Correlation between scores of DM constructs

	X_1	X_2	X_3	X_4
X_1	**1**	0.29	0.46	0.44
X_2	0.46	**1**	0.18	-0.07
X_3	0.46	0.18	**1**	0.07
X_4	0.04	-0.07	0.07	**1**

Table 4.5: Correlation between scores of Innovation constructs

	Y_1	Y_2	Y_3	Y_4	Y_5
Y_1	**1**	0.22	0.217	0.141	0.257
Y_2	0.22	**1**	0.160	0.32	-0.012
Y_3	0.217	0.160	**1**	0.231	-0.155
Y_4	0.141	0.327	0.231	**1**	0.029
Y_5	0.257	-0.012	-0.155	0.029	**1**

The highlighted values are a reflection of convergent validity while those that are not highlighted in the above table are those indicative of the divergent validity, which are uniformly lower in comparison to the convergent validity.

4.6.5 Reliability

Research reliability is the degree to which research method produces stable and very consistent results. A measure is reliable to the degree that it supplies consistent results. An instrument that is valid always has to be reliable but an instrument that is reliable does not have to be valid. This clearly demonstrates the role reliability has as a partial contributor to validity (Krishnaswamy, K N, *et al.*, 2006).

Reliability is measured either through test-retest approach or the more commonly used internal consistency based approach (Joseph F. Hair, *et al*, 2007). In our study, we have

considered the concept of internal consistency which evaluates consistency amongst the variables in a summated scale).

Internal consistency reliability defines the consistency of the results delivered in a test, ensuring that the various items measuring the different constructs deliver consistent scores. The primary metric used to capture the internal consistency is Cronbach Alpha. Cronbach's alpha captures the compactness of the items in a set and how they're related to each other. A value of 0.6 is largely deemed as satisfactory for research purposes (Joseph F. Hair, *et al*, 2007).

The data from the pilot study is analyzed for validity and reliability. The table below provides the values for both independent and dependent variables respectively.

Table 4.6: Cronbach alpha for Independent variables of SM

Demand Marketing Constructs	Independent Variables	No. Of Items	Cronbach Alpha
Business Landscape	X_1	12	0.885
Marketing Mix	X_2	12	0.755
Brand Equity	X_3	12	0.965
Technology Management	X_4	12	0.790

Table 4.7: Cronbach Alpha for dependent variables of Innovation

Innovation Performance Constructs	Dependent Variables	No. of Items	Cronbach Alpha
Technological Innovation	Y_1	10	0.837
Product Innovation	Y_2	10	0.798
Process Innovation	Y_3	10	0.815
System Innovation	Y_4	10	0.620
Innovation management	Y_5	10	0.706

The lowest measure of Cronbach alpha is 0.620 indicating a highly reliable measuring instrument.

4.7 DATA FOR MAIN STUDY

4.7.1 Data Collection Methodology

The main study aims to acquire the feedback from each of the organizations identified initially through the questionnaire.

An important factor in determining the success of any questionnaire is the rate of response or response rate. We have identified a total of 150 organizations based on the previously mentioned criteria and are following a non probability sampling approach for our study. In addition to the already mentioned factors we have practiced to increase response rate, we also undertook extra measures to enhance the chances of achieving a higher response rate:

- The questionnaire was designed in keeping the usage by the end user in mind and only relevant questions were retained in the survey.
- Information related to the study was sent in advance to the concerned individual/team to attain a higher response rate.
- Well timed notifications and reminders were sent to encourage the participants to understand the relevance of the study and enhance the response rate.

We achieved an admirable response rate of 60.6% whose details are presented below:

Table 4.8: Response rate

	Micro	Small scale	Medium scale	Total
# of organizations Contacted	15	75	70	150
# of organizations Responded	04	38	49	91
% Response rate	26.66%	50.66%	70.0%	60.66%

The guideline for a minimum ratio in the case of regression for independent variables across observations is 1:5 (Joseph F. Hair,et al, 2007). In our study, the ratio becomes 1:22, with four independent variables and a total of 91 organizations surveyed.

We provide below the nature of the organizations that are part of the study and refrain from making available any personal data of the respondents. The qualities of the organizations are:

- The details of the organizations are collected from MSME Development Institute of Bangalore and Peenya Industries Association in Bangalore.
- The firm belongs to the manufacturing segment of Indian MSME.
- Regardless of the size of the firm, every organization is treated as a sample for the study.

The preliminary database prepared as part of the pilot study is developed further by the addition of the data obtained from the ninety-one organizations.

To derive empirically accurate, systematic and streamlined data, we perform confirmatory factor analysis. This is crucial not only as a tool for dimensionality reduction but also for retaining valuable information.

Table 4.9: Snapshot of the final database

	X 1-1	***X 1-2***	***X 1-3***	***X 1-4***		
O1	4	3	5	5		
O2	5	4	5	4		
O3	4	4	5	5		
O4	4	3	4	4		
O5	5	4	5	4		

Y 5-08	***Y 5-09***	***Y 5-10***
4	3	4
2	2	3
4	3	4
4	4	3
2	2	3

4.7.2 Confirmatory Factor Analysis

There are two outcomes that are provided when CFA is performed. The two outcomes are related to each other yet diverse in functionality. Dimensionality reduction and data summarization are the two outcomes of CFA.

Dimensionality reduction is achieved by identifying latent variables that capture the information from a larger set of representative variables which can be used for regression analysis. We therefore have a completely new set of factors that are compact in size and enable us to replace the prelimnary set of variables (Joseph F. Hair, *et al*, 2007).

A general rule of thumb while performing dimensionality reduction is to ensure we have more observations than variables with a minimum guideline being at least to have five times as many an observation per variable (Joseph F. Hair, *et al*, 2007). In our study, we ensure that we meet these criteria.

Confirmatory factor analysis (CFA) is a statistical technique used to verify the factor structure of a set of observed variables. CFA allows us to test the hypothesis that a relationship between observed variables and their underlying latent constructs exists.

The variables that indicate the presence of a relationship are identified in advance based on knowledge gathered from the literature study and the goal of CFA is to check if the loading of the factors are on expected lines.

CFA primarily works on the assumption of multivariate normality, a correct model specification, with data coming from a random sample. CFA works on the hypothesis drawn beforehand based on the number of factors in the model. The current measuring instrument uses the concept of reflective measurement concept and CFA creates a latent variable combining factors and checks if they truly are in sync with each other. Reflective measurement theory works on the principle that any alteration in an indicator variable exhibits an alteration in the factor of interest or the dependent variable. If the correlation between an item and other indicators are not high, the factors are to be deleted in line with the reflective measurement theory.

4.7.3 Factor Loadings

Factor loadings capture the correlation amongst the factors and the variables. Factor loadings, in our study, shows the variance captured or explained by the variable on the particular factor.

Factor loadings add more interpretability and establishes the validity of the measuring instrument. An ideal constitution occurs when all the variables have a high loading on single factors. Squared factor loadings indicate the percentage of variance explained by the factor, which consists of the identified variables.

The range for interpretation of CFA is (Joseph F. Hair,et al, 2007):

4.7.3.1 Lower bounds for interpretation: Loadings between ±0.30 to ±0.40

4.7.3.2 Statistically significant: Loadings greater than ±0.5

4.7.3.3 Well-defined structure: Loadings exceeding ±0.7

CFA enables us to identify the factors that adequately match the actual data thereby making it possible to either confirm or deny a predetermined hypothesis. In the scope of our current work, we wanted identify those factors that represent the collection of variables accurately. The factors being the constructs are predefined in this case, and the factor loadings empowers to determine if a selected item can represent a factor.

Allocation of items is not endeavored as we have a higher number of items per each construct and we did not want to pile up to the existing redundancy. SPSS is used to carry out the analysis using CFA on the data captured through the measuring instrument and the tables below give the factor loadings of the dependent and the independent variables of the current research. The item in the table corresponds to the question number in the questionnaire against a particular dependent or independent variable.

Table 4.10: CFA – Innovation Performance- Factor Loadings

Item No.	Y_1	Y_2	Y_3	Y_4	Y_5
1	0.810	0.682	0.442	0.779	0.770
2	0.498	0.432	0.837	0.635	0.794
3	0.756	0.665	0.858	0.564	0.819
4	0.729	0.722	0.635	0.787	0.477
5	0.563	0.800	0.347	0.600	0.526
6	0.801	0.494	0.367	0.629	0.622
7	0.764	0.901	0.593	0.582	0.439
8	0.627	0.810	0.771	0.795	0.678
9	0.811	0.402	0.890	0.663	0.854
10	0.603	0.594	0.841	0.643	0.840

Table 4.11: Demand Marketing- Factor Loadings

Item No.	X_1	X_2	X_3	X_4
1	0.544	0.370	0.532	0.602
2	0.445	0.614	0.737	0.381
3	0.476	0.444	0.492	0.774
4	0.533	0.382	0.734	0.561
5	0.770	0.538	0.799	0.648
6	0.687	0.681	0.754	0.760
7	0.656	0.672	0.656	0.463
8	0.810	0.700	0.758	0.617
9	0.662	0.750	0.862	0.770
10	0.627	0.822	0.788	0.708
11	0.820	0.903	0.783	0.785
12	0.633	0.658	0.742	0.689

From the CFA, we can see that the results tally with the findings from the MTMM method. If, we select, a threshold value of 0.7, then 46% of the items are retained, i.e. 46 items of a total 98. If the threshold is kept at 0.4, then we retain nearly 96% of the items, i.e. 95 out of 98 items.

For our study, we have selected a threshold of 0.5 that facilitates in retaining 82% of the items, i.e. 81 items. The table below gives the values of the loadings above the selected threshold value with those items that are considered for further analysis.

This does not affect the reliability of the study as the minimum number of variables a construct should be a characteristic of is three. In our case, we have ten as the minimum number, therefore, when all items illustrate a particular construct, dropping an item does not alter the meaning of the construct (Joseph F. Hair, *et al*, 2007).

It is important to estimate those variables that are not included in the explanation as part of the derived factors and this is achieved through variable communality. Communality accounts for variance in each variable that is captured by the latent factor. The threshold of variable communality that is selected in our study is 0.5 and any item that does not conform to the threshold is rejected as not having any significance in suitably explaining the relationship.

According to Joseph F. Hair, *et al*, 2007, it is necessary to use at least four items per variable. In our research we can see that we used a minimum of ten and are conforming to the standards.

Table 4.12: Updated number of items in each variable

Demand Marketing					Innovation Performance		
Independent Variables (IV)					Dependent Variables (DV)		
	Number of Items				Number of Items		
IV	Original	Deleted	Retained	**DV**	Original	Deleted	Retained
X_1	12	2	10	Y_1	10	1	9
X_2	12	3	9	Y_2	10	3	7
X_3	12	1	11	Y_3	10	3	7
X_4	12	2	10	Y_4	10	0	10
-	-	-	-	Y_5	10	2	8
Total	48	8	40	**Total**	50	9	41

4.7.4 Summated Scales Creation

The variables identified above are selected for the creation of summated score. A summated score is an average of the total of the factors of the items by the number of items. A summated scale such as this provides us with a few benefits:

4.7.4.1 Accounts for the innate measurement error in all the variables.

4.7.4.2 Denotes numerous characteristics of a construct in a single measure.

4.7.4.3 Offers a thorough management over the calculation of the scale.

4.7.4.4 Makes the usage of the instrument smooth in ensuing analysis.

4.7.4.5 Lessons the likelihood of a measurement error.

4.7.4.6 Can be reproduced across further studies

4.8 MAIN STUDY

4.8.1 Summated Data Conception

The current chapter establishes the formation of the summated scale of the data and an initial analysis of the data which was discussed in the previous chapter.

The data summation and transcription has been carried out using MS Excel and the same is depicted (owing to the size of the data, we have taken only a few for depiction) in the table below.

The data summation spreadsheet consists of three distinct characteristics. They are:

4.8.1.1 Summated data for the variables of DM.

4.8.1.2 Summated data for the variables of Innovation Performance

4.8.1.3 Company attributes such as size, industry nature etc.

4.8.2 Constructs of DM and Innovation Performance

The approach to derive the summated score is as shown below (this has been explained earlier in the methodology section of the previous chapter)

Score for the construct = (Sum of the response values for the statements) / (# of statements)

Consider the case of the Marketing Mix construct (X_2) of DM wherein 9 items are there.

For organization O_1 the score is given by:

Score of $X_2 = (X2\text{-}2+X2\text{-}5+X2\text{-}6+X2\text{-}7+X2\text{-}8+X2\text{-}9+X2\text{-}10+X2\text{-}11+X2\text{-}12)/9$

Although the initial data collection happened across 12 items, we notice only 9 here owing to the dimensionality reduction that is executed using CFA. Hence, it can be noticed that $X_{2\text{-}1}$, $X_{2\text{-}3}$ *and* $X_{2\text{-}4}$, has been excluded from the summation process.

Similarly taking another example, consider the Process innovation construct (Y_3) of Innovation performance wherein 6 items are there. For organization O_1 the score is given by:

Score of $Y_3 = (Y_{3\text{-}2}+Y_{3\text{-}3}+Y_{3\text{-}4}+Y_{3\text{-}7}+Y_{3\text{-}8}+Y_{3\text{-}9}+Y_{3\text{-}10}) / 7$

The seven items represent the selected items based on their factor loadings which had a value of more than 0.5 which is the threshold value for the study.

Table 4.13: Main study data summary (partly depicted)

ORGANISATIONS >>>>>>>		V	O1	O2	O3	O91	Total
CONSTRUCTS OF DM							
1	Business Landscape	X1	5.00	4.40	3.80	4.40	4.27
2	Marketing Mix	X_2	4.10	4.70	4.40	3.88	4.04
3	Brand Equity	X3	4.36	4.72	4.27	4.36	4.07
4	Technology Management	X4	4.80	4.70	4.40	4.70	4.32
Average DM Performance			4.56	4.63	4.21	4.33	4.215
CONSTRUCTS OF INNOVATION							
1	Technological innovation	Y_1	5.00	4.33	4.22	4.44	4.11
2	Product innovation	Y_2	5.00	3.57	3.85	4.42	3.90
3	Process innovation	Y_3	4.85	4.28	4.14	4.57	4.17
4	System innovation	Y_4	5.00	4.55	4.11	4.66	4.41
5	Innovation management	Y_5	5.00	4.50	4.00	4.77	4.35
Average innovation performance			4.97	4.24	4.06	4.57	4.18
ORGANISATION FEATURES							
1	Size of organization (M/S/M)		M	S	M		91
2	Type of manufacturing industry		04	38	49		91

4.8.3 Preliminary Data Analysis

We had a total of ninety one organizations that responded to the survey and the initial analysis of the results were done as explained below.

4.8.4 Information Summary in Organization Attributes

Our research does not distinguish between organizations on the basis of the scale of the firm. With that in mind, the diagram below indicates a strong response from medium size firms. From the point of view of a research, each organization is considered to a business unit and a valid sample as they're following the principles of Demand Marketing in one or the other manner.

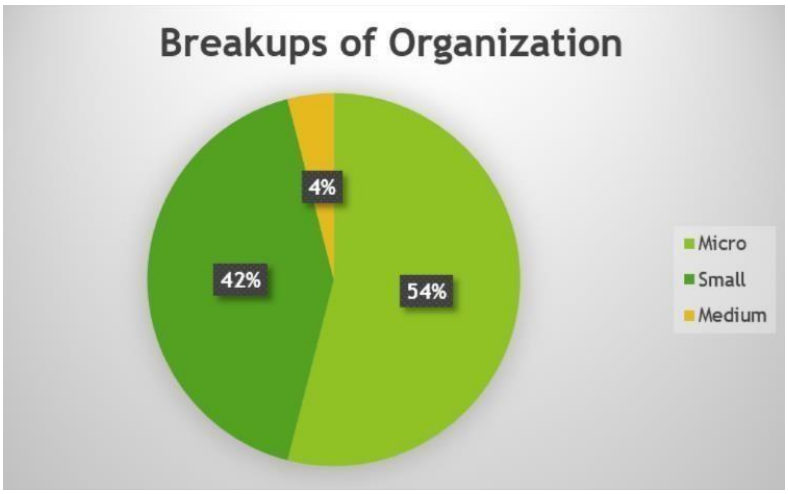

Figure 4.1: Break ups of Organization

The diagram below represents the nature of the firms that are involved in the study. We can see that there is an ample representation across industries of various types and an even distribution amongst sectors. This enables us to provide a platform to better generalize the results.

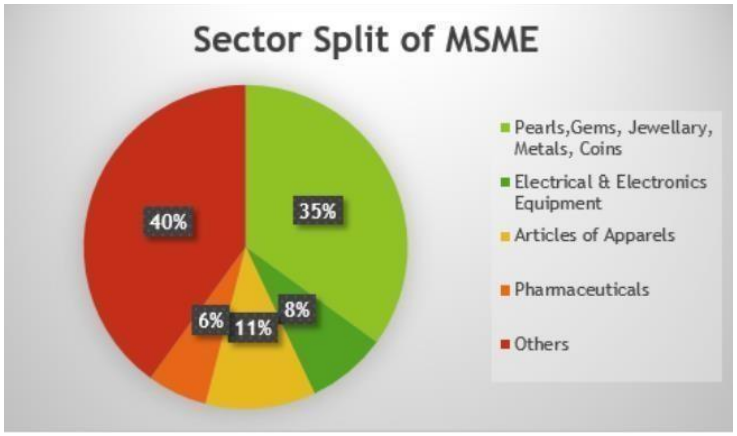

Figure 4.2: Manufacturing organizations- Organization Split-up

4.8.5 Demand Marketing & Innovation Performance Summary

An endeavor is made from the data collected as part of the main study to summarize it and the findings are depicted in the table below. The mean score across the constructs of DM and Innovation Performance are determined and overall score is summarized. The table below captures the information.

Table 4.14: Complete DM and Innovation Performance of organization

DM Constructs			Innovation Performance Constructs		
Construct	Factor	Result	Construct	Factor	Result
Business			Technological		
Landscape	X_1	4.27	Innovation	Y_1	4.11
Marketing Mix	X_2	4.04	Product Innovation	Y_2	3.9
Brand Equity	X_3	4.07	Process Innovation	Y_3	4.17
Technology					
Management	X_4	4.32	System Innovation	Y_4	4.41
			Innovation Management	Y_5	4.33
Overall DM		**4.21**	**Overall innovation**		**4.18**

4.8.6 Adoption of DM across Organizations

The graph below pictorially depicts the performance of the firms against each of the constructs of DM. From the study, it was observed that technology management and business landscape are high on the ratings and marketing mix with the lowest rating. This indicates the mental makeup of the organizations and the way they have embraced the principles of DM in their own firms.

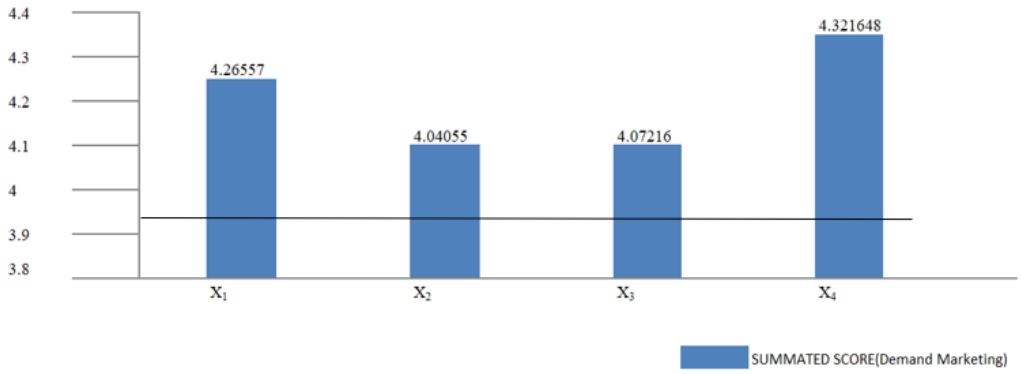

Figure 4.3: Overall Demand Marketing of organizations

The horizontal line represents the overall DM performance across each of the constructs by the organizations.

4.8.7 Adoption of Innovation Performance across organizations

The graph below pictorially depicts the performance of the firms against each of the constructs of Innovation Performance. From the study, it was observed that system innovation and innovation management are high on the ratings and product innovation with the lowest rating. This indicates the mental makeup of the organizations and the way they have embraced the principles of Innovation Performance in their own firms. The horizontal line in the chart below represents the overall Innovation performance across each of the constructs by the organizations.

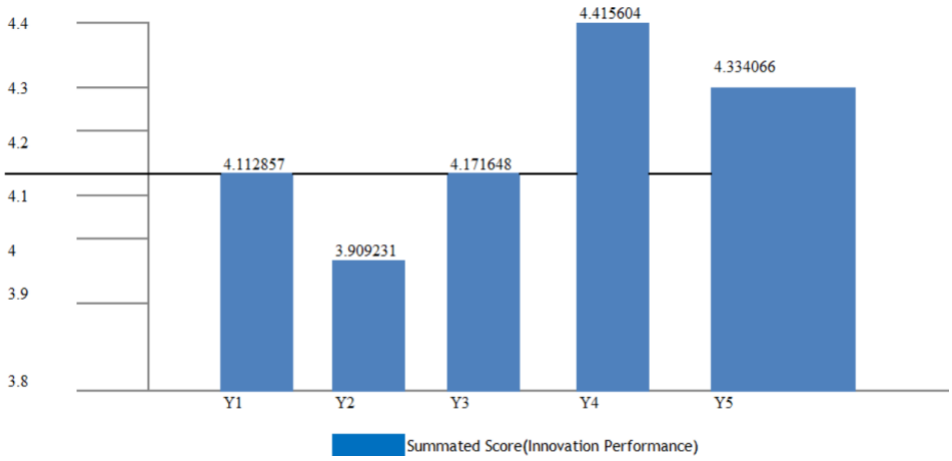

Figure 4.4: Overall Innovation Performance of Organizations

The score of DM is ahead of the overall score for innovation performance indicating that the firms generally adopt principles in line with the fundamentals of DM with Innovation falling behind with lower importance attached to it.

4.8.8 Inclinations Between DM and Innovation Performance

The data has been sorted in the order of the overall score of DM to get a fair understanding between the tendencies of DM and Innovation Performance. This enables us to analyze the trends and the patterns displayed between the constructs of DM and Innovation Performance.

The data table with the information on the Sr # of the firm, the scores of DM and Innovation Performance are attached in annexure.

The plots of DM and Innovation Performance shows a generally increasing trend for innovation performance although it is low in comparison to DM. There are some, whichare the exception rather than the rule wherein the performance of innovation exceeds that of DM that comes as a pleasant surprise and a healthy sign for India's growth engine.

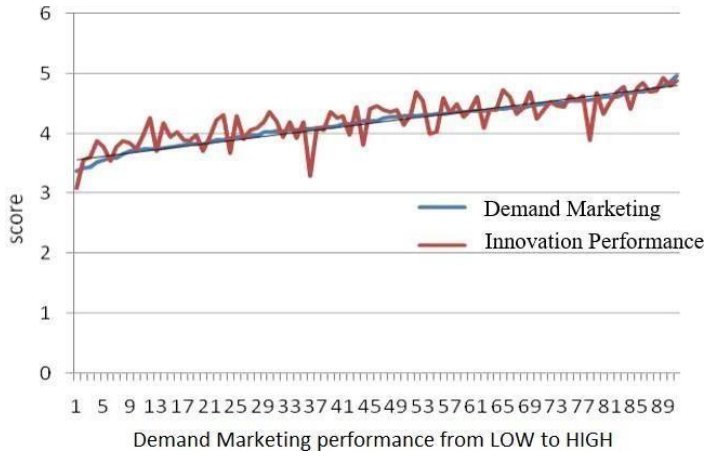

Figure 4.5: Trends of DM and Innovation Performance

The next chart depicts a linear trend analysis that is an important finding of the research. The chart depicts that DM and Innovation Performance go hand in hand with a positive slope. This basically gives weight to the logic that as DM increases, so does Innovation Performance implying a relationship that is directly proportional between the two. This finding is further strengthened in subsequent chapters with the regression analysis and the values of R^2 across multiple models.

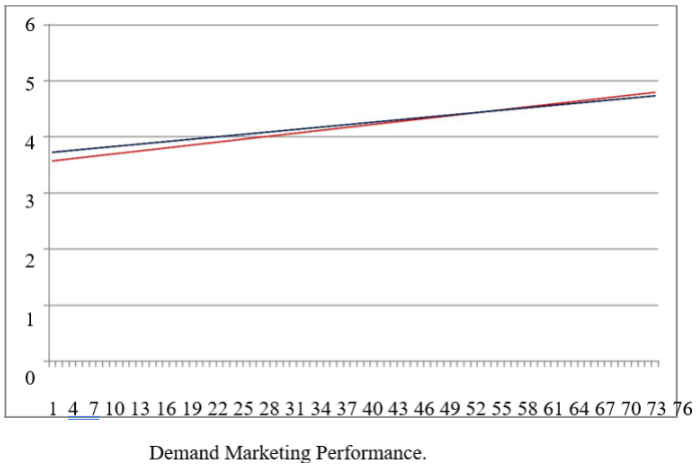

Figure 4.6: Linear trends of DM and Innovation Performance

4.9 REGRESSION ANALYSIS

4.9.1 Research Design and Data

At a healthy response rate of sixty percent, our final data hosted information from ninety-one organizations. We take an in-depth look into the data in this segment. It is necessary to note that each of the ninety-one organizations responded in full to the survey.

4.9.2 Regression Analysis Assumptions

The initial process to be carried out is to ensure that the data conforms to theassumptions of regression and this procedure involves two steps:

4.9.2.1 Examining each of the dependent and independent variables

4.9.2.2 Examining the overall relationship after model estimation

There are three assumptions to a linear regression

4.9.2.3 Linearity

4.9.2.4 Homoscedasticity

4.9.2.5 Normality

4.9.3 Linearity

To check for linearity, scatter plots are developed amongst the variables and the plots are examined for any non-linear patterns (Joseph F. Hair, *et al*, 2007).

The scatter plots below confirm the assumption of linearity as they do not indicate any patterns between the variables that are non-linear in nature.

We have meticulously looked through all possible combinations of the plots which is given in figure 4.7. Select plots between other variables are also shown below. The plots are developed using SPSS.

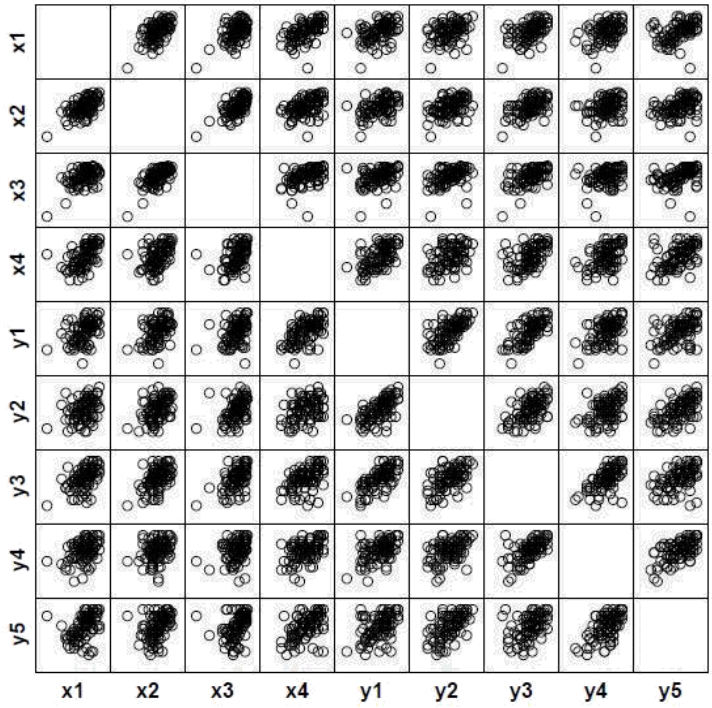

Figure 4.7: Scatter plot- Dependent Vs Independent variables

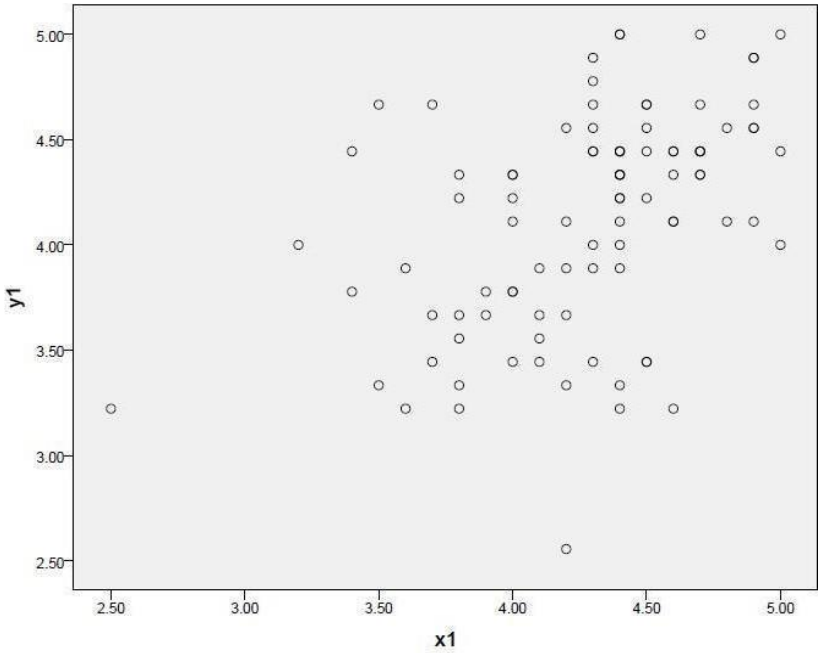

Figure 4.8: Scatter plots between Technological Innovation and Business Landscape

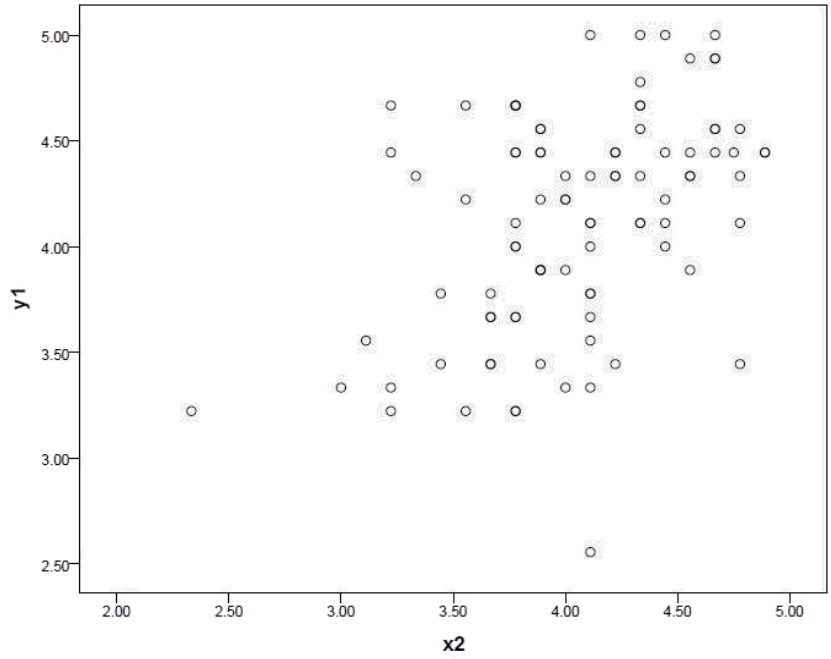

Figure 4.9: Scatter plots between Technological Innovation and Marketing Mix

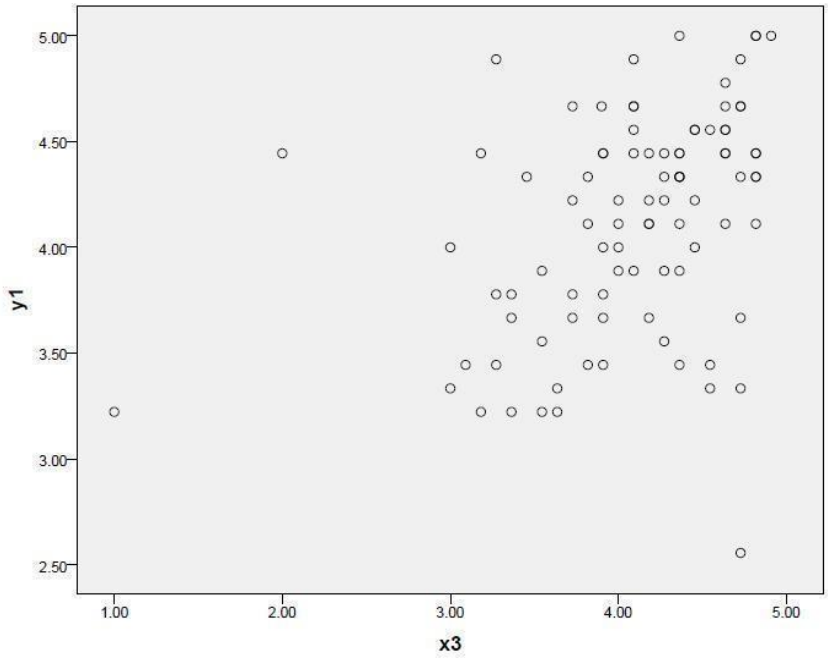

Figure 4.10: Scatter plots between Technological Innovation and Brand Equity

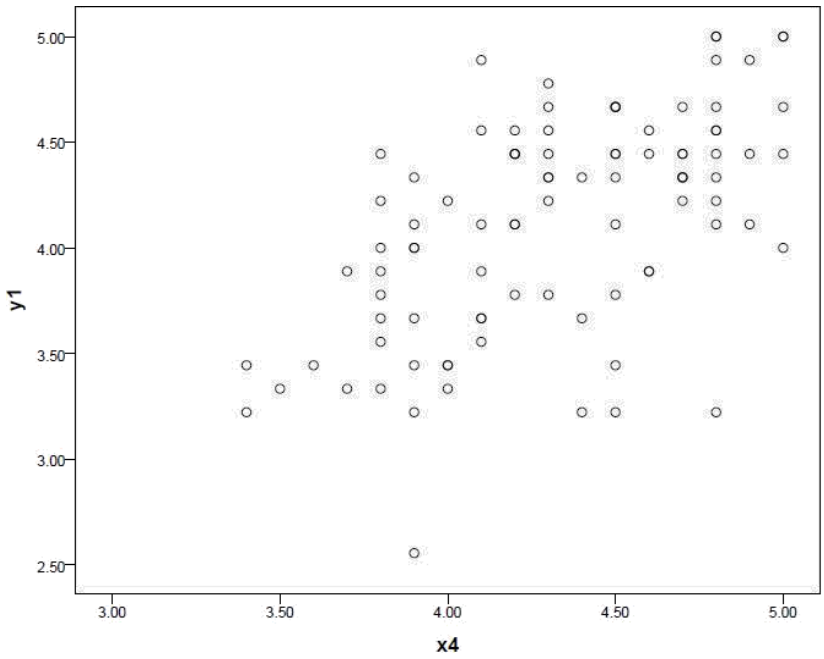

Figure 4.11: Scatter Plots between Technological innovation and Technology management

4.9.4 Homoscedasticity

Homoscedasticity refers to a scenario when the residual term is uniformly distributed across the values of the independent variables.

Box plots are used to visually portray the distribution of the residual term. Box plots are widely used to denote the amount of variation amongst the groups. Box plot portrays homoscedasticity by varying lengths between the boxes and whiskers of the respective groups (Joseph F. Hair, *et al.*, 2007). The figure below illustrates the box plot across each of the dependent and independent variables. We can conclude from the plot, that there is no evidence to support homoscedasticity in our data. To corroborate the result, we have conducted the Bartlett test, which is given in the table below, and each of the p-values are greater than 0.05, which indicates an absence of homoscedasticity.

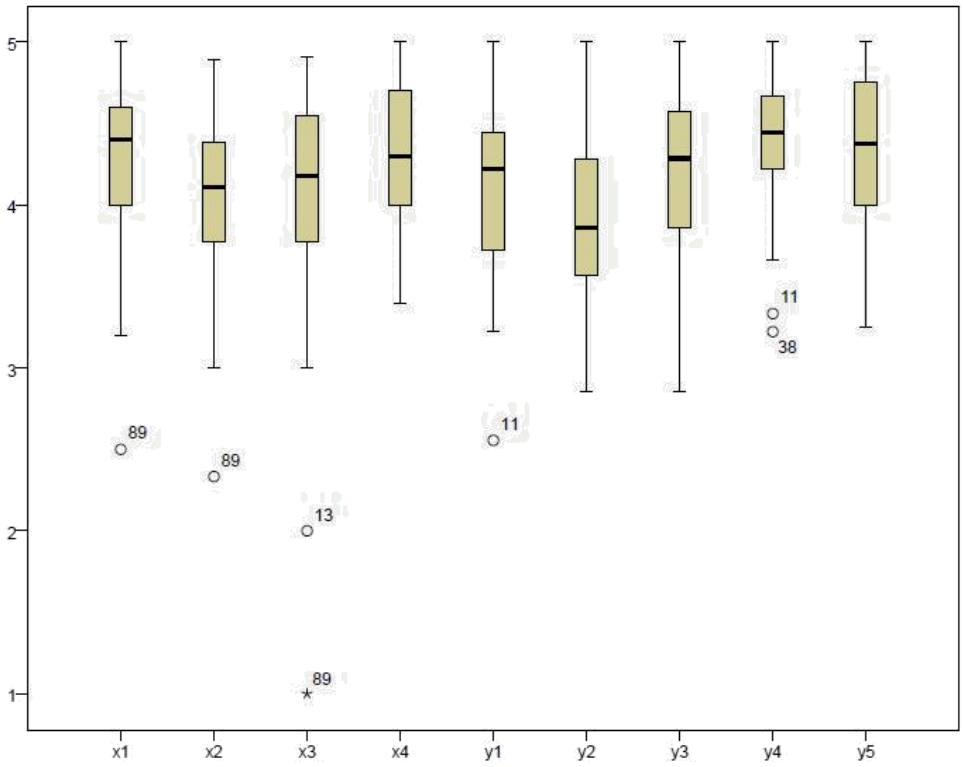

Figure 4.12: Box Plots of Variables

Table 4.15: Bartlett's Test of Homoscedasticity

Groups of variables	K-squared	*p*-value
Y_1,X_1,X_2,X_3,X_4	9.06859	0.3365
Y_2,X_1,X_2,X_3,X_4	7.06470	0.5297
Y_3,X_1,X_2,X_3,X_4	13.04840	0.1102
Y_4,X_1,X_2,X_3,X_4	6.10760	0.6352
Y_5X_1,X_2,X_3,X_4	7.90600	0.4427

4.9.5 Normality

The next assumption of regression is the normality and it is one of the most misunderstood in all of statistics. In multiple regression, the assumption requiring a normal distribution applies only to the disturbance term, not to the independent variables as is often believed.

To test the assumption of normality we have generated normal probability plots which are depicted below for the dependent and the independent variables.

The normal probability plot (Chambers et al., 1983) is a technique for gauging whether a dataset is nearly normally distributed or not. The data are plotted against a theoretical normal distribution in such a way that the points should form an approximate straight line.

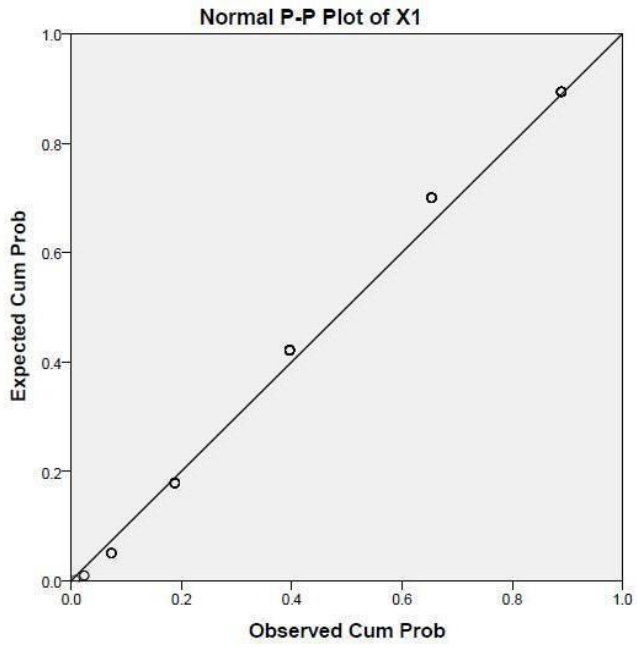

Figure 4.13: Normal Probability plots of Independent variables

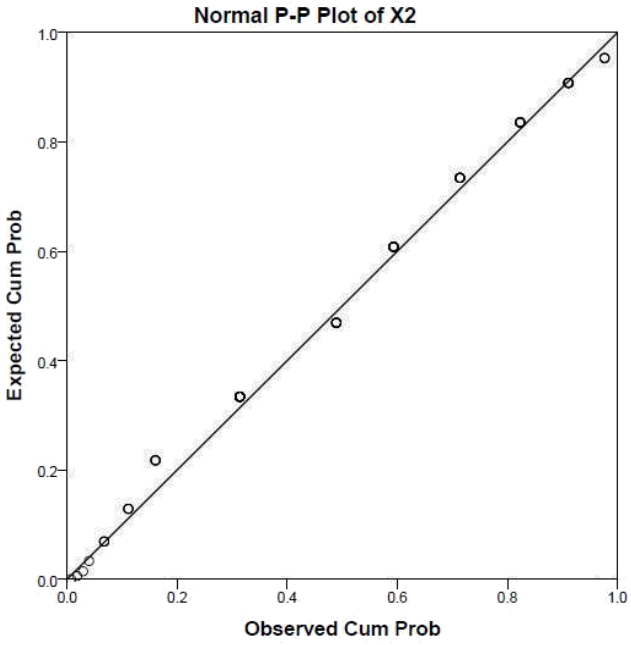

Figure 4.14: Normal Probability plots of Independent variables

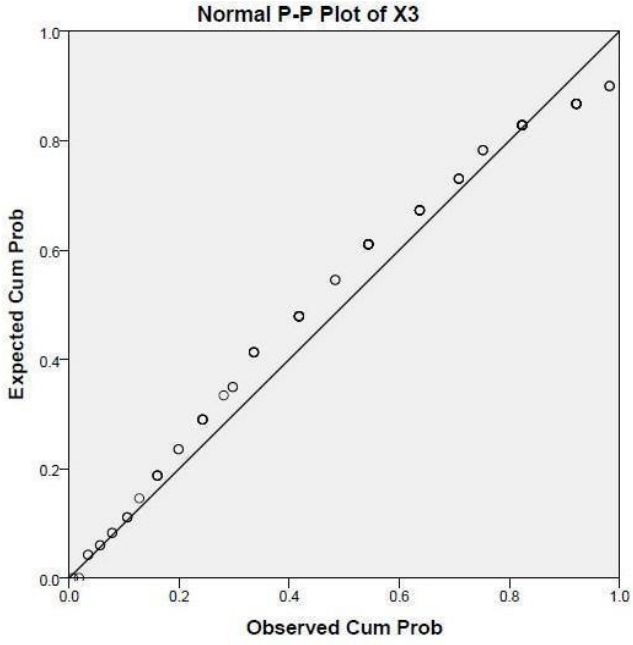

Figure 4.15: Normal Probability plots of Independent variables

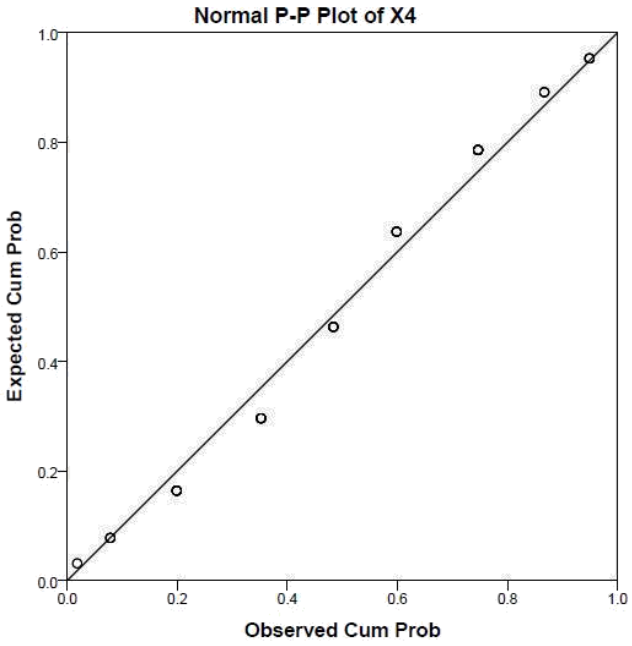

Figure 4.16: Normal Probability plots of Independent variables

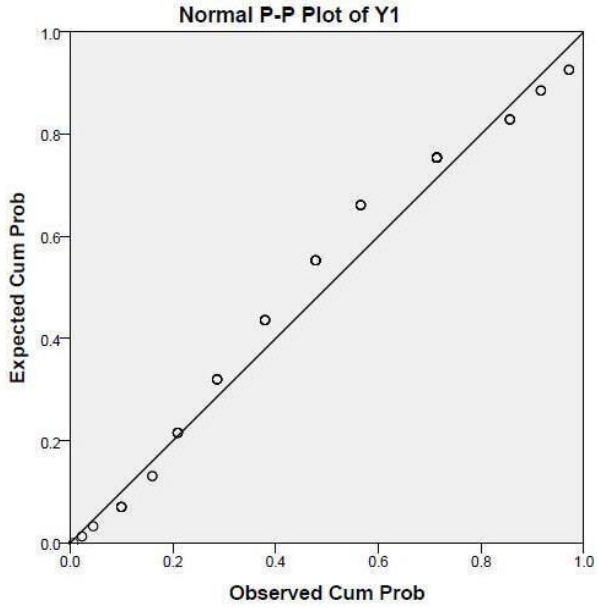

Figure 4.17: Normal Probability plots of Dependent variables

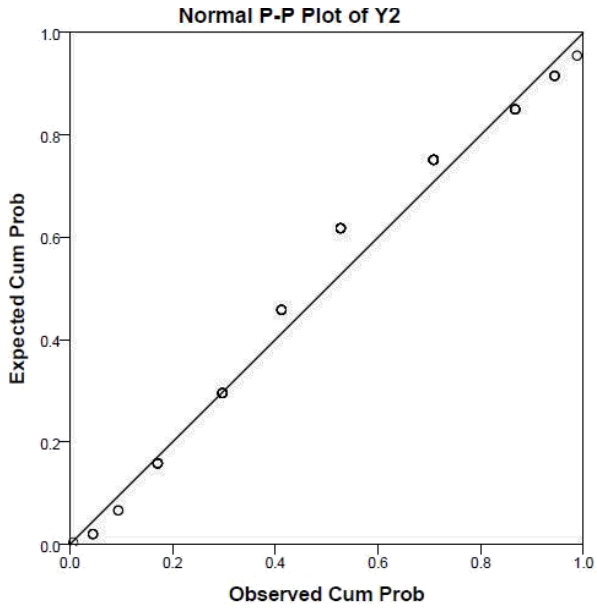

Figure 4.18: Normal Probability plots of Dependent variables

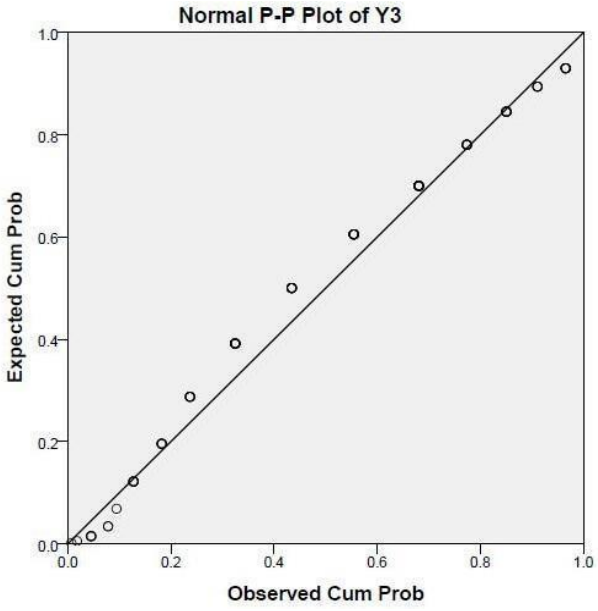

Figure 4.19: Normal Probability plots of Dependent variables

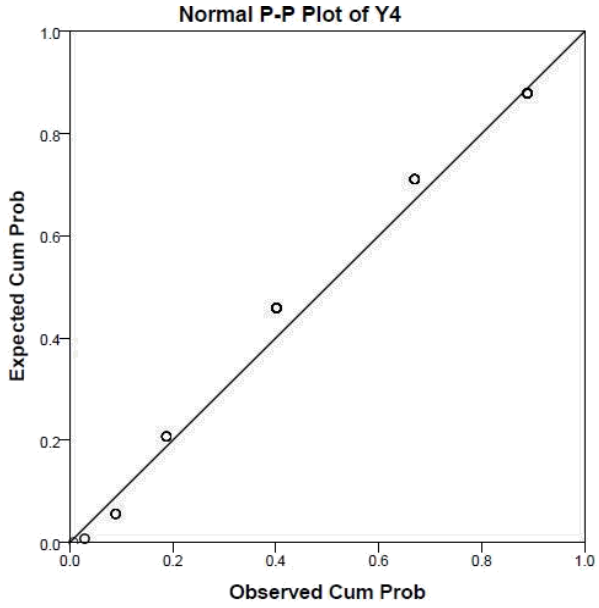

Figure 4.20: Normal Probability plots of Dependent variables

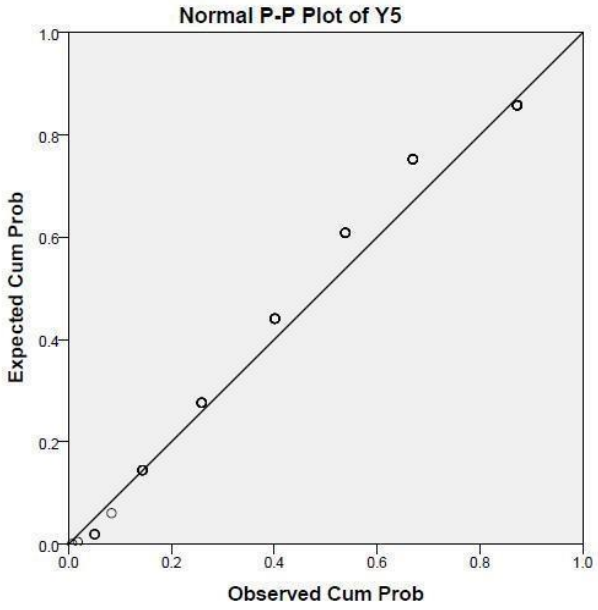

Figure 4.21: Normal Probability plots of Dependent variables

We can see from the above plots, that the assumption of normality is valid apart from a few minor deviations from the diagonal in select cases. To ensure the assumption of normality, we conduct the Shapiro Wilks normality test and check for the p-values. The Shapiro-Wilks test for normality is one of three general normality tests designed to detect all departures from normality. It is comparable in power to the other two tests.The test rejects the hypothesis of normality when the p-value is less than or equal to 0.05.

The output of the normality tests indicate that there are a few variables that are not normal in nature, we tried transformations but the overall result showed no visible improvement. Hence, we have proceeded with care since the model has highlighted characteristics of robustness (Joseph F. Hair, *et al.*, 2007).

The arguments in favor of persisting with the variables are:

- Sample size increases accuracy by reducing sampling error. Hence, larger sample sizes reduce the impact of non-normality
- Sample size of more than thirty can thwart the negative impact of non-normality (Joseph F. Hair, *et al,* 2007). We have ensured with a higher sample size, we can overlook the effect of non-normality as the variables conform to the other assumptions
- In addition, the effect of non-normality are associated primarily with Skewness and Kurtosis of the variables. Unless the degree of skewness and kurtosis is sufficiently large, i.e. a skewness value greater than ±5 and a kurtosis value greater than 3, the impact of non-normality can be overlooked. In the table below, it is seen that the values of skewness and kurtosis are small enough to ignore the influence of non-normality

Table 4.16: Skewness and Kurtosis of Variables

Independent Variables			Dependent Variables		
Variables	Skewness	Kurtosis	Variables	Skewness	Kurtosis
X_1	-.906	1.646	Y_1	-.450	-.364
X_2	-.556	.749	Y_2	-.123	-.699
X_3	-1.736	2.584	Y_3	-.482	-.153
X_4	-.178	-.917	Y_4	-.668	.371
			Y_5	-.431	-.619

4.9.6 Regression Analysis- Model Fit Assessment

We now proceed to the model fit and assessing the performance of the regression analysis after specifying the independent and dependent variables, ensuring we have an adequate sample size to measure the objective of the study, and validating all the assumptions of regression. There are primarily three primary tasks to be checked for while performing and assessing the regression:

- Determine a method to estimate the regression model
- Identifying the variables that are statistically significant in predicting the outcome variable
- Recognizing the variables that are exerting an unwarranted impact on the outcome

4.9.6.1 Determine a method to estimate the regression model

We have primarily adopted two approaches to determining a suitable regression model. One is a confirmatory regression and the other is a stepwise regression.

Confirmatory regression evaluates the dependent variables in the light of the independent variables. This method enables a researcher to retain control over the selection of the variables (Joseph F. Hair, *et al.*, 2007). The subsequent approach is that of the stepwise regression. In statistics, stepwise regression is a method where in the selection of the optimal combination of the variables is automated by the model itself. The model considers each of the variables and eventually retains only those variables that increase the predictive prowess of the model based on select criteria. In our study,

we have used stepwise regression primarily for cross validation of the performance of the model.

To evaluate the impact of the independent variables across the dependent variables, we construct regression equations across each of the dependent variables and the respective independent variables.

The models with each of the constructs of dependent variable *(Y_1,Y_2,Y_3,Y_4 and Y_5) of innovation performance* are evaluated against each of the variables of demand marketing *(X_1,X_2,X_3, ,and X_4).*

Model I

$$Y_1 = b_{10}+b_{11}X_1+b_{12}X_2+b_{13}X_3+b_{14}X_4+ \mu_1$$

Model II

$$Y_2 = b_{20}+b_{21}X_1+b_{22}X_2+b_{23}X_3+b_{24}X_4 + \mu_2$$

Model III

$$Y_3 = b_{30}+b_{31}X_1+b_{32}X_2+b_{33}X_3+b_{34}X_4+ \mu_3$$

Model IV

$$Y_4 = b_{40}+b_{41}X_1+b_{42}X_2+b_{43}X_3+b_{44}X_4+ \mu_4$$

Model V

$$Y_5 = b_{50}+b_{51}X_1+b_{52}X_2+b_{53}X_3+b_{54}$$

4.9.6.2 Identifying the variables that are statistically significant in predicting the outcome variable

To identify the variables that are statistically significant, we perform two distinct tests:

- R^2 :Captures the variation that is explained by the model
- Individual performance of each of the coefficient

R-squared (R^2) is a statistical technique that denotes the amount of the variance for a dependent variable that's explained by an independent variable or variables ina regression model.

R^2 in isolation provides for the accuracy of the model but fails to account for the concept of overfitting. To ensure that the variables indeed impact the model in a positive manner, we use a second measure called Adjusted $R^{2.}$

The adjusted R-squared is a modified version of R-squared that has been adjusted for the number of predictors in the model. The adjusted R-squared increases only if the new term improves the model more than would be expected by chance. It decreases when a predictor improves the model by less than expected by chance (Joseph F. Hair, *et al.*, 2007).

There are three concepts that are to be considered while estimating the significance of the regression coefficient, i.e., if the coefficient is indeed different from zero. The three concepts are:

- Establishing the significance level (alpha)
- Sampling error
- Standard error

We can confidently reject the null hypothesis as the estimates of the regression for the ninety-one organizations indicate a robust model. The table below captures the output of the regression model.

Table 4.17: Models summary

Model	*R*	R^2	Adjusted R^2	Std. Error of the Estimate
1	0.724	0.524	0.501	0.41732
2	0.696	0.484	0.456	0.45149
3	0.757	0.573	0.552	0.39124
4	0.616	0. 379	0.356	0.34110
5	0.648	0.419	0.398	0.39231

Multiple *R* can be seen from the table to be reasonably high and this represents the correlation coefficient of the actual and predicted values of the dependent variable.

R^2 from the table can be seen to be indicating a robust performance and thereby a good fit. The different values of R-squared represent the different models that were developed for each of the dependent variables.

To assess the overall model fit, we have used the ANOVA analysis in light of F-ratio. The table below provides the summary of the test conducted. It can be concluded that all the models are statistically significant as the p-values are not greater than 0.05 leading to the rejection of the null hypothesis across the five models.

Table 4.18: ANOVA Ratio

Model	F statistic	*p*-value
1	13.689	0.000
2	7.410	0.000
3	16.285	0.000
4	7.388	0.000
5	9.229	0.000

Model I - Technological innovation ~ DM

Ho: $b_{10} = b_{11} = b_{12} = b_{13} = b_{14} = 0$

and

Ha: Not all b_i *values equal to zero*

Model II - Product innovation ~ DM

Ho: $b_{20} = b_{21} = b_{22} = b_{23} = b_{24} = 0$

and

Ha: Not all b_i *values equal to zero*

Model III - Process innovation ~ DM

Ho: $b_{30} = b_{31} = b_{32} = b_{33} = b_{34} = 0$

and

Ha: Not all b_i *values equal to zero*

Model IV - System innovation ~ DM

Ho: $b_{40} = b_{41} = b_{42} = b_{43} = b_{44} = 0$

and

Ha: Not all b_i *values equal to zero*

Model V - Innovation management ~ DM

Ho: $b_{50} = b_{51} = b_{52} = b_{53} = b_{54} = 0$

and

Ha: Not all b_i values equal to zero

4.9.6.3 Recognizing the variables that are exerting an unwarranted impact on the outcome

The outcome of a model can be affected by variables that are having extreme values. In statistics, these variables are called outliers. The goal of this section is to identify outliers, i.e., a data point that differs significantly from other observations.

There is no rigid definition to what constitutes an outlier. Hence identifying an outlier falls on the expertise of the researcher. It is in this context that it becomes very important to understand the location of the outlier relative to other data points. An outlier that has an impact on the outcome of the regression are called influential cases. To evaluate the impact of the variables we use Cook's distance (Michael H. Kutner *et al*, 2005). It is a common measurement of a data point's influence. It's a way to find influential outliers in a set of predictor variables when performing a least-squares regression analysis.

Cook's Distance, C = 4 / (n – k – 1)

Where *n* = number of cases

k = number of independent variables

Applying the formula to the current study:

Cook's Distance, C = 4/ (91-4-1) = 0.046

We see that a case may have a significant impact on the outcome if the value of the case is higher than a value of 0.046.

If the residual of a dependent variable is greater or less than three, the score is considered to be unusual. Similarly, for an independent variable, the combination of all the scores is considered an outlier if the value of the Mahalonobis distance score is less than or equal to 0.001 (Joseph F. Hair, *et al.*, 2007). We have used the concept of Cooks, Mahalanobis distance and residual scores to select cases that can be excluded. The table below gives the details of the cases after treating for outliers.

Table 4.19: Details of cases after removal of outliers and influential

Model	No of Valid Cases	Ratio of Valid Cases to Independent Variables
1	84	21.00
2	89	22.25
3	90	22.50
4	89	22.25
5	88	22.00

We once again see that the ratio of independent to dependent variables meet the criteria for 5:1. After the outliers are treated, it can be seen that the number of cases vary from 84 to 90 across different models. The minimum ratio is 21.0 and this validates the assumption.

4.9.7 Regression Model- Post Treatment for Outliers

The table below provides the summary of the results for the regression once the outliers are treated, and influential cases are removed from the data.

Table 4.20: Model Summary after removal of Outliers

Model	R	R^2	Adjusted R^2	Std. Error of the Estimate
1	0.756	0.571	0.557	0.3988
2	0.781	0.609	0.589	0.4402
3	0.801	0.641	0.621	0.4704
4	0.710	0.504	0.501	0.2883
5	0.720	0.518	0.498	0.3208

We can notice a considerable increase in performance with the minimum value being 50.4% in R-Squared. This is a considerable improvement from 37.9% value of R-Squared exemplifying the role of outliers in deteriorating result of the regression.

Table 4.21: Change in R^2 after treating for outliers

Model	R^2 prior to removal of outliers and influential' s	R^2 after to removal of outliers and influential' s	Change in R^2 Percentage
1	0.524	0.571	8.96
2	0.484	0.609	25.82
3	0.573	0.641	11.86
4	0. 379	0.504	32.98
5	0.419	0.518	23.62

The table below indicates the value of the F-statistic from ANOVA

Table 4.22: ANOVA Ratio after removal of outliers and influential

Model	**F statistic**	**p-value**
1	15.101	0.000
2	9.071	0.000
3	19.312	0.000
4	9.402	0.000
5	11.314	0.000

The table below indicates the relationship amongst the dependent and independent variables from the multiple R perspective. A value greater than 0.6 is considered strong and a value between 0.4 to 0.6 is considered moderate. The subsequent chapter elaborates more on the relationship amongst the variables.

Table 4.23: Type of relationship between variables

Model	Multiple R	Type of relationship
1	0.756	Strong
2	0.781	Strong
3	0.801	Very Strong
4	0.710	Strong
5	0.720	Strong

4.9.8 Regression Analysis- Evaluation of Assumptions

In this segment, we look at how the variates are meeting the assumptions of regressions.The assumptions as explained before are:

4.9.8.1 Linearity

4.9.8.2 Homoscedasticity

4.9.8.3 Normality

4.9.8.4 Multi-collinearity

4.9.8.5 Independence of residuals

To evaluate the variates, we look at the residuals of the model, i.e. the difference in the value of the observed and the predicted value of the dependent variable. To measure this, we use the students' t-test. To detect any violation of the assumptions, we plot the residualsversus the predicted variables and check for specific patterns. All our assumptions are heldvalid, when the residuals are randomly distributed and no clear pattern is found (Joseph F. Hair, *et al.*, 2007).

4.9.8.1 Linearity

The residual plots for linearity are developed using SPSS and indicate no clear patterns thus not conforming to the assumption of linearity.

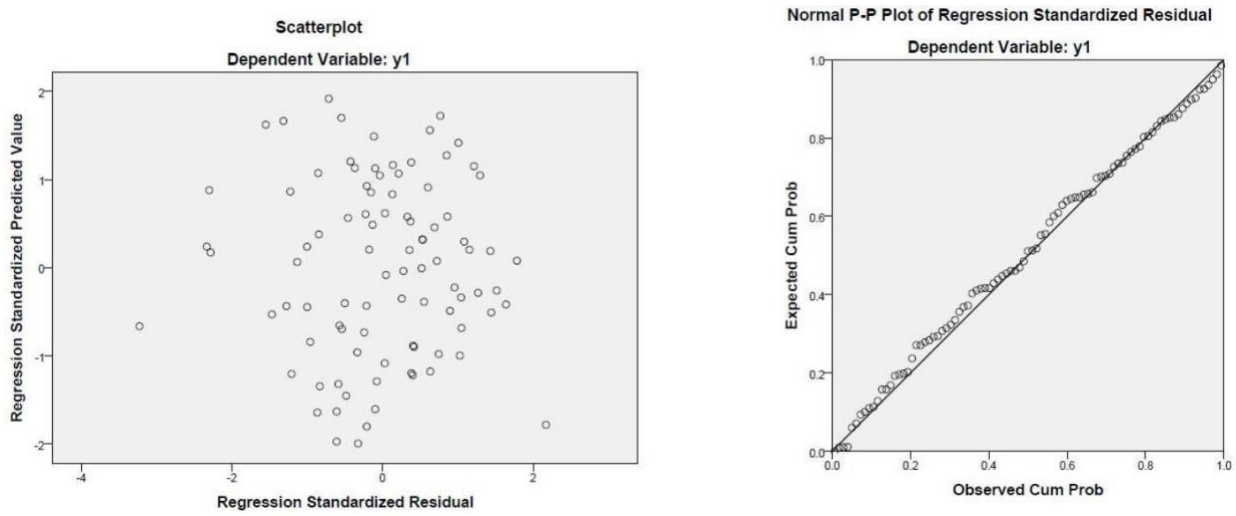

Figure 4.22: Model I - Residuals – Scatter plot and Normal P-P Plot

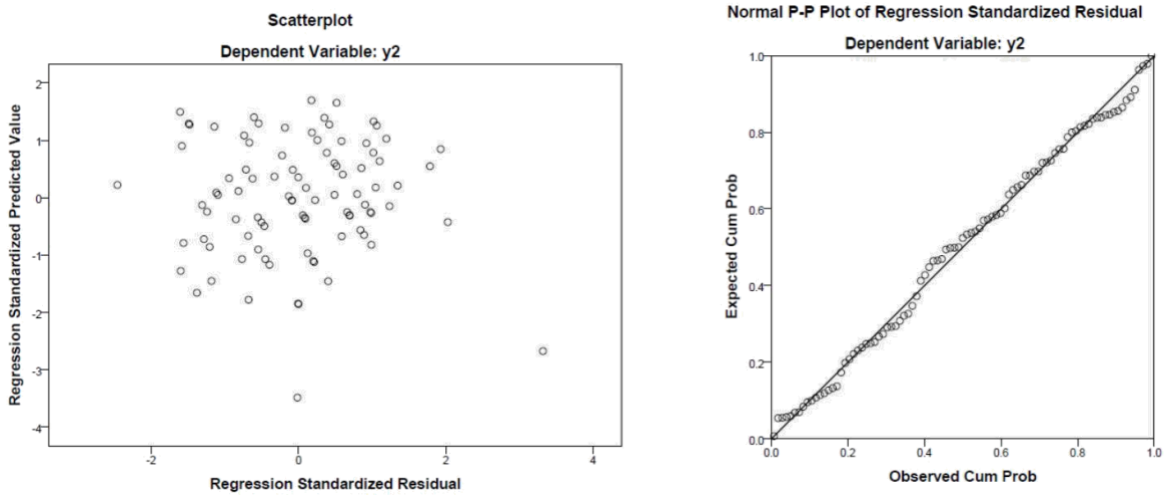

Figure 4.23: Model II- Residuals – Scatter plot and Normal P-P Plot

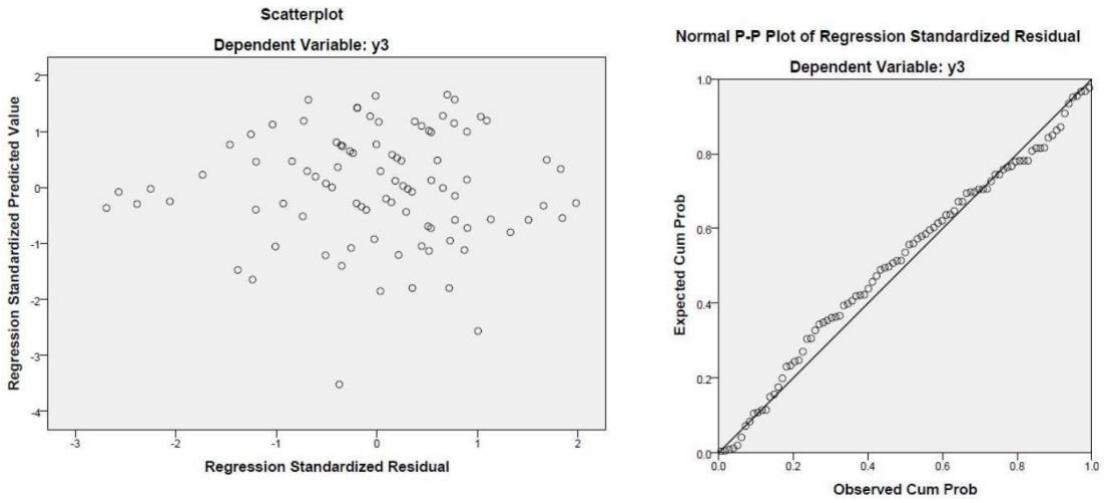

Figure 4.24: Model III- Residuals – Scatter plot and Normal P-P Plot

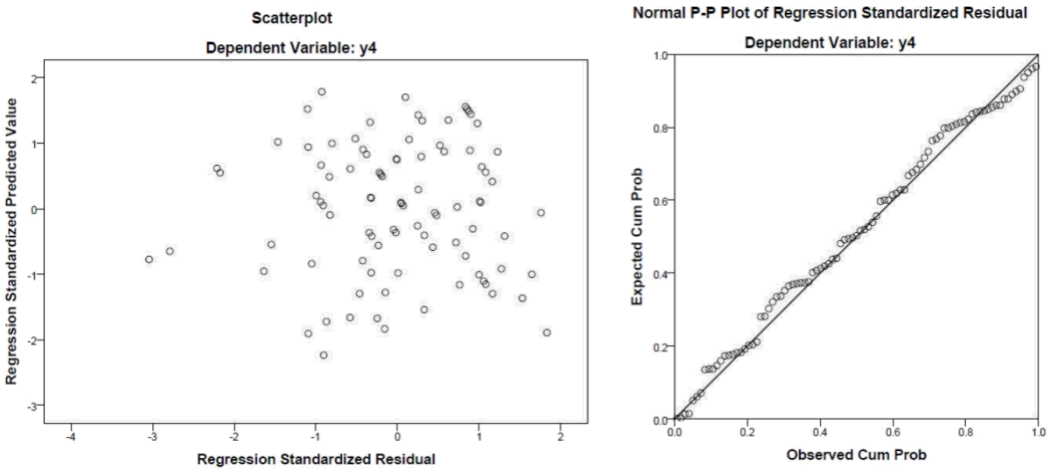

Figure 4.25: Model IV- Residuals – Scatter plot and Normal P-P Plot

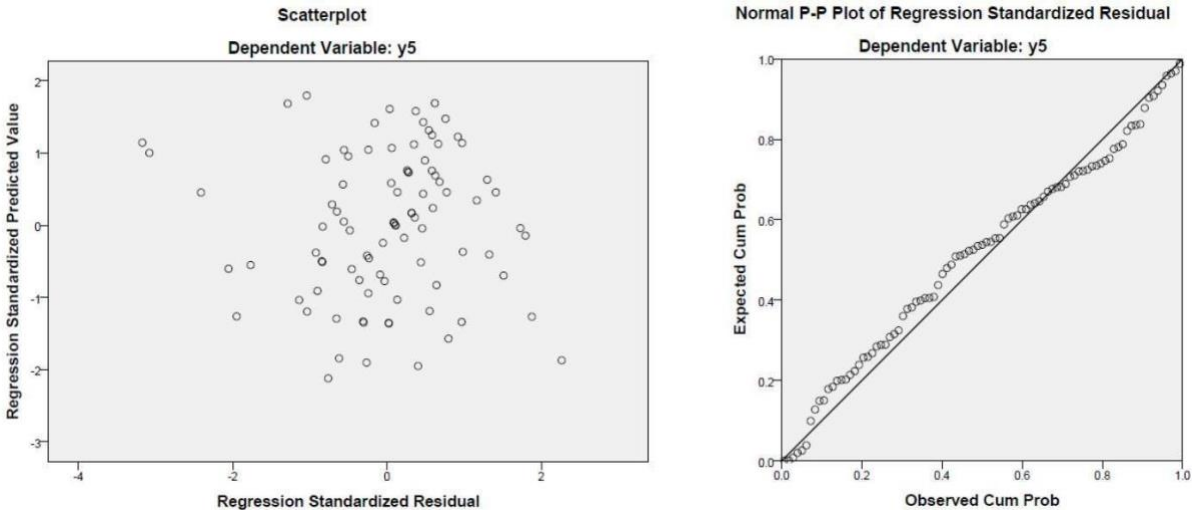

Figure 4.26: Model IV- Residuals – Scatter plot and Normal P-P Plot

4.9.8.2 Homoscedasticity

Homoscedasticity describes a situation in which the error term (that is, the "noise" or random disturbance in the relationship between the independent variables and the dependent variable) is the same across all values of the independent variables.

Plotting the residual versus the predicted variable with no clear pattern ensures that the models conform to the assumption of homoscedasticity. The findings reveal the presence of homoscedasticity in the multivariate case. To analyze the levels of homoscedasticity, we have carried out Levene's test to validate the assumption of equal variance, with the table below summarizing the findings.

Table 4.23: Significance for Levene's Test of Homogeneity of Variances

	X_1	X_2	X_3	X_4
μ_1	0.444	0.831	0.077	0.803
μ_2	0.330	0.232	0.052	0.051
μ_3	0.230	0.230	0.088	0.552
μ_4	0.437	0.590	0.376	0.772
μ_5	0.968	0.726	0.407	0.789

We can see from the table above that each of the variable pairs the level of significance is greater than 0.05. Hence we can reject the null hypothesis and conclude that the variance is equal.

4.9.8.3 Normality

The normality plots above indicate the presence of normality and to confirm the same, we have conducted the Shapiro-Wilks normality test. The table confirms that the assumption of normality is valid with all the p-values greater than 0.05.

Table 4.24: Shapiro-Wilks normality test of Residuals

Models	1	2	3	4	5
p-value ($p > 0.05$)	0.3254	0.3442	0.2850	0.1296	0.1154

4.9.8.4 Multi-collinearity

Multi-collinearity refers to a situation in which two or more explanatory variables in a multiple regression model are highly linearly related. We have perfect multi-collinearity if, for example as in the equation above, the correlation between two independent variables is equal to 1 or −1.

The perfect condition for a regression equation is when the correlation is between the dependent and the independent variables. However in the case of multi-collinearity, the correlation is seen amongst the independent variables which is a problem because it undermines the statistical significance of an independent variable. Other things being equal, the larger the standard error of a regression coefficient, the less likely it is that this coefficient will be statistically significant.

To overcome the issue of multi-collinearity, we use Variance Inflation Factor. Variance inflation factor (VIF) is a measure of the amount of multi-collinearity in a set of multiple regression variables. Mathematically, the VIF for a regression model variable is equal to the ratio of the overall model variance to the variance of a model that includes only that

single independent variable. A rule of thumb for interpreting the variance inflation factor: 1 = not correlated. Between 1 and 5 = moderately correlated. Greater than 5 = highly correlated.

Table 4.25: Variance Inflation Factor

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
X_1	1.980	1.979	2.012	2.211	2.015
X_2	2.136	2.158	2.245	2.347	2.211
X_3	1.937	1.943	1.998	1.957	1.977
X_4	1.524	1.524	1.614	1.601	1.651

From the table above, it can be seen that none of the variables indicate a value greater than 10, therefore in our study, multi-collinearity is not a problem.

4.9.8.5 Independence of Residuals

Any violation of the assumptions result in varying precision of the estimates although the accuracy is largely unaffected. This is popularly known in statistics as the bias variance trade off. To ensure that the residuals are independent, we have used the Durbin-Watson statistic. The value of the statistic lies in the range of zero to four with a value near two indicating no auto-correlation or independence of residuals. From the table, we can see that the assumption is valid in our study.

Table 4.26: Autocorrelation – Durbin Watson

Model	**1**	**2**	**3**	**4**	**5**
Durbin Watson Statistic	2.061	2.188	2.026	2.298	2.030

4.10 SUMMARY

The table below captures the essence of the chapter.

Table 4.27: Summary of assumptions of regression analysis

Assumptions and Conditions	Regression models				
	1	2	3	4	5
Ratio of cases to IV > 5	21.0	22.25	22.50	22.25	22.0
ANOVA significance < 0.05	0.000	0.000	0.000	0.000	0.000
Absence of non linear patterns	OK	OK	OK	OK	OK
Residual normality (p> 0.05)	0.3254	0.3442	0.2850	0.1296	0.1154
Homoscedasticity (p> 0.05)	0.0770	0.0500	0.0880	0.0500	0.1990
Multi-collinearity (VIF < 10)	2.136	2.158	2.245	2.347	2.211
Autocorrelation (DW ≈ 2.0)	2.061	2.188	2.026	2.298	2.030
R^2> 0.5	0.571	0.609	0.641	0.504	0.518
Model Adequacy	OK	OK	OK	OK	OK

CHAPTER 5

RESULTS AND DISCUSSIONS

5.1 REGRESSION – EXPLANATION OF RELATIONSHIP BETWEEN CONSTRUCTS

Regression enables us to quantify the impact of the independent variables on the dependent variable. Regression enables us to model and analyze the relationships between variables and how they contribute and are related to producing a particular outcome together through the magnitude and the statistical importance of the coefficient of regression for each of the independent variable. Therefore, we can quantify the impact of each of the variables on the target variable and establish the variable that most impacts the target variable. Interpretation is subject to the following viewpoints and each of the three standpoints are provided by the output of the regression equation:

- Significance of the independent variables
- Nature of the relationship determined
- Relationship amongst the predictor variables

In our study, we have used the concept of CFA keeping in mind the dimensionality of the data. The approach supports us by capturing the strengths of each of the independent variable but comes at a possible cost of lower predictive power of the equation. We have further used multiple regression and stepwise regression to ensure there is a balance between the variance bias trade off.

5.2 REGRESSION – INTERPRETATION OF THE COEFFICIENT

The coefficient of regression is represented by β. The output of the regression equation comes with a sign, i.e. either a positive or a negative sign for the regression coefficient. This indicates the nature of the relationship between the target and the predictor variable. For example, if the β is negative, it means that a unit change in the value of the concerned target variable will reduce the predictor variable by –β times. Thus, it becomes possible for us to measure the impact of the variables against the concerned target variable and simultaneously allows for the impact to be quantified at an individual variable level.

It is of cardinal importance to standardize the data prior to regression in order to ensure that the β coefficient can be compared across variables. Therefore, it can be conceptualized

that the β coefficients represent a measure of relative importance when the data is scaled and make redundant the problem of different units of measurement.

The table below quickly recaptures the different constructs that are used for the study and in this chapter, we develop the regression equations that facilitate predictive analytics.

Table 5.1: Constructs of Demand marketing (DM) and Innovation Performance

Independent variables of Demand marketing		**Dependent Variables of Innovation Performance**	
Business Landscape	X1	Technological innovation	Y1
Marketing Mix	X_2	Product innovation	Y_2
Brand Equity	X_3	Process innovation	Y_3
Technology Management	X4	System innovation	Y4
		Innovation management	Y_5

The five models that are developed on the basis of the regression equation are:

Model I

$Y_1 = (.405) + .081\ X_1 + .223\ X_2 + .017\ X_3 + .555\ X_4$

Model II

$Y_2 = (1.246) + .048\ X_1 + .142\ X_2 + .193\ X_3 + .254\ X_4$

Model III

$Y_3 = (.610) + .164\ X_1 + .186\ X_2 + .190\ X_3 + .309\ X_4$

Model IV

$Y_4 = (2.232) + .182\ X_1 + (-.024)\ X_2 + .033\ X_3 + .316\ X_4$

Model V

$Y_5 = (1.474) + .125\ X_1 + .082\ X_2 + .045\ X_3 + .0418\ X_4$

The term with independent variable in each of the equation is called a constant term and it is symbolically that value an equation retreats to in the absence of or when the independent variables are zero. In our study, it holds no explanatory power as no value of the predictor variable is zero.

5.3 MODEL I – TECHNOLOGICAL INNOVATION ~ DEMAND MARKETING

The table below captures the summary of the regression output performed through CFA and stepwise regression approach with respect to the first model.

Table 5.2: Model I - Coefficients (CFA approach)

Model I	Coefficients	Unstandardized Coefficients β	Std. Error	Standardized Coefficients B	T	Sig.
	Constants	0.405	0.51		0.79	0.43
Dependent Variable *Y1*	X_1	0.081	0.14	0.069	0.59	0.56
	X_2	0.223	0.13	0.205	1.66	0.1
	X_3	0.017	0.1	0.021	0.18	0.86
	X_4	0.555	0.13	0.442	4.25	0

Table 5.3: Model I - Coefficients (Stepwise Regression approach)

Model I	Coefficients	Unstandardized Coefficients β	Std. Error	Standardized Coefficients β	T	Sig.
Dependent Variable Y_1	(Constant)	.469	.493		.952	.344
	X_2	.270	.101	.248	2.671	.009
	X_4	.591	.116	.472	5.085	.000

It can be seen that both the approaches capture the two variables, viz., X_2 *and* X_4 to be of statistical significance. A variable is said to be of statistical significance if the p-value is less than 0.1 in the case of CFA and less than 0.05 in the case of stepwise regression approach. The interpretation for the model is that the constructs of Marketing Mix(X_2) and Technology Management(X_4) play a crucial role on the development of Technology Management. The value is having a positive sign indicating that a focus on the concepts of Marketing Mix(X_2) and Technology Management(X_4) results in a positive output for technology management.

5.4 MODEL II –PRODUCT INNOVATION ~ DEMAND MARKETING

The table below captures the summary of the regression output performed through CFA and stepwise regression approach with respect to the second model.

Table 5.4: Model II - Coefficients (CFA approach)

Model II	Coefficients	Unstandardized Coefficients β	Std. Error	Standardized Coefficients β	T	Sig.
Dependent Variable Y_2	Constants	1.246	.554		2.250	.027
	X_1	.048	.149	.042	.323	.748
	X_2	.142	.145	.233	.979	.033
	X_3	.193	.104	.240	1.855	.067
	X_4	.254	.141	.206	1.799	.076

Table 5.5: Model II - Coefficients (Stepwise Regression approach)

Model II	Coefficients	Unstandardized Coefficients β	Std. Error	Standardized Coefficients β	T	Sig.
Dependent Variable Y_2	(Constant)	1.495	.506		2.958	.04
	X_3	.268	.082	.334	3.261	.002
	X_4	.305	.126	.228	2.425	.027

It can be seen that both the approaches capture the three variables, viz., X_2, X_3 *and* X_4 to be of statistical significance. A variable is said to be of statistical significance if the p- value is less than 0.1 in the case of CFA and less than 0.05 in the case of stepwise regression approach.

The interpretation for the model is that the constructs of Marketing Mix(X_2), Brand Equity(X_3) and Technology Management(X_4) play a crucial role on the development of Product Innovation Performance (Y_2).

The value is having a positive sign indicating that a focus on the concepts of Marketing Mix(X_2), Brand Equity(X_3) and Technology Management(X_4) results in a positive output for technology management. From the standardized coefficients value, it can be seen that a large impact on product innovation is visible through Brand Equity(X_3) with a high coefficient value.

5.5 MODEL III –PROCESS INNOVATION ~ DEMAND MARKETING

The table below captures the summary of the regression output performed through CFA and stepwise regression approach with respect to the third model.

Table 5.6: Model III - Coefficients (CFA approach)

Model III	Coefficients	Unstandardized Coefficients β	Std. Error	Standardized Coefficients β	T	Sig.
Dependent Variable Y_3	Constants	0.61	0.48		1.272	0.207
	X_1	0.164	0.129	0.145	1.27	0.208
	X_2	0.186	0.126	0.176	1.482	0.142
	X_3	0.19	0.09	0.239	2.111	0.058
	X_4	0.309	0.122	0.254	2.527	0.013

Table 5.7: Model III - Coefficients (Stepwise regression approach)

Model III	Coefficients	Unstandardized Coefficients β	Std. Error	Standardized Coefficients β	T	Sig.
Dependent Variable Y_3	(Constant)	.752	.468		1.607	.112
	X_2	.239	.119	.226	2.008	.048
	X_3	.209	.089	.263	2.350	.021
	X_4	.370	.113	.304	3.284	.001

It can be seen that both the approaches capture the two variables, viz., X_3 *and* X_4 to be of statistical significance. A variable is said to be of statistical significance if the p-value is less than 0.1 in the case of CFA and less than 0.05 in the case of stepwise regression approach.

The interpretation for the model is that the constructs of Brand Equity(X_3) and Technology Management(X_4) play a crucial role on the development of Process Innovation Performance (Y_3). The value of the coefficient is having a positive sign indicating that a focus on the concepts of Brand Equity(X_3) and Technology Management(X_4) results in a positive output for Process Innovation Performance (Y_3).

5.6 MODEL IV –SYSTEM INNOVATION ~ DEMAND MARKETING

The table below captures the summary of the regression output performed through CFA and stepwise regression approach with respect to the fourth model.

Table 5.8: Model IV - Coefficients (Confirmatory estimation approach)

Model IV	Coefficients	Unstandardized Coefficients β	Std. Error	Standardized Coefficients β	T	Sig.
Dependent Variable Y_4	Constants	2.232	.418		5.335	.000
	X_1	.182	.112	.212	1.616	.090
	X_2	-.024	.110	-.029	-.216	.830
	X_3	.033	.078	.054	.418	.677
	X_4	.316	.107	.340	2.963	.004

Table 5.9: Model IV - Coefficients (Stepwise estimation approach)

Model IV	Coefficients	Unstandardized Coefficients β	Std. Error	Standardized Coefficients β	T	Sig.
Dependent Variable Y_4	(Constant)	2.523	.377		6.692	.000
	X_4	.437	.087	.470	5.030	.000

It can be seen that both the approaches capture the two variables, viz., X_1 *and* X_4 to be of statistical significance. A variable is said to be of statistical significance if the p-value is less than 0.1 in the case of CFA and less than 0.05 in the case of stepwise regression approach.

The interpretation for the model is that the constructs of Business Landscaping (X_1) and Technology Management(X_4) play a crucial role on the development of System innovation performance (Y_4).

The value of the coefficient is having a positive sign indicating that a focus on the concepts of Business Landscaping (X_1) and Technology Management(X_4) results in a positive output for System innovation performance (Y_4).

5.7 MODEL V – DEMAND MARKETING AND INNOVATION MANAGEMENT

The table below captures the summary of the regression output performed through CFA and stepwise regression approach with respect to the fifth model.

Table 5.10: Model V - Coefficients (Confirmatory estimation approach)

Model V	Coefficients	Unstandardized Coefficients B	Std. Error	Standardized Coefficients β	T	Sig.
Dependent Variable Y_5	Constants	1.474	.481		3.063	.003
	X_1	.125	.129	.122	.964	.338
	X_2	.082	.126	.086	.653	.516
	X_3	.045	.090	.063	.504	.616
	X_4	.418	.123	.379	3.408	.001

Table 5.11: Model V - Coefficients (Stepwise estimation approach)

Model V	Coefficients	Unstandardized Coefficients β	Std. Error	Standardized Coefficients β	T	Sig.
Dependent Variable Y_5	(Constant)	1.888	.435		4.339	.000
	X_4	.565	.100	.513	5.642	.000

It can be seen that both the approaches capture the single variable, viz., X_4 to be of statistical significance. A variable is said to be of statistical significance if the p-value is less than 0.1 in the case of CFA and less than 0.05 in the case of stepwise regression approach.

The interpretation for the model is that the constructs of Technology Management(X_4) play a crucial role on the development of Innovation management performance (Y_5).

The value of the coefficient is having a positive sign indicating that a focus on the concepts of Technology Management(X_4) results in a positive output for Innovation management performance (Y_5).

5.8 RESULTS- AN OVERVIEW

The primary aim of this research has been to answer the question: How are the variables of Innovation Performance impacted by the variables of Demand Marketing? To this end, we have used the concept of multiple regression to address and identify the underlying relationship amongst the set of variables. It is in that context, we have discussed the following aspects.

The table below captures the relationship, or the percentage of variance explained by each of the models which has been explained in the preceding chapter. The values of R-square range from 50.4% to 64.1% . These values are highly encouraging and should provide a considerable motivation to Indian organizations to implement the concepts o DM and achieve a superior competitive edge.

Table 5.12: Amount of variance for all Models

Models	**I**	**II**	**III**	**IV**	**V**
R^2	0.571	0.609	0.641	0.504	0.518

The explanatory powers of the regression equation is determined through the significance of each of the individual variables and how a unit change in the value of the target variable impacts on the independent variable. In our case, there is a positive correlation amongst the significant variables and the target variables and the same is reflected in the table below.

	Dependent Variable		Demand Influencing Independent variable		β	Sig.
1	Technological Innovation	Y_1	Technology Management	X_4	.442	.000
2	Product Innovation	Y_2	Marketing Mix	X_2	.233	.03
			Brand Equity	X_3	.334	.002
3	Process Innovation	Y_3	Brand Equity	X_3	.263	.021
			Technology Management	X_4	.304	.001
4	System Innovation	Y_4	Technology Management	X_4	.470	.000
5	Innovation Management	Y_5	Technology Management	X_4	.513	.000

It can be seen that the three of the variables of DM, i.e. Marketing Mix (X_2), Brand Equity (X_3), and Technology Management (X_4) are statistically significant and have a substantial impact on the innovation performance of an organization. There is only one variable in our study which does not have sufficient evidence to showcase any impact on an organization's innovation performance and that is Business Landscape(X_1).

5.9 COMPARISION ACROSS MODELS

The table below shows the summary of the significant coefficients derived through the regression model.

Table 5.14: Summary of Significant Coefficients

	Model I	Model II	Model III	Model IV	Model V
	Y_1	Y_2	Y_3	Y_4	Y_5
X_1	-	-	-	-	-
X_2	-	0.142	-	-	-
X_3	-	0.268	0.298	-	-
X_4	0.591	-	0.370	0.437	0.565

The table sums up the findings in a crisp manner and indicates the positive impact played by three of the constructs of Demand Marketing, i.e. Marketing Mix (X_2), Brand Equity(X_3) and Technology Management(X_4).

This is a highly encouraging finding that enables an organization to adopt the approach of DM and provide the firm a competitive edge by thriving to be innovative. Another key finding of the study is the lack of any influence by the variable Business Landscape (X_1) indicating no visible trend that the an organization can improve the innovation performance despite competition.

It has to be acknowledged that despite a significant impact by the variables of DM towards Innovation Performance of an organization, these are not to be considered in isolation owing to the collinearity amongst the variables. Management can now base its decision and ally their strategies with their mission and vision on the perceptions of these dimensions to better their innovation performance. The study aimed to provide a framework for improved decision making to facilitate innovation by understanding the constructs of DM and has delivered on the same.

5.10 VALIDATING THE RESULTS

Validation aims to ensure that the result can applicable across a larger population and generalizes well rather than overfitting to a small sample and failing to recognize any patterns across the population and therefore can be used across situations.

In our study, we have used the holdout method for validation. The holdout method is a type of cross validation where the data set is separated into two sets, called the training set and the testing set. The errors made by the model are accumulated as before to give the mean absolute test set error, which is used to evaluate the model (Joseph F. Hair, *et al*, 2007).

The method of validation is effective as the ability to collect new data are limited by factors such as time, response rate, cost etc.

5.10.1 Model I Validation

The results of the holdout method for validation is presented in the table below. The relationship displayed between the dependent and the independent variables as captured by the model are of statistical significance as the p-value is less than 0.05.

Table 5.15: Model I Validation

MODEL I	Full Data	Split 1	Split 2
ANOVA Significance ($p \leq 0.05$)	0.000	0.000	0.000
R^2	0.571	0.518	0.520
% Variation in R^2		9.3	8.94
Significant Coefficients ($p \leq 0.05$)	X_4	X_3, X_4	X_4
Significant Coefficients ($p \leq 0.10$)	X_2	X_2	X_2, X_3

The results displays that the total variance explained by the model to be at 57.1% which is better than what is explained in the second and third split. Overall, the result displays

a high level of similarity in R-squared. The total proportion of variance explained was within 9.3% of the variance explained in the model using the full data set (57.1%). There are some differences that can be seen across models and this is noticed in the section of significant coefficients. In the first model X_3 and X_4 are significant but only appear in the second sample. Across all the samples X_4 is retained as a significant variable. This indicates that Technology Management(X_4) has a strong relationship with Y_1. The findings of the holdout method support the initial findings from the regression analysis.

5.10.2 Model II Validation

The results of the holdout method for validation is presented in the table below. The relationship displayed between the dependent and the independent variables as captured by the model are of statistical significance as the p-value is less than 0.05.

Table 5.16: Model II Validation

MODEL II	Full Data	Split 1	Split 2
ANOVA Significance ($p \leq 0.05$)	0	0.03	0
$_R2$	0.609	0.625	0.581
% Variation in R^2		2.62	4.6
Significant Coefficients ($p \leq 0.05$)	X_2, X_3	X_2, X_4	X_3
Significant Coefficients ($p \leq 0.10$)	*Nil*	*Nil*	*Nil*

The results displays that the total variance explained by the model to be at 60.9% which is better than what is explained in the third and worse than what is explained in the second split. Overall, the result displays a high level of similarity in R-squared. The total proportion of variance explained was within 4.6% of the variance explained in the model using the full data set (60.9%).

There are some differences that can be seen across models and this is noticed in the section of significant coefficients. In the second sample X_2 and X_4 are significant but in the first and the third sample X_2 and X_3 are seen to be significant. The findings of the holdout method support the initial findings from the regression analysis.

5.10.3 Model III Validation

The results of the holdout method for validation is presented in the table below. The relationship displayed between the dependent and the independent variables as captured by the model are of statistical significance as the p-value is less than 0.05.

Table 5.17: Model III Validation

MODEL III	Full Data	Split 1	Split 2
ANOVA Significance ($p \leq 0.05$)	0	0	0
R^2	0.641	0.622	0.63
% Variation in R^2		2.97	1.8
Significant Coefficients ($p \leq 0.05$)	X_3, X_4	X_4	X_3, X_4
Significant Coefficients ($p \leq 0.10$)	*Nil*	X_1	X_2

The results displays that the total variance explained by the model to be at 64.1% which is better than what is explained in the second and third split. Overall, the result displays a high level of similarity in R-squared. The total proportion of variance explained was within 2.97% of the variance explained in the model using the full data set (64.1%).

There are some differences that can be seen across models and this is noticed in the section of significant coefficients. In the first model X_3 and X_4 are significant while X_4 occurs to be a sole significant coefficient in the second split. Across all the samples X_4 is retained as a significant variable. This indicates that Technology Management(X_4) has a strong relationship with Y_3. The findings of the holdout method support the initial findings from the regression analysis.

5.10.4 Model IV Validation

The results of the holdout method for validation is presented in the table below. The relationship displayed between the dependent and the independent variables as captured by the model are of statistical significance as the p-value is less than 0.05.

Table 5.18: Model IV Validation

MODEL IV	Full Data	Split 1	Split 2
ANOVA Significance ($p \leq 0.05$)	0	0	0
R^2	0.504	0.521	0.485
% Variation in R^2		3.37	3.8
Significant Coefficients ($p \leq 0.05$)	X_4	X_1, X_4	X_4
Significant Coefficients ($p \leq 0.10$)	*X1*	*Nil*	X_8

The results displays that the total variance explained by the model to be at 50.4 % which is better than what is explained in the third and worse than the result of the second split. Overall, the result displays a high level of similarity in R-squared. The total proportion of variance explained was within 3.8% of the variance explained in the model using the full data set (50.4%).

There are some differences that can be seen across models and this is noticed in the section of significant coefficients. In the first model X_4 is significant and in the second both X_1 and X_4 are seen to be significant. Across all the samples X_4 is retained as a significant variable. This indicates that Technology Management(X_4) has a strong relationship with Y_4. The findings of the holdout method support the initial findings from the regression analysis.

5.10.5 Model V Validation

The results of the holdout method for validation is presented in the table below. The relationship displayed between the dependent and the independent variables as captured by the model are of statistical significance as the p-value is less than 0.05.

Table 5.19: Model V Validation

MODEL V	Full Data	Split 1	Split 2
ANOVA Significance ($p \leq 0.05$)	0	0	0
R^2	0.518	0.532	0.488
% Variation in R^2		2.7	5.88
Significant Coefficients ($p \leq 0.05$)	X_4	X_4	X_3, X_4
Significant Coefficients ($p \leq 0.10$)	*Nil*	*Nil*	*Nil*

The results displays that the total variance explained by the model to be at 51.8 % which is better than what is explained in the third and worse than the result of the second split. Overall, the result displays a high level of similarity in R-squared. The total proportion of variance explained was within 5.88% of the variance explained in the model using the full data set (51.8%).

There are some differences that can be seen across models and this is noticed in the section of significant coefficients. In the first model X_4 is significant and in the third both X_3 and X_4 are seen to be significant. Across all the samples X_4 is retained as a significant variable. This indicates that Technology Management(X_4) has a strong relationship with Y_5. The findings of the holdout method support the initial findings from the regression analysis.

5.11 SUMMARY

The table below captures the summary of the validation across models. The variation explained across 2 models are within 10% and less than 5% for three models. It is interesting to note that the holdout method added no new significant variables to the model validating our regression approach. The summary indicates that the model generalizes well.

Table 5.20: Summary of Validation

Model	I	II	III	IV	V
Significance ($p \leq 0.05$) maximum	0.000	0.03	0.000	0.000	0.000
% Variation in R^2 *(split 1)*	9.30	2.62	2.97	3.37	2.70
% Variation in R^2 *(split 2)*	8.94	4.60	1.80	3.80	5.88
Common significant coefficients ($p \leq 0.05$)	X_4	X_2, X_3	X_3, X_4	X_4	X_4
Common significant coefficients ($p \leq 0.1$)	X_2	*NIL*	*NIL*	*NIL*	*NIL*

The chapter provided a detailed insight into the regression models that were developed and the approach to validation. The results of the validation were discussed keeping in mind the scope of the study.

CHAPTER 6

CONCLUSION

6.1 FOCUSING ON THE OBJECTIVES OF THE RESEARCH

The concept of Demand Marketing has been adopted by organizations of Indian origin since the country opened up its' economy owing to the liberalization. Therefore for a company to remain competitive in a globalized environment, it becomes necessary to develop the understanding of the relationship between the constructs of Demand marketing as a strategy and fine tune their mission and vision to advance their innovation performance. The study aims to examine this particular relationship between DM and Innovation Performance to understand the impact DM can have on the innovation performance of an organization. The study had outlined specific research objectives in chapter 4 and the objectives have been accomplished as elaborated below:

Capture the relationship between DM and Innovation Performance by developing a research framework.

We have in chapter 4 outlined the dimensions of Demand Marketing and Innovation Performance. In our study, we have identified four dimensions of DM and five dimensions of Innovation Performance. We have further developed a conceptual research framework depicting the scope of the research, and the relationships that are to be determined amongst the variables.

Determine a measuring instrument to ensure the reliability and the validity of the study.

We have further elaborated in chapter 4 on a In chapter 6 through a methodical approach to concept development, the description of the construct dimensions and have developed a questionnaire to collect data from the organizations. We have also detailed on the sampling procedure for the questionnaire. Subsequently we have provided information on the data analysis approach exercised for collection of the primary data. We have conducted a pilot study to measure the validity and the reliability of the instruemnt, i.e. questionnaire. We have performed a CFA to provide more evidence to the validity of the instrument and created a summated scale by the combination of factors.

Conclude on the role of the importance of the concepts of DM on the perception of innovation performance in an Indian organization.

We have carried out a multiple regression to determine the impact of each of the variables of DM individually and also in combination against the constructs of innovation performance. This has been established with the hypothesis testing on each of the five models and the significance of DM on Innovation Performance has been ascertained.

Report on the key aspects of DM and their significance on the parameters of Innovation Performance to identify those features that require immediate focus and can provide with long term impact.

Provide apt recommendations that are to be applied to enhance the adoption of DM and enable Indian MSMEs to achieve sustainable growth.

The variables that are significant to the progress of innovation at an organization have been identified and the models developed help in analysing the relationships between the variables. The outcome provides emphasis on which variables are to be looked at for an organization to support an innovation of a particular nature. To ensure that our findings are robust, we have adopted the method of holdout validation to better generalize their result.

6.2 IMPORTANT FINDINGS

In our study, we were able to shed light into the perceptions on the constructs of Demand Marketing and Innovation Performance from the point of view of multiple organizations. These constructs detail an organizations strategies based on their vision and mission which is backed by exhaustive literature.

We have developed a reliable and valid measuring instrument to evaluate the role of DM on Innovation performance. Therefore, the analysis based on the response to the questionnaire can be considered to be dependable.

The study details out the impact and the role played by DM on Innovation performance, which is primarily due to the relationship between the variables. An organization can fine tune its' performance and fare better on the charts of Innovation by focusing on the essential elements of DM and thereby achieve a competitive advantage.

Technology Management, an element of DM was seen to be a significant variable influencing target variables such as Process Innovation, System Innovation, and Innovation Management. An organization to leapfrog its' competitors must focus on the activities of Technology Management and monitor the same.

The impact of Marketing mix and Brand Equity on Innovation Performance constructs such as Process and Product Innovation are noted in the research. This reveals that an organization to bring about a change in the way a product is made or a process can be changed, it needs to start from the angle of these two specific constructs of DM.

Overall, from the study we have identified three variables of importance viz, Marketing Mix, Brand Equity and Technology Management to be having a significant impact on Innovation Performance of an organization. This indicates that Innovation is primarily dependent or driven by technology, market and the nature of the brand. The fourth variable of DM is business landscape and is not seen to be significant in determining innovation as per the findings of the study. It is to be noted that this does not mean Business Landscape is not important, but only that the contribution towards driving innovation performance in an organization is not significant.

6.3 LIMITATIONS OF THE RESEARCH

No research can be completely devoid of limitation and neither is ours. The limitations of the research are:

6.3.1 Despite taking optimal care while performing the literature review through the sources of NITK library and the internet to include all relevant variables, it might not be comprehensive.

6.3.2 The research is an ex-post facto research and not an experimental study invoking the concept of DM from the basic principles. It involves collecting data for an empirical study and to this end we have developed a questionnaire and analyzed it with multiple regression. The data has been collected from organizations practicingDM and having a perception about Innovation Performance. All the limitation that are applicable to the regression analysis hold good in our study as well.

6.3.2.1 The nature of the organization for sampling belongs to either Micro, Small or Medium Enterprises from the Indian manufacturing sector. We have used non- probability sampling to ensure adequate representation across organizations of different scale and size.

6.3.2.2 Gathering the response for the questionnaire as part of the data collection was not particularly straightforward. The method to evaluate the questionnaire was a self-assessment exercise where the participants are responding on the knowledge of the performance of their organization.

6.3.2.3 The number of cases where a respondent did not have time for the questionnaire or did not want to share the information can impact the accuracy of the generalization despite the data collected being adequate for analysis.

6.4 DIRECTION FOR FUTURE RESEARCH

The scope for future research has been outlined based on the findings and limitations of the present study.

6.4.1 Researchers should further explore the presence of any other variable that has been out of scope for our study.

6.4.2 The present study details out the relationship amongst the variables of DM and Innovation Performance. Future studies can focus on each of the relationships and the reasons for the presence of the relationships as a case study.

6.4.3 The study can be replicated across service industries as our research focuses on the manufacturing sector of the Indian MSME with adequate changes made as required by the sector.

6.4.4 Researchers can explore the possibility of performing a random sampling as compared to non-probability sampling that is exercised in our study.

6.4.5 The present study employs self-assessment type as the method of evaluation for the questionnaire. Researchers in the future can consider stakeholder evaluation as a comparison tool for the evaluation.

6.4.6 The method of analysis in our study has been a multivariate regression analysis. Researchers can consider performing a Structural Equation Modeling for further data analysis in the next iteration.

6.5 END NOTES

The nature of the manufacturing industry is changing and adopting to the dynamic market conditions is vital for the survival of any organization. The changes are primarily dictated by the changes in the market, the innovation in technology and the features that are bundled across various products for a consumer to choose from. It is because of this reason we chose to do an analysis of the factors guiding strategy makers at an organization and for usto have an understanding on how Demand Marketing is perceived with the organization hierarchy as a tool for achieving competitive edge through boosting innovation. We offer this research as a guideline for making those policy decisions in times of transition and to quickly adopt to dynamic market conditions.

A single study is not a definitive conclusion. In the world of research, we want to encourage more findings that can transform the working of an Indian MSME and catapult it to global success. Our study has evolved through iterations of questionnaire formation, model conceptualization and it is with this refinement made we have been able to provide conclusions with such confidence and reliability. An analysis made by our study can be considered as a baseline or a preliminary study to understand the influence exerted by the constructs of DM on Innovation Performance and we highly encourage to use our findings as guidelines for further research.

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APPENDIX

APPENDIX

QUESTIONNAIRE

Demand Marketing and Innovation performance:

A study on Indian MSMEs

Dear Sir/Madam,

I, Shrisha S, a Research Scholar, doing research under the supervision of Prof. K. B. Kiran, from the School of Management, National Institute of Technology, Karnataka in the area of Demand Marketing and Innovation Performance. I understand that your company has been using Demand Marketing techniques and has had a lot of success. I'm curious about the impact of these Demand Marketing techniques on your company's innovation performance.

In this regard, I respectfully need your assistance in gathering data from your company relevant to Demand Marketing and Innovation. I hereby guarantee that the information gathered will be used solely for academic reasons and that the information will be kept private.

The information must be provided in the form of a response to a questionnaire that is attached. The questionnaire is straightforward to complete, and you will be asked to rate your level of agreement with a statement made about your esteemed organization on a scale of 1 to 5.

Give a score of 5 if you STRONGLY AGREE with the statement.

Give a score of 4 if you SOMEWHAT AGREE to a statement.

If you have a NEUTRAL OPINION, meaning you don't agree or disagree, provide 3 points.

If you have SOME DISAGREEMENT with the statement, give it a score of 2.

Give a score of 1 if you STRONGLY DISAGREE with the statement.

PART 1

BASIC INFORMATION

Org Name:
Products/Services:
Address:
Respondent(s) Name:
Role/Title(s):
Type of manufacturing firm (tick): General engineering/ Textiles and Garments/ Electrical and Electronics/, Printing and Stationery/ Rubber and Plastics/Chemicals/Food and Beverages/ Basic metal Any other
Firm Size (Circle): Micro/Small/ Medium
Demand marketing initiatives(tick): Defining markets / vision & mission statement/ Product or Process development/Branding/Long-term investment/Forecast of Technological changes/Merger & Acquisitions/Any other
MSME CLASSIFICATION:

Sector	Micro enterprises	Small enterprises	Medium enterprises
Manufacturing	Up to ₹ 25 Lakhs	Above ₹ 25 Lakhs but does not exceed ₹ 5 Crores	Above ₹5 Crores but does not exceed ₹10 Crores

PART 2

Attributes describing Demand Marketing

1. Business Landscape (X_1)		
1	We have defined established policies to preserve and build a valuable customer relationship.	
2	We have successful processes to ascertain customer expectations.	
3	We have determined successful methods (surveys, visits) to quantify customer satisfaction with all processes that affect customer expectations.	
4	We desire to establish a healthy relationship with our competitors	
5	We believe competitors as the source of motivation for our Progress	
6	We initiate calculated coordination amid suppliers	
7	We consider all legal attributes into deliberations across our business.	
8	We ensure that our organization abides by the environment	
	protection laws to a large degree.	
9	We prioritize protecting our Technology through patent protection.	
10	Our organization demands us to commercialize the product from research to end customer.	
11	We ensure suitable procedures to enhance the efficiency of our firm.	
12	We ensure highest preference for employee career.	

2. Marketing Mix - 4Ps (X_2)		
1	We aim to produce high quality merchandise.	
2	We provide unique attributes to ensure we are aggressive in the market	
3	We offer a varied range of products to suit our customer needs.	
4	We prefer to give prominence to the exterior of the products.	
5	We prioritize on offering post sale services for all our products.	
6	We offer a high durability on our products	
7	We promote our products using our network to ensure wider penetration of the products.	
8	We ensure a strong supply chain network to meet consumer demand.	
9	We strive for unique methods to promote our merchandise.	
10	We promote our products using a range of marketing strategies	
11	We provide flash deals and other unique offerings to promote our products	
12	We often consider penetrative marketing as a possible method of increasing our sales volume.	

3. Brand Equity - (X_3)		
1	We firmly believe that Brand equity(a suite of strengths and weaknesses linked with the company) reinforces product image	
2	We prioritize developing our brand equity.	
3	We opine those products that achieve performance beyond set expectations increases brand equity.	
4	We embrace unique coherent marketing policies to strengthen our brand equity.	
5	We opine that distribution efficacy enhances brand equity.	
6	We believe in incorporation of IPR as a necessary stratagem to increase brand equity.	
7	We believe that products with higher durability enable us to retain customers.	
8	We believe that brand awareness enhances brand equity.	
9	We firmly consider that consumer loyalty is correlated to our marketing and branding pursuits.	
10	We opine that branding develops a strong relationship with consumers.	
11	We consider that branding enables us to achieve greater rewards.	
12	We opine that a company's brand indicates status and notability and enables higher rewards	

TECHNOLOGY MANAGEMENT- (X4)		
1	We consider technology to be an important tool that enables us to make our presence felt in the marketplace.	
2	We upgrade our technology stack to design and promote our merchandise.	
3	We consider demand marketing as a key pillar for the progress of an organization.	
4	We ensure that all our marketing, supply chain and operational activities go hand in hand.	
5	We investigate unique technological opportunities to continue our growth in the market.	
6	We prioritize on technology led research to come up with innovative ideas to design and manufacture our products.	
7	We constantly strive for continued learning amongst our employees in new and upcoming technologies.	
8	We push our employees to showcase their technology skills to achieve the goals of the company.	
9	We emphasize on the role of technology management to increase productivity for an MSME.	
10	We believe technology management as a way to identify and exploit opportunities for acquiring and retaining profitable customers	
11	We opine that through technology led development, we can maintain our competitive position in the market.	
12	We consider that the prospects of an organization looks better when coupled with technology led development.	

PART 3

Attributes Describing Innovation Performance

1. TECHNOLOGICAL INNOVATION (Y_1)		
1	Our organization prioritizes to be always ahead of competition by utilizing technology led innovation.	
2	We are constantly searching for new technology practices to fulfil our goals.	
3	We invest in advancing our tech capabilities.	
4	We are keen to replace outdated technologies with the latest in the market.	
5	We believe technology enables us to improve our day-to-day working by removing redundancy.	
6	We ensure that all our departments are aware of the work that is happening by maintaining harmony and communication.	
7	We believe in technology led R&D.	
8	Our research team has the freedom to carry out projects that are deemed a necessary risk and with a potential to generate high rewards.	
9	R&D is always prioritized while we develop our short- and long-term goals.	
10	We opine technology led innovation enables us to design unique products.	

2.PRODUCT INNOVATION (*Y2*)		
1	We emphasize on offering fresh and novel products that differentiate us in the market.	
2	We benchmark our products by a process technology led design and innovation.	
3	We prioritize on product developments to satisfy the needs of our customers.	
4	We pride in being market leaders when it comes to launching our products.	
5	We focus on developing and bringing more products to the market and maintain competitive advantage.	
6	We believe in products with higher quality above cost	
7	We cater our products to meet and exceed consumer expectation	
8	We focus on bringing new products and services to stay ahead in the market.	
9	We pride ourselves with being open to change and are always looking for ways to add unique features to our existing and new products and services.	
10	We constantly strive to ensure that our offerings have a sense of novelty in them.	

3. PROCESS INNOVATION (Y_3)		
1	We ensure we follow state of the art relevant practices and processes	
2	We strive to adopt innovative technologies that provide us with an edge in our processes.	
	We enable for a faster rate of adoption of change in terms of processes and technologies at our organization.	
3 4	We ensure to practice only modern accepted processes for delivery of our offerings.	
5	We always strive for efficiency by inculcating our unique ideas in the form of processes or products.	
6	We regularly promote novel products and services.	
7	We regularly design new manufacturing processes.	
8	We constantly seek to experiment and improve our processes.	
9	We opine that improvement in any process and innovation are directly correlated.	
10	We opine that for a firm to stay relevant in the market, regular updates in the process is necessary.	

4. SYSTEM INNOVATION (Y_4)		
1	We encourage continuous development at our organization.	
2	We design goals keeping in mind our long-term prospects.	
3	We constantly seek to upgrade our practices and open to change	
4	We emphasize innovation as part of our strategic roadmap.	
5	We encourage employees to cross-skill and collaborate with each other.	
6	Our organization supports and preaches teamwork.	
7	We support and nurture creative thinking within our organization.	
8	We provide a platform where in our resources can tap their potential.	
9	We constantly seek ways to deal with hurdles to creativity.	
10	We are constantly looking for new market opportunities	

5. INNOVATION MANAGEMENT (Y_5)		
1	Our senior leaders are open to inculcating novel practices.	
2	Our organization develops and enhances the potential for creativity from each resource.	
3	Our organization promotes innovation and creativity.	
4	We constantly seek novel ideas from niche resources.	
5	Our organization ensures that our resources are informed and well-versed in the modern practices in terms of innovation.	
6	We provide a platform that encourages and stimulates creativity.	
7	Our leaders showcase a strong devotion to inculcate innovation.	
8	We always set apart financial resources to encourage innovation.	
9	We carry out a faithful resolve to evaluate the commercial feasibility of each innovative concepts.	
10	We have a culture of open information system to capture new ideas.	

THANK YOU

Demand Marketing (DM) and Innovation Performance scores summary (Sorted in the ascending order of DM scores)

Org ID	DM (Demand Marketing)	Innovation Performance	Org ID	DM (Demand Marketing)	Innovation Performance
89	3.37	3.08	8	4.12	4.26
21	3.42	3.55	36	4.15	4.28
47	3.43	3.61	26	4.16	3.97
11	3.52	3.86	27	4.17	4.43
28	3.55	3.77	9	4.2	3.8
14	3.58	3.54	87	4.2	4.4
85	3.59	3.76	45	4.21	4.46
25	3.66	3.86	20	4.26	4.39
22	3.7	3.84	50	4.27	4.34
38	3.72	3.74	34	4.27	4.38
24	3.74	3.97	80	4.28	4.13
65	3.74	4.24	23	4.28	4.29
53	3.74	3.7	56	4.29	4.68
30	3.75	4.17	2	4.31	4.53
40	3.76	3.92	57	4.31	3.98
43	3.79	4.02	31	4.33	4.02
88	3.81	3.89	37	4.33	4.59
15	3.82	3.87	5	4.34	4.34
42	3.82	3.96	35	4.35	4.48
18	3.82	3.7	62	4.36	4.27
17	3.85	3.93	90	4.36	4.38
54	3.88	4.22	33	4.37	4.6
69	3.89	4.29	79	4.37	4.08
46	3.92	3.66	67	4.39	4.38
7	3.94	4.28	52	4.4	4.38
83	3.94	3.89	4	4.41	4.72
29	3.96	4.04	72	4.42	4.59
76	3.96	4.08	60	4.42	4.31
44	4.02	4.18	39	4.43	4.41
75	4.03	4.35	81	4.46	4.68
3	4.03	4.21	6	4.46	4.22
59	4.03	3.94	63	4.48	4.39

16	4.06	4.18	91	4.5	4.52
86	4.06	3.92	41	4.5	4.46
58	4.06	4.18	71	4.5	4.43
13	4.07	3.28	82	4.53	4.62
66	4.08	4.08	73	4.53	4.53
12	4.1	4.05	10	4.54	4.62
48	4.11	4.35	84	4.56	3.89
77	4.57	4.66	68	4.69	4.83
78	4.6	4.31	70	4.73	4.69
64	4.6	4.51	32	4.76	4.7
74	4.6	4.68	51	4.78	4.91
19	4.65	4.76	49	4.86	4.78
61	4.66	4.39	1	4.95	4.83
55	4.68	4.75			

RESEARCH PUBLICATIONS

Research Papers Published in International Journals:

1. S Shrisha & Kiran K. B. (2018a), " Perception of demand and Innovation capability of Indian MSMEs ", International Review of Research in Emerging Markets and Global Economy"(ISSN: 2311-3200),21-35.
2. S Shrisha & Kiran K. B. (2018b), "Demand, Markets and Innovation for Indian MSMEs", Euromed Press,1764-1776.
3. S Shrisha & Kiran K. B. (2019), "Technology, Demand and Innovation Capability of Indian MSMEs", IEEExplore,2019, Print on Demand(PoD) ISSN: 2159-5100

Research Papers Presented in International Conferences:

1. S Shrisha & Kiran K. B. (2018a), " Perception of demand and Innovation capability of Indian MSMEs ", Global Business Research Conference, Taiwan
2. S Shrisha & Kiran K. B. (2018b), "Demand, Markets and Innovation for Indian MSMEs", 11th Annual Conference of the EuroMed Academy of Business, Malta, September 2018
3. S Shrisha & Kiran K. B. (2019), "Technology, Demand and Innovation Capability of Indian MSMEs", Portland International Conference for Management of Engineering and Technology, Oregon, USA.

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PROFILE

A proactive professional with 65+months of experience and a strategic thinker with an insatiable intellectual curiosity. I aim to leverage my skills to successfully solve problems and help businesses overcome obstacles.

SKILLS

- STATISTICS
- DEEP LEARNING
- MACHINE LEARNING
- PYTHON

EXPERIENCE

Mindtree Consulting

2018-Present

Implicit Feedback Based Recommendation Engine:

- DATA ANALYSIS

EDUCATION

Doctor of Philosophy (Ph.D.)
2016-2022
National Institute of Technology, Karnataka

Master of Business Administration (M.B.A)
2012-2014
National Institute of Technology, Karnataka

Languages

- ENGLISH
- KANNADA
- HINDI
- SPANISH
- FRENCH

Develop a recommendation engine that captures the
hidden tastes and intentions to recommend relevant courses for users.

Infosys
2016-2018
Entity Recognition and Intent Extraction System: Applying princples of NLP, developed a system that classifies the mail to the select operators at multiple locations using a spectral embedding technique.
Oil Production Dashboard: Developed a program that takes intuitively significant variables and boosts the robustness of the model by minimizing forecast error.

Supported Causes

- VOICE FOR STRAY DOGS
- YOUTH AND EDUCATION
- ARTS AND CULTURE
- CIRCLE OF ANIMAL LOVERS