Chapter 4

SURVEY OF LITERATURE
4.1 Background

This research study is aimed at analyzing the strategies followed by worldwide hospitality industry vis-à-vis the Application of Six sigma and status of hospitality industry in India. The analysis of the global hospitality industry will suggest ways to develop hospitality industry in India.

Having formulated the problem, it is necessary to take an overview of the published and unpublished literature relevant to the problem under study. Survey of Literature always forms an important step in any research study. A survey of literature can guide the researcher in several ways. Thus, a survey of the literature can:

a) Suggest ideas for research problems.

Well before the time one actually starts working on research project, one can be on the lookout for potential research topics. While reading a textbook, listening to a lecture, or browsing through a journal, the intuitive reaction to items may signal potential topics. Such reactions can be recognized in spontaneous response to what one encounters: "That may not be true in all cases" or "Surely that's an oversimplification of a complex situation" or "Now that's an idea worth following detail" or "One can't draw such a broad conclusion from such a limited sampling of people" or "There must be a better way to test that theory." On these occasions, one may find it worth the bother to jot down the reaction and to suggest, even in a vague way, the kind of study that could derive from the response. Adopting this habit enables the researcher to compile a list of research possibilities from which he can select research problem.
b) **Identify strengths and weaknesses of others’ theories and empirical studies.**

Authors of books, articles, and book reviews in the concerned discipline frequently offer assessments of work in that field. Those analyses can prove useful for any research work by alerting researcher to weaknesses to avoid and suggesting good ideas to incorporate in his study. By pausing in the reading to note these features and to identify the publication in which they appear (author, year, title, volume, number, publisher, page number), the researcher gradually accumulates references that may prove useful for research project.

c) **Identify theories that can be applied or tested.**

The word theory, as it is used throughout this thesis, is a proposal about (a) what variables are important for understanding some phenomenon and (b) how those variables interact to make the phenomenon turn out as it does. Thus, a political theory may be designed to explain why people vote the way they do in elections. A sociological theory may show how and why people within a family may rise or fall on a social status scale from one generation to the next. An economic theory may explain stock market cycles of advance and decline. An anthropological theory may offer reasons for the appearance of particular religious practices within representative cultures. A psychological theory may identify factors affecting compulsive behavior. An educational theory may propose how teachers’ personality characteristics interact with pupils’ characteristics to affect pupils’ academic performance.

Thus, in the professional literature, one may find theories which the thesis or dissertation will test empirically, extend, revise, or replace. During reading, as ideas about theories come to mind, researcher may
find it worthwhile to record his thoughts and note the passage or chapter that stimulated those thoughts, along with the bibliographic location of the passage (author, year, title, volume, number, publisher, page number).

d) Suggest methodological approaches.

The word methodology is used here to mean the steps a researcher will follow in answering his research question, including the kinds of information he collects, how he collects it, and how he classifies and interprets the results. The professional literature is a valuable source of methodological possibilities, including the advantages and limitations of different approaches. Such information not only can guide choice of a research design but also can aid in devising a defense of that choice. Therefore, as a researcher browses through the literature, he can profitably take notes about (a) the components of a given method, (b) the kinds of research problems for which that method has been used, and (c) the method’s strengths and weaknesses.

e) Explain data-gathering techniques and instruments.

Each research design includes ways of collecting information, such as, analyzing the contents of documents, conducting an opinion survey, observing people’s behavior, administering tests, or carrying out an experiment. Journal articles or single chapters of an edited book, because they are restricted in length, may mention the data collecting methods and instruments but not describe them in detail. Researcher will find this practice satisfactory if the instrument that a writer mentions (such as a test or questionnaire) is a standardized, published document whose specific nature can be discovered by obtaining a copy and reading its instruction manual. But authors’ tests, questionnaires, or interview protocols are often ones they created on their own and may
not be reproduced in the account of their research. In these cases, if it is important that the researcher learns the specific nature of a data-gathering technique, he may need to hunt for the study’s original, detailed description (perhaps in a book or dissertation) or else write directly to the author to request a copy of the account.

f) **Provide typologies and taxonomies for classifying data.**

A quantity of collected information - such as historical accounts, survey responses, and test scores - is typically an incomprehensible mess until it’s been classified and summarized. The professional literature contains alternative ways this can be done. Taking notes about different approaches, along with each one’s advantages and limitations, prepares researcher for writing the portion of thesis or dissertation in which he can (a) discuss alternative classification schemes, (b) tell which scheme are adopted, and (c) defend the suitability of that scheme by comparing its features with the strengths and weaknesses of other options.

g) **Suggest statistical and graphic treatments.**

Numbers, tables, diagrams, and pictures are among the devices useful for classifying and summarizing data. Therefore, as researcher evaluates the literature, he may benefit from contemplating the kinds of data he intend to collect and from taking notes about authors’ statistical techniques, kinds of tables, and graphic displays that he might wish to include in his own study.

h) **Illustrate ways of interpreting research results.**

The word interpreting in the present context refers to explaining to readers what your classified information means. This is the “so what?” phase of research. The professional literature can help prepare
researcher for the interpretation task by illustrating the diverse conclusions authors have drawn from their data. It’s useful for researcher to note which modes of interpretation in the literature he finds most convincing, and why. Conversely, he can also determine which interpretations he considers weak, and why. This exercise can aid researcher in establishing criteria to guide the conclusions drawn from the data.

i) **Show ways of presenting the completed research project.**

Throughout the literature, the quality of presentations is remarkably varied. Some authors write well, some moderately well, and others very badly, indeed. The term bad writing as used here refers to research reports that are difficult to understand by the audience for which they are intended. Flaws of presentation can be of various kinds - (a) poor organization, so readers are amazed at what comes next in the report, (b) key words not defined precisely, (c) esoteric terms used when simpler, familiar terms would suffice, (d) convoluted sentences, (e) few, if any, life-like examples to clarify abstract concepts, and more. As researcher reads authors’ accounts, he may wish to note which features of their presentation contribute to ease of understanding and which serve as barriers to meaning. This can alert researcher to ways he can enhance the quality of his own writing.

j) **Suggest outlets for publishing the completed product.**

Researcher will reach a broader audience with his project if the results can be disseminated in some form other than that of an unpublished thesis or dissertation. That form may be an abstract, a succinct journal article, a microfiche or microfilm version of the entire work, a chapter in someone else’s book, or an entire book itself. During the review of the literature, researcher may locate potential outlets for the type of
research his project involves. Recording the addresses of those outlets and noting the form that each type assumes can prepare researcher for contacting sources of publication once his project is finished.

In summary, the professional literature has many potential functions for promoting the quality and speed of the research work. Recognizing these functions at the outset of this research work and then taking proper notes during the search has helped the researcher ensure that he invests his time economically.

4.2 Search Strategies

An approach many researchers use is the generally-browse-and-peruse strategy. They hunt for books and journals in the broad area of their topic, then read the sources in detail, hoping to find material that might apply to their project. In our experience such a method is very inefficient. A specify-and-look-up strategy is far more productive because it saves lots of time, eliminates wading through pages that will be of no use. It has guided us to where relevant material should be located. While employing a specify-and-look-up approach, we first decided which functions we intend our literature survey to serve. Those functions can be cast as questions our plan to answer, such as:

1. What studies have already been conducted about my topic, and what conclusions did the authors draw?
2. What key terms did the author use that can relate to my study, and how were those terms defined?
3. What are methodological strengths and limitations of previous studies relating to my topic?
4. On what theories have previous studies been founded? Or, which theories have been applied in previous studies?

Additional questions of this sort can focus on the other functions described earlier in this chapter. Armed with these guide questions, the researcher skimmed through
book chapters, journal articles, or newspaper accounts to find the answers we seek. In some instances this required a detailed perusal of one or more chapters - sometimes an entire book or monograph - as when it is wished to thoroughly understand the theory on which the study was grounded. In other cases, it was found economical to look up answers to several questions at the same time in order to make the most efficient use of a book, dissertation, or journal that would be difficult or inconvenient to obtain on a future occasion.

4.3 Review of Select Relevant Literature

For the purpose of obtaining insight into the subject, several sources of literature were tapped including books, journals, magazines, newspapers, annual reports of the companies operating in the field of Six Sigma and their websites. Reports of the professional associations of Six Sigma and hospitality industries in various countries were reviewed. The summary of the select literature and its analysis follows-

Although Six Sigma has been of importance to industry for a number of years, the academic community has been slower to study this phenomenon. However there has been a recent increase in the number of published papers in more academic journals, particularly from 2000 onwards. It is therefore a timely point at which to extensively review the literature on Six Sigma and to identify the key academic studies that have been undertaken. Researcher had reviewed more than 200 papers, classifying them according to their research content and the research methodology employed. A comprehensive list of future research areas is given. Key examples are further development of a scientific foundation for the methodology; integrating Six Sigma with other methodologies such as adding Lean Tools; considering implementation issues in areas other than North America & Europe and furthering the debate on how to adapt the approach for use in a service context.

In the business world, quality management has long been established as an important management strategy for achieving competitive advantage. The traditional quality initiatives, including Statistical Quality Control (SQC), Zero Defects and Total
Quality Management (TQM), have been key players for many years, whilst Six Sigma is one of the more recent quality improvement initiatives to gain popularity and acceptance in many industries across the globe. Its popularity has grown as the companies that have adopted Six Sigma claim that it focuses on increasing the wealth of the shareholders by improving bottom-line results and achieving high quality products/services and processes. Thus, it is claimed that the implementation of Six Sigma brings more favorable results to companies in comparison with traditional quality initiatives in terms of turning quality improvement programmes into profits. Success stories of big corporations that have adopted Six Sigma, such as Motorola and General Electric (GE), have been reported in various papers (Denton, 1991; Hendricks and Kelbaugh, 1998). However, such claims lead to a number of key questions for the academic community, such as whether the success is attributable to the Six Sigma methodology, and if so, what particular aspects of the methodology are key to its success.

Interest from the academic community has increased in recent years, however to date only one paper can be identified as a literature review regarding Six Sigma focusing on the critical success factors of Six Sigma implementation (Coronado and Antony, 2002). Thus it provides a valuable review in this area but does not give a full picture of research to date. Therefore, there is a timely need for a more extensive review of the literature, particularly given that over 200 papers have now been published with the annual number of papers having increased substantially since 1998. These papers fills this gap, specifically aiming to:

• Comprehensively review the Six Sigma literature to identify and summarize key research issues that have been explored so far;

• Categorize the literature based on its subject related content to understand trends in the research regarding Six Sigma and identify research gaps;

• Investigate the research methodologies employed in the literature;

• Suggest future research areas for Six Sigma.
Further this review is organized in a further five sections. It briefly describes the key characteristics of Six Sigma and some of the associated key assumptions and explains the categorization of the literature, showing how the number of publications has increased in recent years. Two main categories of literature are identified – that with a methodology focus and that with an implementation focus. These groups of papers are reviewed in detail identifying research gaps throughout the discussion. Finally, summarizes the areas of future research that have been identified.

4.4 Six Sigma: Key Characteristics

The Six Sigma methodology was introduced by Motorola Inc. in the USA in the late 1980s. Its aim is to achieve lower levels of defects than had been previously considered necessary or realistic. Specifically, Six Sigma achievement relates to 3.4 defects per million opportunities (DPMO) (Linderman et al., 2003). To achieve this goal, a deployment process and two data-driven methodologies have been developed.

The Six Sigma deployment process focuses on ensuring a successful, continuous implementation through effective Top Management leadership and the introduction of various new roles/ job titles to support the improvement activities. For example, the title of ‘Champion’ is given to the senior manager who is responsible for the success of a particular Six Sigma project. The project team leader is given a martial arts title such as Black Belt or Green Belt. Each belt level is given appropriate training and has a different scope of work, including specific targets.

The Six Sigma methodologies are DMAIC and DFSS. DMAIC is an acronym covering five phases of the implementation process: Define, Measure, Analyze, Improve, Control and is used for improving a current process or improving existing product/service performance, which does not meet customer expectation. DFSS stands for Design for Six Sigma and is used to design/develop a new product/service
and/or new processes for existing products. DMAIC and DFSS both rely on the use of statistical tools with a particular assumption of a 1.5 sigma shift in the process mean when measuring the process capability of Six Sigma. For full details regarding the methodologies, the deployment process, the assumption regarding the shift in the process mean and other key characteristics of Six Sigma, *(Source Breyfogle III (2003), Tennant (2001), Eckes (2001)).*

**Classifying the literature**

The Six Sigma literature reviewed focuses on papers published in journals and excludes articles published on the websites of the Six Sigma community, such as isixsigma.com, as they aim to share ideas and best practices among members of the community but are vague from an academic point of view. Types of published papers reviewed concentrate on those in academic journals and conference proceedings, but also include a number of articles in industrial peer-reviewed journals. There are two main reasons why we included industrial peer-reviewed journals. Firstly, it was considered important to gain an understanding of some of the practical issues from practitioners regarding Six Sigma, although it is well understood that much of this evidence is anecdotal and lacks academic rigor. A second reason is that Six Sigma articles began to appear in 1991, but members of the academic community wrote very few articles until the late 1990’s. Thus to ignore all articles from the industrial journals would be to ignore all the early evidence of Six Sigma. Instead this literature is included, but throughout the review the type of paper is clearly identified along with the research methodology employed, if any.

**4.4.1 Six Sigma Methodology focus**

This is an attempt to explain the basic philosophy of Six Sigma and to indicate how to improve the functionality of the associated methodology. Three main areas of study are identified:
• **Six Sigma initial concept:** This aim to educate the readers by providing information regarding the Six Sigma methodology. They explain the background and evolution of Six Sigma including details of the key characteristics of DMAIC, DFSS and the deployment process. Various tools including statistical tools employed in Six Sigma are discussed;

• **Comparison between Six Sigma and other methodologies:** This category includes papers that explain and compare Six Sigma with other quality systems and other improvement methodologies, such as TQM and Lean. They present the similarities and differences without suggestions for integration;

• **Six Sigma Enhancement:** This is an attempt to enhance the Six Sigma methodology by developing a scientific or theoretical foundation for Six Sigma; by proposing new features for Six Sigma and by widening the applicability of Six Sigma in business, such as through the integration of Six Sigma and Lean. Six Sigma Implementation focus Papers with an implementation focus attempt to explain how to successfully implement Six Sigma in the organization. In addition, they investigate the impact of Six Sigma on the organization in terms of business performance, customer service levels and employee relationships. Four main sub-categories are identified:

  • **Six Sigma implementation process in the whole business:** It describe the process of implementing a Six Sigma programme into an organization including best practice studies based on a business case. The review identifies papers in manufacturing and non-manufacturing businesses with a separate section on the implementation issues in SME’s;

  • **Six Sigma implementation process in specific business functions/activities:** It focuses on Six Sigma implementation in internal business functions or activities, such as Human resources (HR) and Supply chain management (SCM);

  • **Success & Failure factors:** This sub-category includes that study critical success factors of Six Sigma implementation as report on the difficulties and problems associated with its implementation;
• **Six Sigma and business performance**: The main focus here is on the impact of Six Sigma on business performance, specifically in terms of financial performance and customer satisfaction.

**Classification of research method**

Research methods employed in the literature are classified into four categories:

- Descriptive,
- Empirical,
- Conceptual and
- Literature review,

As used in a previous review of the manufacturing strategy literature (Dangayach and Desmukh, 2001). The explanation for each category given below is adapted from the definition previously given by Malhotra and Grover (1998) cited by Dangayach and Desmukh (2001).

• **Descriptive**: It explain or describe various aspects of Six Sigma with or without background business information. In this category, a business case might be used in the study but the authors present it without a research framework;

• **Empirical**: Basically it uses data taken from a database, secondary data source and/or fieldwork. These studies can be case studies, experimental, exploratory, explanatory, longitudinal, or based on a survey including a pilot survey. The work is presented using an academic research framework. Thus case studies that are classified as ‘empirical’ use explicit research techniques, such as interviews and surveys, representing the fieldwork that the author has undertaken. Any other paper that refers to a business case without a research framework is classified as descriptive;
• **Conceptual**: It employs a research framework to explain, propose or develop any new conceptual models/ideas without testing them using empirical data;

• **Literature review**: This focuses on reviewing part of the Six Sigma literature and the summary of the research methods employed in the Six Sigma literature is discussed later in the review.
Concept: Overall concept, DMAIC, DFSS, deployment and tools. Each of these topics is discussed in turn below.

- Overall concept:

Six Sigma is considered to be a new initiative introduced by Motorola in the late 1990s (Tennant, 2001), hence several articles from the early 1990’s concentrate on explaining the development of Six Sigma using the Motorola case (Kumar and Gupta, 1993; Dambolena and Rao, 1994). These authors view Six Sigma as a quality tool which has lead to improvements in Motorola quality performance and consequently propose Six Sigma as a new opportunity for any organisation that wants to improve quality. Other authors attempt to investigate and explain the Six Sigma methodology in a descriptive manner without empirical evidence or any related business information (Blakeslee, 1999a; Elliott, 2003; Godfrey, 2002; Hammer and Goding, 2001; Harry, 2000a, 2000c; Maguire, 1999; Rowlands, 2003; Snee, 1999). These papers are valuable to researchers new to Six Sigma in providing background information, and giving evidence of the emerging importance of the methodology.

Two key conceptual papers also consider the overall concept, attempting to analyse the development of Six Sigma and explain its statistical foundation (Antony, 2004a; Bothe, 2001). Bothe (2001) presents a statistically based reason for adding a 1.5 sigma shift before estimating process capability, proposing a new capability index, called dynamic Cpk. He also suggests future study on the impact and behavior of the shift in various circumstances. Antony (2004a) studies the strengths and the weaknesses of Six Sigma in detail and links Six Sigma to statistical thinking. He suggests that Six Sigma has a strong statistical foundation and consequently is likely to continue to be of importance in the future.

There is scope to continue to build up a solid theoretical foundation, as is discussed further within the Six Sigma Enhancement sub-category below.
• Design, Measure, Analyze, Improve and Control (DMAIC):

This is an attempt to focus on explaining the DMAIC contents, with some authors discussing each phase of DMAIC in detail (Hoerl, 1998; Rasis et al., 2002, 2003; Snee, 2004). For example, Rasis et al. (2002, 2003) present self-learning training material for DMAIC, using a fictitious application. It helps the readers to learn how to carry out a small-scale Six Sigma project, including guidance on the application of tools. It indicates a perceived need for training material and suggests that an avenue for further research is to develop training material to cover a wider range of applications and larger scale projects. It also concentrate on specific aspects of DMAIC, such as the project selection process in the Define phase or process control in the Control phase, explaining some key measures in Six Sigma, such as project metrics and Roll throughput yield (RTY) (Abernathy, 2001; Breyfogle III, 2002; Caldwell, 2002; Graves, 2001; Hoerl, 1998; Mason, 2000; Snee, 2001a). For example, Snee (2001a) emphasises the importance of the project selection process in the Define phase for the successful implementation while Mason (2000) suggests using multivariate statistical process control in the Control phase. These articles tend to explain the features of DMAIC rather than critically appraising or enhancing it. Future research should investigate whether aspects of DMAIC need to be modified to increase its scope, for example for the service sector or non-profit organizations. If so, research to enhance the methodology may then be needed.

• Design for Six Sigma (DFSS):

DFSS is potentially far more effective than DMAIC as its application is in the early stage of new product/process development, yet it has received less attention in the literature. Only 4 papers specifically discuss DFSS, and all of these are descriptive papers (Antony, 2002; Mader, 2002, 2003; Treichler et al., 2002). For example, Mader (2003) explains the DFSS methodology, its key aspects and how it enhances the design process, improving new product development. Antony (2002) presents DFSS using the IDOV (Identify, Design, Optimize and Validate) approach. Treichler et al., (2002) discusses the use of DFSS in the design function of major US corporations. All of these studies of DFSS have been undertaken in a manufacturing context. Hence, there is a need for more extensive study to consider new areas of
DFSS application, such as how DFSS can be applied to non-manufacturing processes and services industries like Hotels

- **Six Sigma deployment**:

  Papers addressing Six Sigma deployment focus on people issues, with particular emphasis on the professional role of Belts and training issues. For example, authors such as DeFeo (2000), Hoerl et al. (2001) and Hyde (2000) describe the role of Black Belts (BB) and the required qualifications including the suggestion of a BB training curriculum. Hahn et al., (1999) and Hoerl et al. (2004) suggest that it is a positive career move for a statistician to take up a leadership role in Six Sigma, implying that it is important for Black Belts (BB) to have statistical skills. However, care is needed in selecting the right qualities for Belts, as it is important for Six Sigma to retain an inclusive stance rather than becoming too closely aligned with specialist skills. Therefore further research is needed to investigate the qualities required by the Belt candidates. Further reference to training issues is given in Delsanter (1992), Hahn et al., (2001) and Snee (2000a) who focus on the importance of providing Six Sigma training to Belts and other employees. They also suggest curriculum for belt professionals and for employees at lower levels in the organization. Further rigorous research is needed to investigate evidence for the effectiveness of the proposed training methods.

  Another issue regarding deployment is the successful use of teams, given that Six Sigma projects are accomplished through team efforts. Cooper (2003) pointed out that it is important to focus on team success, rather than individual success, if Six Sigma projects are to be successful overall. Neuschhler-Fritsch (2001) highlights the importance of the early involvement of Finance and Accounting personnel to ensure that they reinforce the use of appropriate guidelines to quantify project benefits. No papers have been identified that address an individual’s reaction or resistance to Six Sigma. Management involvement and support are essential to Six Sigma deployment, as is the case for many other initiatives; yet the only paper found that addresses this issue in a Six Sigma context is Haikonen et al. (2004). This paper
presents a preliminary case study on the role of management in the improvement of the deployment process in Six Sigma and highlights its key finding that the level of management support is positively related to how well they understand the Six Sigma methodology.

Although the deployment process involves people, few papers have been identified that look at these issues in practice, such as the impact of Six Sigma on people in the organization and how to motivate employees to participate in Six Sigma. Thus, further empirical study to identify the impact of the deployment process from a people perspective is recommended.

4.4.2 Six Sigma tools:

The study found that Design of experiments (DOE), a high level statistical tool to investigate simultaneously the potential causes of variation in a process (George, 2003), is the most frequently studied tool in the literature (Chan and Spedding, 2001; Conklin, 2004; Goh, 2001, 2002; Kowalski and Potcner, 2003; Vivacqua and Pinho, 2004). Most of these papers explain the concept and its application. For example, Goh (2001) explains the concept of DOE and compares it with SPC, in which SPC is viewed as a traditional tool while DOE is considered a modern statistical tool. Chan and Spedding (2001) conduct a case study, recommending using three tools: DOE, the ‘response surface plot’ and a Neural Network metamodel (NNM). These tools are used to build a decision-support model to achieve Six Sigma quality performance without going through the variety of other statistical tools suggested in the Six Sigma methodology.

Most of these authors explain DOE in a manufacturing context using continuous data, with the exception of Conklin (2004) who explains the application of DOE using discrete data. Vivacqua and Pinho (2004) present an experimental study on the production process of a battery manufacturer to illustrate the application of DOE with actual data. Three of the authors that have studied DOE have conceptualized the application (Chan and Spedding, 2001; Goh, 2001, 2002), whilst the remainder of these publications are descriptive.
The application of other tools in Six Sigma is also described in the literature. For example, Breyfogle III and Meadows (2001) explain how to calculate cost of poor quality (COPQ) and Anderson and Kraber (2002) compare two methods of Taguchi robust design within a Six Sigma context using an empirical research approach. In addition, Vaughan (1998) and Echempati and White (2000) study process capability. Vaughan (1998) presents the details of how to detect non-normality in the process and explains the importance of process control to maintain Six Sigma quality levels, while Echempati and White (2000) conduct empirical research on process capability in a manufacturer of wood caskets. Other tools, such as process mapping, process design and SPC are also discussed, mainly using a descriptive approach (Amelsberg, 2002; Firedman et al., 2002; Goh and Xie, 2003; Gourishankar, 2003; King, 2003; Stein, 2003). For example, Firedman et al (2002) recommend that process design should comply with good business practice regulations. It is noted that the literature focuses on common statistical tools that have been used in other quality management systems. None of the reviewed papers discuss the use of tools from other methodologies, such as Lean tools, within a Six Sigma context. In addition, the two empirical papers both address a manufacturing environment.

Therefore the research gaps are to investigate the use of common Six Sigma tools in a service setting as well as to investigate the integration of Lean Tools with other Six Sigma tools.
4.4.3 Comparison with other methodologies

Given the recent introduction of Six Sigma, researcher has attempted to compare Six Sigma with previous quality management systems as well as other methodologies.

Researcher investigated the details of each program, and then identifies their common elements and weaknesses; such as comparing Six Sigma to TQM (McManus, 1999) and to ISO9001:2000 (Dalgleish, 2003b). However, the review found more frequent comparisons between Lean and Six Sigma (Antony et al., 2003; McAdam and Donegan, 2003; Nave, 2002). For example, McAdam and Donegan (2003) present a study of three systems within a manufacturing organisation: Six Sigma, Self managed teams and Lean. They conclude that they are compatible; however they suggest that the Six Sigma results are more readily measurable and contribute most to the bottom line.

Other articles that compare Six Sigma include Nave (2002) who investigates Six Sigma and Theory of Constraints (TOC) and highlights the unique features of each. In addition, Card (2000) investigates software process improvement by comparing Six Sigma to the Capability Maturity Model (CMM) and investigates their common features and weaknesses. Finally, Hutchins (2002) investigates the relationship between Supply Chain Management, TQM and Six Sigma in the US context. It is noted that some of these articles are neither in favour of Six Sigma nor see it as new initiative. They argue that Six Sigma is either part of an existing quality theory or an add-on program to improve implementation. For example, McManus (1999), through the comparison with TQM, concludes that Six Sigma is just an add-on project management tool. Only one of the papers discussed in this sub-category, McAdam and Donegan (2003), employed a research framework using a longitudinal and explanatory comparative case analysis. The rest are descriptive. Consequently, there is scope to determine the relative success of Six Sigma through further empirical research.

However, it would be very difficult to set up reliable ‘experiments’ that would lead to rigorous results. So, although there is scope to continue to study comparisons to Six Sigma, it is concluded here that such study is purely academic and not worthwhile.
from a practitioner’s point of view. It is unlikely to affect the take-up of Six Sigma in industry and researchers are hence better investigating issues that will bridge the gap between theory and practice.

### 4.4.4 Six Sigma enhancements

There are approximately 48 papers in this category that attempt to enhance and contribute to the knowledge of Six Sigma. These papers demonstrate a recent trend to study these issues, given that all but one of the 48 papers have been published since 2000. This category is further sub-divided into the following topics, each discussed in turn below: new Six Sigma models; Integration; theory development; widening Six Sigma applicability; new Six Sigma tools.

- **New Six Sigma models:**

  The review found two papers presenting an extension of the traditional Six Sigma model (Kuei and Madu, 2003; Basu, 2004). Kuei and Madu (2003) present customer centric Six Sigma quality management (CSSQM), which they claim presents a holistic view of quality by focusing on achieving both product and process quality. There are many similarities between the traditional Six Sigma and CSSQM, such as the role of leadership and use of DMAIC. However, CSSQM emphasises engaging all stakeholders including suppliers and customers. They suggest suppliers should be trained in CSSQM and customers should be informed and prepared to participate in the process. Hence, the difference is in the Six Sigma deployment process. Basu (2004) proposes FIT SIGMA, an integrated Six Sigma and Lean model that aims to achieve all three quality dimensions of product quality, process quality and organizational quality to provide a holistic operational excellence programme. The two models are presented conceptually; further study could be to investigate their implications with empirical evidence.
• Integration with other methodologies:

In this, the subject of Lean philosophy is the most frequently discussed, with various authors studying the advantage of integrating the Lean philosophy with Six Sigma (Bane, 2002; Bossert, 2003; Edgeman and Bigio, 2004; Sharma, 2003; Smith, 2003). Bossert (2003) and Sharma (2003) address a manufacturing operation while Bane (2002) presents the successful implementation of Lean and Six Sigma in service settings, including education. Smith (2003) suggests that the integration should result in the utilization of the statistical approach of Six Sigma to identify root causes and set targets. Both approaches are deemed to be complimentary due their similar goals to reduce defects or variations in the process. While Lean increases the speed of the process, Six Sigma controls the variation of the process. Many authors suggest that Six Sigma can be integrated into the existing TQM program of the company (Elliott, 2003; Pfeifer et al., 2004; Revere and Black, 2003, Yang, 2004). Revere and Black (2003) suggest a framework to integrate Six Sigma into the existing TQM program in healthcare to improve the success of the TQM program.

Similarly, Elliott (2003) presents the initiative program of the company to combine TQM and Six Sigma to improve the production process and product quality. Yang (2004) proposes the integration of TQM and GE-Six Sigma using customer loyalty and business performance as a strategic goal of the model. While others suggest integrating Six Sigma with a single quality programme, Kubiak (2003) proposes an integrated approach of a multiple quality system, such as ISO9000, Baldridge, Lean and Six Sigma for improving quality and business performance. Some attempt to combine Six Sigma with various management initiative programmes or tools for better results, such as the integration with process management (Hammer, 2002); business entitlement matrix (Harry, 2000d); balanced scorecard (BSC) for a strategy Six Sigma deployment plan (Pyzdek, 2004); new technologies (Pearson, 2000); the action workout system for performance measurement (Biedry, 2001); the capability maturity models (CMM) and the goal question measurement (GQM) for software development (Murugappan and Keeni, 2003; Hong and Goh, 2004), and daily management for workforce motivation (Ouellette and Petrovich, 2002). In addition, DeFeo (2002) presents a conceptual
framework for integrating Six Sigma and I-TRIZ (the Ideation/TRIZ methodology) to improve the new product design process. Finally, Pearson (2001) discusses combining Six Sigma with measurement science, particularly including the automated knowledge supply chain, for business advantages. These papers all search for new perspectives of Six Sigma by combining it with existing quality improvement programs or other management initiative programs.

• Theory foundation:

Two academic papers were identified that attempt to develop a scientific foundation for Six Sigma (Linderman et al., 2003; Choo et al., 2004). Linderman et al. (2003) use a goal theoretic perspective. They indicate that, given that the distinctive feature is to achieve a high goal (3.4 DPMO) including the measurement of results, the main focus of Six Sigma is more on the technical side rather than the people side. On the other hand, Goal theory is concerned with behavioral issues and understanding how people respond to the goals set them. Several propositions are given in the paper to explain how people react to the Six Sigma approach. For example, it is suggested that having specific challenging goals leads to a better magnitude of success than having vague goals. The propositions also explain the role of the belts and of senior management leadership. They also suggest future research areas including the expansion of our understanding of Six Sigma through integration with other management theories. Choo et al., (2004) conduct an empirical study on the social and method mechanisms (Psychological safety and Structured method) of knowledge creation to build up a better understanding of both the quality and knowledge management literature. The survey result reveals that learning behaviours and knowledge created have direct and indirect roles in predicting performance in Six Sigma projects.

Both of these papers are important in providing insights into the success of the Six Sigma methodology from an academic perspective. The development of such a scientific foundation could lead the focus of the methodology away from concentrating on using statistical tools to reduce defects (micro view) to become more of a management strategic tool (macro view). Further study to increase understanding of
the strengths and weaknesses of the Six Sigma approach could be carried out by bringing in

other management, behavioural theories. Testing of such theories using empirical evidence is also an interesting area of further study.

**Widening Six Sigma applicability:**

This sub category reviews papers that attempt to widen the applicability of the Six Sigma methodology by strengthening some of its features, or describe applications in a wider organizational context than anticipated by the initial concept. Firstly, some authors discuss how Six Sigma can be used to improve organisational learning (Man, 2002; Webster and Buldrini, 1998; Wiklund, 2002). For example, Wiklund (2002) describes Six Sigma as a methodology that enables organizational improvement and organizational learning in manufacturing organizations, such as improved leadership skills. Similarly, Man (2002) suggests that Six Sigma can be adopted as a model that enables employees to engage in lifelong learning in the organisation. In addition, Webster and Buldrini (1998) use the Six Sigma methodology as part of an operator certification system to improve product quality through operators on the shop floor. A second area of wider applicability is the use of the Six Sigma methodology to develop reliable and accurate financial systems to ensure corporate governance. Phillips-Donaldson (2003) explains how Six Sigma can be used for tracking governance metrics in the organisation. Faltin and Faltin (2003) present an empirical study on developing corporate financial quality systems through design for Six Sigma – DMADV - using the WorldCom company’s data to illustrate. Other authors suggest further specific areas of application using the Six Sigma methodology (De Brantes and Galvin, 2001; Hong and Goh, 2003; Lucas, 2002; Frank, 2003; Snee, 2002; Snee and Rodebaugh, 2002). For instance, Snee (2002) develops a new statistical model and regression model by using the Six Sigma methodology and Snee and Rodebaugh (2002) suggest applying the Six Sigma methodology to the management of project portfolios and project selection. De Brantes and Galvin (2001) propose a framework that would enable the organisation to identify key customer requirements in an active consumer program in a healthcare business. Frank (2003) discusses
using Six Sigma methodology in revenue and pricing management, whilst Hong and Goh (2003) use the Six Sigma methodology in software development.

Some papers are concerned with the future of the Six Sigma methodology and attempt to propose better features to strengthen Six Sigma (Buggie, 2000; Goh and Xie, 2004; Hoerl, 2004; Keller, 2001). For instance, Goh and Xie (2004) propose an “eight- S” paradigm to sustain excellence in performance. Half of the papers under this topic heading are conceptual papers, with only one empirical study (Faltin and Flatin, 2003). Thus there is scope for further empirical study to investigate the impact in practice of the applications proposed. In addition, these papers suggest there is a broad range of potential application for Six Sigma and hence the investigation of other applications could also be argued to be worthwhile.

**New tools in Six Sigma**

This is an attempt to propose new tools for DMAIC and DFSS to improve the results of Six Sigma (Banuelas and Antony, 2003, 2004; Fu, 2003; Koonce et al., 2003; Mader, 2004; McInerney, 2003; Rudisill and Druley, 2004; Yang, 2004). In some cases, tools are proposed to be used in a particular phase of DMAIC, such as Mader (2004) proposes guidelines for managing project portfolios for effective resource allocation in the define phase; Yang (2004) discusses the possible roles of multivariate statistical methods to be used in each phase of DMAIC; Rudisill and Druley (2004) propose a nomograph to be used in the define phase to enable project prioritization; Fu (2003) proposes computer software to improve the measure and analyze phases whilst McInerney (2003) suggests barcode technology for the improve and control phases. Other papers propose tools specifically for use in DFSS. For example, Koonce et al. (2003) presents the development of a cost estimation system to support design time cost estimation. Banuelas and Antony (2003, 2004) propose and then empirically test the use of analytical hierarchy process for prioritizing DFSS and DMAIC. This tool is intended to help the user to determine whether the Six Sigma project should be undertaken under DFSS or DMAIC. It is noted that these tools are developed for enabling practitioners to attain better results when projects
are undertaken, implying that issues have arisen with the initial concept that require improvement. It seems likely that further enhancements may be needed, but to identify these, it is first necessary to carry out empirical exploratory research to determine the weaknesses of Six Sigma for which improved or additional tools are appropriate. Again, most of the papers in this topic are descriptive or conceptual, and hence most of the tools proposed need further academic study to verify their effectiveness.
Literatures focusing on Six Sigma implementation

Six Sigma implementation process in the whole business

This first sub-category for Six Sigma implementation is further divided into types of business: manufacturing; non-manufacturing and SME’s, as described below.

- **Manufacturing business:**

Stories of successful companies that have adopted Six Sigma are presented in these papers. The authors describe how the respective companies implement Six Sigma, giving insights into issues of perceived best practices. In addition to the discussion on successful implementation strategy, the tools that they have used are indicated. Many big corporations are named, such as Motorola (Adams, 2002; Denton, 1991; Ettorre, 1995; Waterman, 1996), Allied Signal (Zinkgraf, 1998) GE (Hendricks and Kelbaugh, 1998; Lucier and Seshadri, 2001), Raytheon (Treicher and Carmichael, 2001), Ford Motor (Munro, 2000) and Meyer Tool (Easton and Howe, 1999). In a more general paper, Harry (1998) investigates Six Sigma strategy as launched by a number of leaders in American Industry. All of these papers are categorised as descriptive papers, giving details of business cases, but without a rigorous case study approach. In addition, two empirical case studies were identified. Firstly, Tylutki and Fox (2002) present a case study on the implementation of Six Sigma in a dairy farm to identify output variation and improve feeder technical skills. Secondly, McAdam and Evans (2004) present a case study in a high-tech manufacturing environment to investigate the practical aspects of Six Sigma implementation and its deployment process. As a result of Six Sigma being initiated in the US, all the above success stories describe US companies. No papers have been found regarding successful implementation strategies for whole businesses in other parts of the world.

Hence, academic study outside the US could be a good area of future research to determine any comparative differences in implementation issues, such as those caused by cultural issues. In addition, issues of perceived best practice identified in
the descriptive papers above need to be verified using more rigorous research approaches, possibly through a comparative study of these secondary data sources to generate hypotheses followed by a large scale survey to test the hypotheses.

• **Non-manufacturing business:**

Health care services are one of the major active non-manufacturing contexts in which Six Sigma has been adopted, with the majority of papers studying implementation issues in the US. These papers explain how Six Sigma improves healthcare service quality by reducing medical errors and increasing patient safety (Buck, 1998, 2001; Chaplin, 2003; Cooper, 2002; Grim, 2001; Johnstone et al., 2003; Keim et al., 2001; Revere et al., 2004; Sehwail and DeYong, 2003; Snee, 2000b; Snell, 2002; Thomerson, 2001, 2002; Thomson and Lewis, 2002). In addition, Johnstone et al. (2003) propose an assessment framework to determine the appropriateness of implementing Six Sigma in ancillary services of healthcare in the US. This latter paper is a conceptual paper, as is the paper by Revere et al. (2004); all of the other papers regarding the healthcare sector are descriptive.

A second non-manufacturing business context for Six Sigma implementation is the financial services sector. For example, Douglas (2000) explains the implementation of Six Sigma in Citibank to increase customer satisfaction and Taghaboni-Dutta and Moreland (2004) present an empirical case study on Six Sigma implementation to improve the performance of the student loan industry. Further study into other non-manufacturing businesses is recommended, such as the implementation in a large financial institute including the insurance business. In addition, further empirical study to verify the findings of the descriptive papers is a potential area for future research.

• **SME:**
One of the criticisms of Six Sigma is that it is a high investment and resource-intensive program that only big companies can afford (Caulcutt, 2001). Hence, it is argued that Six Sigma seems to be an expensive program for a small company or SME. Despite this, some authors have proposed guidelines to adapt Six Sigma in this context (Davis, 2003; Gnibus and Krull, 2003; Gross, 2001; Wessel and Burcher, 2004). For example, Wessel and Burcher (2004) examine a sample of German SMEs and propose ten requirements to adjust the Six Sigma approach in this context. This modification framework could also be useful for a larger company that has a limited financial budget for investment, especially in an emerging country. However, the level of Six Sigma modification for SMEs has not yet been validated. Therefore it is necessary to further study this proposed model, along with other guidelines in the papers listed above.

**Implementation process in specific business functions/activities**

This is to study Six Sigma implementation in internal functions, other than Production, and other business activities. Thus internal functions are defined as any non-manufacturing functional areas, such as administrative, human resources, sales and research & development, while the business activities include cross functional activities in the organization, such as supply chain management, training and safety. Accordingly, these papers are categorized into three areas:

- **In administrative and other non-manufacturing functions:**

  Human Resource Management (HR) is one of the most frequently studied nonmanufacturing functions (Foulkes and Keight, 2002; Lanyon, 2003; Wyper and Harrison, 2000). Wyper and Harrison (2000) present an empirical case study of Six Sigma implementation in the HR central function to improve the HR process and develop measures of employee performance. Foulkes and Keight (2002) describe the implementation of Six Sigma to improve the internal recruitment process in Ford, while Lanyon (2003) explains how Six Sigma improves the HR management process.
in the Raytheon Company. Other internal functions discussed in the literature include product development and R&D (Bentley, 1992; Johnson and Swisher, 2003; Rajagopalan et al., 2004), Sales (Niemes, 1999), service (Benedetto, 2003; Ruller, 2004) and non-manufacturing operations in general (Bisgaard et al., 2002; Bott et al., 2000; Does et al., 2002). In particular, Does et al. (2002) present a comparison of eight Six Sigma projects in nonmanufacturing areas with the traditional (manufacturing) application in a case study company in Netherlands. They used the five phase of DMAIC to discuss the differences and similarities between the two. They concluded that Six Sigma can be applicable in non-manufacturing with a minor adaptation. The remainders of these papers are descriptive. The latter paper, by Does et al. (2002), is clearly an important contribution to the debate regarding the applicability of Six Sigma to non-manufacturing contexts. For instance, this paper addressed difficulties in applying traditional tools, suggesting that non-manufacturing projects should use measures of location and variation for the baseline rather than perform capability and performance studies given the lack of hard specification limits in this context. However, their conclusions arise from a single company, hence it is necessary to use a multi-case study approach to further identify the differences between manufacturing and non-manufacturing environments and hence to validate their claims. In addition, there is potential to study other internal functions in the organization, such as Finance and IT, as well as developing empirical or theoretical validations of the conclusions of the descriptive studies published to date. Hence, future study could continue to explore a variety of non-manufacturing internal functions to address the implementation issues contingent upon that context and hence to further contribute to the debate on any differences between the use of Six Sigma is production and non-production functional areas.

- In business activities – Supply chain management (SCM):

SCM is a topic that has received much attention in the literature in recent years, and three papers have been identified that look at the implementation of Six Sigma in this context. Dasgupta (2003) develops conceptual ideas on the measurement of supply chain performance using Six Sigma metrics while Anonymous (2003b) describes the implementation of Six Sigma in the supply chain in Europe. Wang et al. (2004)
develops conceptual guidelines for the assessment, improvement and control of quality in the SCM based on the Six Sigma methodology.

The testing out of the ideas of the two conceptual models described above would be an obvious area for future research. In addition, studying Six Sigma in the Supply Chain in areas other than the US and Europe is another area of potential future research.

- In business activities – Others:

In this the discussion is about Six Sigma implementation and how Six Sigma improves the performance of various activities, such as safety, training, the lending process, the claim process and public services. The application of Six Sigma in safety is presented in descriptive papers using business cases. These papers investigate how Six Sigma could be applied to improve Safety in various organisations, such as Honeywell, and in food supply (Phillips-Donaldson, 2002; Rancour and McCracken, 2000; Revelle, 2004).

Within a public services context, Bigio et al. (2004) present a case study on using Six Sigma DMAIC to examine strengths, weaknesses, opportunities, and threats in and to the Service Delivery Availability Management of one of the US government offices. Kilbey (2003) presents Six Sigma implementation in the lending process in Australian Banks. Lipscomb and Lewis (2004) discuss the application of Six Sigma to improve all phases of the claims process in the claims services industry, including investigation, evaluation, negotiation, medical / disability management and litigation management, and suggest the best practices for effective implementation in this area. Finally, Snee (2001b) describes the use of the Six Sigma approach to improve the training process, stressing the importance of the evaluation of training. Given the apparent success of Six Sigma in such a variety of non-manufacturing contexts, it is suggested that other business activities could also be explored, such as purchasing and the warranty claim process in the sales and manufacturing industry. Such further study would increase understanding of the application of Six Sigma and enable
companies to expand the implementation throughout their organisation, where appropriate.

4.4.5 Success & Failures factors in Six Sigma

Given the importance of success & failures in the context of other initiatives, such as TQM, it is not surprising that this has attracted much attention in the Six Sigma literature, with almost 20% of papers in this sub-category. It is sub-divided further into critical success factors (CSFs) and difficulties/problems below.

- Critical Success Factors (CSFs):

Coronado & Antony (2002) have conducted a review of the literature related to the critical success factors (CSF) for the effective implementation of Six Sigma. They identified 12 typical CSFs from their review of Six Sigma textbooks and other related literature. These CSFs include issues relating to the role of management; Belts qualification; project selection techniques and deployment strategy. It is not our purpose here to report this work in detail or list all the papers included in it. However, it is interesting to note that since this review article, further papers have been published that identify similar factors. For example, there are further studies that identify management commitment and on-going support (Anonymous, 2002; Byrne, 2003; Caulcutt, 2001); organisational infrastructure (Kendall and Fulenwider, 2000); organisational culture (Blakeslee, 1999b; Brewer, 2004; Carnell, 2004); cross functional team working (Knowles et al., 2004); effective internal communication (Poole, 2000); and understanding customer’s needs (Naumann, 2000). Some authors propose new success factors in particular areas. For example, Voehl (2004) highlights the need for governance factors for successful implementation in public work. Lynch et al. (2003) focus on how to define the scope of the project. Brewer and Bagranoff (2004) stress the importance of emphasizing measurement and accountability when implementing Six Sigma in the Finance function. In addition, Johnson (2002), Little (2003) and Lakhavani (2003) propose CSFs of Six Sigma implementation in R&D and product development areas, while Martens (2001) identifies three strategic elements for successfully implementing and executing Six Sigma.
Sigma in the Financial Advisors Client Services of American Express. With the exception of Knowles et al., 2004, who use a case study approach, all of the above papers are descriptive. However, a further three papers have been identified that have used a research method to identify CSFs.

- **Difficulties and problems in Six Sigma implementation:**

These papers investigate the negative side of Six Sigma and problems that occur during the implementation process. In some cases, it is suggested that such problems arise because Six Sigma is being implemented in an inappropriate context, arguing that Six Sigma is more suitable for manufacturing than non-manufacturing processes. For instance, Binder and Lawrence (1997) debate that Six Sigma is not appropriate for a computer software design process. Other authors highlight specific behavioural difficulties of Six Sigma implementation (Harry, 2000b; Kennett, 2001; Pylipow, 2001). Harry (2000b) and Kennett (2001) suggest that such difficulties are caused by the Six Sigma learning curve and issues of organisational culture, while Pylipow (2001) investigates the negative reaction from people in the product design function to the implementation of Six Sigma. On the technical side, Gnibus (2000) points out that a lack of data can lead to problems in root cause analysis of business problems in the Analyze phase, which could lead to ineffective improvement actions. McAdam and Lafferty (2004) present an exploratory study using a multilevel case analysis from both a process and people perspective. From the process perspective, they have found low success in non-manufacturing areas. From the people perspective, they have found problems due to lack of empowerment and suggest that the organisation needs to evaluate the existing culture, empowering employees where appropriate, before adopting Six Sigma into the organization.

- **Financial performance:**

Four papers have been published recently, which focus on studying the relationship between Six Sigma and company financial performance (Bisgaard and Freiesleben, 2004; Goh et al., 2003; Harry, 2000e; Motwani et al., 2004). Goh et al. (2003) have conducted an exploratory study on the impact of Six Sigma implementation on stock
price performance. This study presents a perspective of the impact of Six Sigma on company financial performance using a macro view rather than a project-by-project micro view of performance measurement. Motwani et al. (2004) propose a framework for evaluating the impact of implementation factors on a company’s performance in a case study at Dow Chemical. Harry (2000e) studies the relationship between quality management and financial performance for a business in the US. Bisgaard and Freiesleben (2004) propose a managerial accounting framework that can be modified to a quality context to evaluate the financial effects of Six Sigma. A longitudinal study may give better insight into the effects of Six Sigma on long-term company performance. However, it must be acknowledged that the overall impact of one initiative in an organisation is extremely difficult to judge, given the many other factors that impact performance, including other internal initiatives and the external issues such as the economic environment which is beyond the companies control.

• Customer satisfaction:

It could be argued that the underlying focus of Six Sigma is process improvement, which in turn should lead to increased customer satisfaction. Indeed, several papers have been identified that explain how Six Sigma can address this strategic objective in various settings (Behara et al., 1995; Rucker, 2000; Watson, 2000; Woodall, 2001). For example, Watson (2000) describes how Six Sigma could lead to improvements in both shareholders value and customer satisfaction. Rucker (2000) presents a business case of Citibank using Six Sigma to improve total customer satisfaction through defect and cycle time reduction. Behara et al. (1995) present a similar study in a high-tech manufacturing company in the US during 1991 and 1992. Woodall (2001) presents a conceptual paper on the opportunity of deploying the Six Sigma methodology to achieve perfect technical and functional quality, which are the principal components of service quality within the Christian Grönroos context. There is scope to continue studies of this type, verifying the concepts proposed. In addition, further study could be undertaken on other aspects of improving and measuring
service quality to increase customer satisfaction, such as using Six Sigma to improve service quality dimensions based on the model by Parasuraman et al. (1985).

**Observations and scope for research**

Considering the research gaps identified in each topic, some common threats have been identified like application in service industries like Hotels and resorts or we can say hospitality industries. There is the need for more empirical research into the Six Sigma phenomenon, using rigorous research methods to validate the many uncorroborated Six Sigma claims and to test new theories or models that have been proposed to strengthen the methodology. This would allow the building of a sound foundation for Six Sigma well as providing opportunities for academic researchers to work alongside industry in striving for operational excellence.

Further it is revealed from the literature survey that there is ample opportunity of application of six sigma in service industry. Hospitality Industries being one of the upcoming sources of revenue generation and having very good future from countries growth point of view. Researcher after discussion with his guide Dr. B. V. Sangvikar has decided to go for this study. This study will definitely open up the prospects of six sigma to service industries.

**Table 4.1 Types of Literatures Reviewed with Year**

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Figure 4.1 Types of Literatures Reviewed with Year

Table 4.2 Classification of literature by research contents

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Classification of literature by research contents

Table 4.3  Classification of literature by research

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Figure 4.3

- Descriptive: 72%
- Empirical: 12%
- Conceptual: 16%
- Literature review: 0%
References


5. Blakeslee, 1999a; Elliott, 2003; Godfrey, 2002; Hammer and Goding, 2001; Harry, 2000a, 2000c; Maguire, 1999; Rowlands, 2003; Snee, 1999


