Research on management issues in the pharmaceutical industry: a literature review

Sushmita A. Narayana and Rupesh Kumar Pati
Quantitative Methods & Operations Management,
Indian Institute of Management Kozhikode, Kozhikode, India, and

Prem Vrat
Operations Management Area, Management Development Institute,
Gurgaon, India

Abstract

Purpose – This paper aims to present a review of literature to assess the progress of research on managerial issues in the pharmaceutical industry globally.

Design/methodology/approach – Literature from peer-reviewed journals available on online databases was collected for the last decade, using the keyword search technique, and then classifying it according to major managerial issues, research methodologies used and geographical zones.

Findings – Behavioral issues at the consumer/physician level and non-behavioral issues in pricing and medical expenses are studied the most, followed by supply chain management, research and development and manufacturing and services operations management. There is scope for conjunction of research efforts across themes and players. The studies focus on the developed nations through the application of field research and mathematical modeling techniques. The studies in the American region focus more on development and marketing while studies in Europe are aligned towards manufacturing and distribution in the industry. Studies in the developing nations are mostly exploratory in nature and require more focus on issues of research and development and marketing in addition to a substantial increase in overall research efforts. More trans-continental studies are needed to consolidate research efforts globally.

Research limitations/implications – The review is not exhaustive of all studies available on the industry and each of the issues. Conference papers, unpublished material and lectures were excluded.

Practical implications – Identification of the present and emerging issues together provides practitioners in healthcare systems with an idea of available techniques and strategies to solve problems in healthcare/pharmaceutical management.

Originality/value – A study on research of management issues in the pharmaceutical industry across the world has perhaps not been conducted in the recent past: this paper fills part of that gap.

Keywords Pharmaceuticals industry, Management issues, Health services sector, Research work, Drug administration

Paper type Literature review

1. Introduction

Growth and prosperity of a nation largely depend on the health of the individual in the society. Subsequently, the pharmaceutical industry has been identified in the United Nations' Millennium Development Goals as a major driver for the healthcare sector. Globally, the pharmaceutical industry has been on a growth of around 3-5 percent as of the year 2009 and is expected to grow at 4-6 percent over the next three years (IMS © Health, 2009). This is a rather slow rate for the industry as it has had its share of

challenges in the recent past. Innovation rates in the industry have been on decline, with development of new drugs taking at least 15-30 years (Talias, 2007). Mergers and acquisitions among companies have become a common strategy to synergize intellectual capital. Product withdrawal issues in the case of Vioxx and Baycol have raised questions on the credibility of the pharmaceutical companies and their prescribing healthcare practitioners in producing and delivering the right kind of healthcare (Glass and Poli, 2009). Growing lifestyle diseases like obesity and the discovery of new strains of viral infections have placed pressures on the industry to adapt rapidly to risks and uncertainty.

While the above issues are growing in importance of late, the problems of HIV infections and tuberculosis that plague the lower-income countries have been prevalent for decades. Drug prices as high as 650 percent of the acceptable international standards have been reported in under developed countries coupled with the low availability of cheap medicines in the public sector (WHO, 2009). Insufficient funding, lack of incentives for maintaining stocks, inability to forecast accurately, inefficient distribution systems and pilferage of medicines for private resale have led to the low availability of cheap generic drugs that are required especially in primary healthcare (Health Action International and WHO, 2009). Pharmaceutical companies in these countries are also facing the competitive pressures of multi-national companies, with the enforcement of product patents in 2005 (Rao, 2008). With low-cost manufacturing capabilities, lower and lower-middle income countries have greater incentives to develop and manufacture high quality drugs for the developed economies instead and hence these countries are bound to face several issues in their healthcare systems. Hence, managing pharmaceutical industry effectively and efficiently is vital, particularly in the developing countries.

Considering the challenges of the pharmaceutical industry and the societal importance of healthcare, this paper presents a review of literature that has researched various issues of management in the pharmaceutical industry. The pharmaceutical industry has been described as the complex of processes, operations and organizations involved in the discovery, development and manufacture of drugs and medications (Shah, 2004). Given the involvement of several players in the industry from research related and manufacturing companies, to healthcare providers, governmental and non-governmental agencies, the study of management related issues in the industry is of relevance to all these players and for the research community. Available reviews on the pharmaceutical industry are specific to issues in certain domains such as supply chain management (e.g. Shah, 2004; Jarrett, 2006), pricing (e.g. Lopez-Casasnovas and Puig-Junoy, 2000), prescribing methods (e.g. Cooper *et al.*, 2008), etc. This study aims at providing a holistic review of management research in the pharmaceutical industry by identifying, classifying and analyzing research interest that covers management issues pertinent to the industry.

The paper is organized as follows: section 2 describes the methodology used to collect and analyze the literature. Section 3 provides details of the basic issues that were identified and studied in the literature on the pharmaceutical industry, with additional analysis across geography and research methodologies. Concluding remarks are provided in section 4, along with an agenda for future research.

2. Review methodology

The search for the literature was confined to research papers published during the years 1999-2009 on management issues in the pharmaceutical industry in peer-reviewed journals available in online databases of Proquest, EBSCO, Emerald and ScienceDirect. Keywords used for the search are related to the primary products of the pharmaceutical industry, i.e. pharmaceutical preparations. These keywords include "pharmaceuticals", "drugs", "medicines", "generics", "formulations", etc. Since the literature on the pharmaceutical industry is very vast, only a sample of journals was selected. Studies related to pharmaceutical sciences (detailing chemical compositions and manufacturing techniques) and those related purely to healthcare management (related to nursing and hospital care issues other than pharmaceutical care) were excluded. Also, published/unpublished conference papers and lectures were excluded.

Around 304 studies[1] were obtained from 48 journals as shown in Table I. Majority of these studies (62 percent) are from journals dedicated to pharmaceuticals/healthcare. Many research papers were also found in the eight journals in the area of policy-making, health economics, marketing and quality management in pharmaceuticals/healthcare industry. The remaining studies are distributed across several other journals in areas of general management like economics, marketing, operations management, etc. Table I also identifies the list of journals where there are prospects of publishing research papers pertaining to pharmaceutical management.

For a holistic review, a content analysis of the literature has been carried out across specific categories, in order to understand and gather interesting insights about the nature of research between the years 1999-2009. These categories deal with:

- Prevalent and emerging issues/themes of interest in management that have been the focus of research in this industry: The classification has been done by exploring the articles for commonalities repeatedly until no more themes/issues emerge, a method applied in content analysis of logistics literature (Gravier and Farris, 2008). Each article has been coded and classified by the three authors according to a basic issue, followed by the additional issue(s) of interest addressed by it. The issues are also divided into two major categories, namely: behavioral studies which focus on the behaviors of and interrelationships between different entities in context of the pharmaceutical industry; and non-behavioral studies, which focus on the issues concerned with management of assets/information/knowledge that may be material, financial or technological in nature.

- Geographical focus of the studies to explain the relation of such research to the health/economic status in these regions: The classification is done on the basis of region where the research is carried out/ geographical location of the authors (if the study is not region-specific). For this review, the studies in both North America and South America are classified under the American region while the Asia-Pacific region comprises of Asian countries and Australia. Trans-continental studies are those that study issues in two or more regions from different continents.

- Research methodologies applied in the studies, namely, conceptual studies, literature reviews, case-based studies, opinion surveys/interview-based studies and studies using mathematical modeling/secondary data: It can be noted that case-based studies here include studies employing a case-research method which may combine usage of mathematical modeling, surveys and interviews.

Journal name	No. of studies per journal	No. of studies
Journals specific to healthcare/pharmaceuticals		
Journal of Health Organization and Management	1	1
Leadership in Health Services	2	2
International Journal of Health Care Quality Assurance	13	13
Journal of Health Economics	21	21
International Journal of Pharmaceutical and Healthcare Marketing	32	32
Health Economics	41	41
Health Policy	79	79
Total		189
Journals related to other areas in management		
Management Science	6	6
European Journal of Operational Research, International Journal of Operations and Production Management	4	8
Journal of Consumer Marketing	9	9
Benchmarking: An International Journal	2	12
Industrial Engineering and Chemical Research		
International Journal of Productivity and Performance Management		
International Journal of Quality and Reliability Management		
Supply Chain Management: An International Journal		
Total Quality Management		
International Journal of Production Economics	3	15
International Journal of Retail and Distribution Management		
Journal of Operations Management		
Journal of Product and Brand Management		
Omega		
Managerial and Decision Economics	16	16
Computers and Chemical Engineering	24	24
Academy of Management Journal	1	25
British Food Journal		
Business Process Management Journal		
Corporate Communications: an International Journal		
Environmental Quality Management		
European Business Review		
Industrial Management & Data Systems		
Integrated Manufacturing Systems		
Interfaces		
International Journal of Logistics Research and Applications		
International Journal of Physical Distribution and Logistics Management		
International Journal of Production Research		
International Marketing Review		
Journal of Business and Industrial Marketing		
Journal of Communication Management		
Journal of Management Development		
Journal of Managerial Psychology		
Journal of Manufacturing Technology Management		
Logistics Information Management		
Management Decision		
Marketing Intelligence and Planning		
Production Planning and Control		
The TQM Magazine		
World Development		
Journal of Intellectual Capital		
Total		115
Total no. of studies collected across all journals		304

Table I.
Number of studies collected across various journals

Each study has been coded and classified under a geographical zone, a predominant research methodology employed and the basic issues of interest along with either a behavioral/non-behavioral focus of the basic issue. The coding and classification procedure was iterative. Causes for differences were resolved between the authors through discussion after each iteration, to improve inter-rater reliability with regard to coding and classification.

3. Analysis of studies on management in the pharmaceutical industry

The collated literature is studied on the basis of managerial issues of research interest, contribution by geographical zones and application of research methodologies in the studies, both, at an aggregate level and across the various managerial issues.

3.1 Major issues studied

The major issues, along with the sub-issues have been encapsulated and depicted in an inverted tree diagram (Figure 1), while the distribution of studies across time is depicted in Figure 2. The peak in studies in the year 2007 (Figure 2) can be attributed to the commencement of a new journal related to the pharmaceuticals industry (International Journal of Pharmaceutical and Healthcare Marketing) and a special issue in Managerial and Decision Economics on "Economic and Policy Issues in the Pharmaceutical industry". Thus, there has been a growing interest over the last decade specific to the pharmaceutical industry and its issues from different academic perspectives, reflecting the important role played by the industry in global healthcare.

The major issues identified in this review for classification are:

- pricing and medical expenses (P&ME) in the industry;
- marketing studies on segmentation, targeting and positioning strategies (STP), advertising and promotion (PR) and consumer/physician level behaviors (CB);
- research and development (R&D) which is crucial for designing the right drug;
- manufacturing and service operations management (M&SOM) at the level of a single organization;
- supply chain management (SCM) studies which focus on different entity relationships across the entire enterprise between the pharmaceuticals and healthcare industries;
- organizational behaviors (OB) that depict how the players in the industry behave in an environment of competition, technological advancement and regulatory pressures;
- corporate growth strategies (CGS) which refers to the increasing instances of mergers and acquisitions in the industry; and finally
- other strategic issues (others) such as environmental management, anti-counterfeiting strategies, etc., to incorporate emergence of several different perspectives in the realm of the pharmaceuticals industry.

Figure 1 also depicts the various sub-issues that have been studied under the major issues/themes (see Table II). Though the analysis of the sub-issues is beyond the scope of this paper, some interesting insights regarding the major issues can be obtained along the following lines:
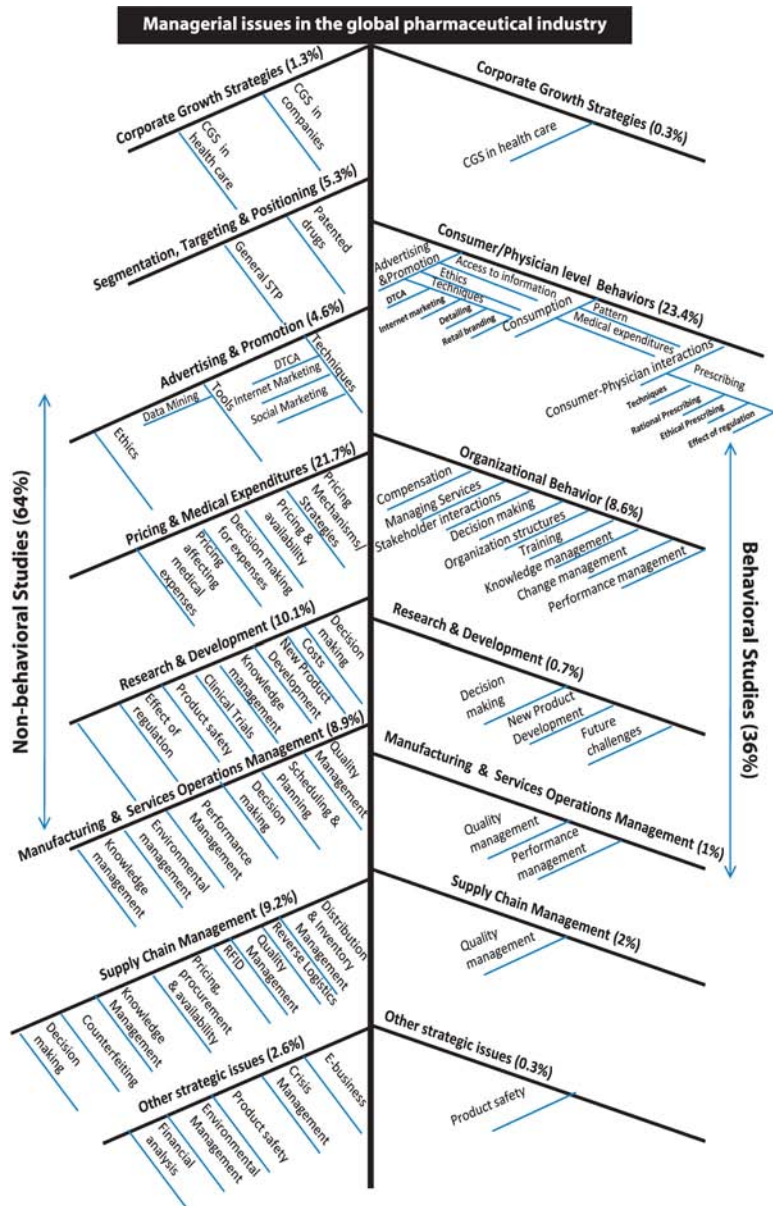
Figure 1.
Managerial issues studied
in the pharmaceutical
industry (1999-2009)

Note: Figures in brackets indicate proportion of 304 studies

Legend:
⊞ CGS (5)
⊞ Others (9)
⊞ PR (14)
⧄ STP (16)
⊞ OB (26)
☐ M&SOM (30)
▤ R&D (33)
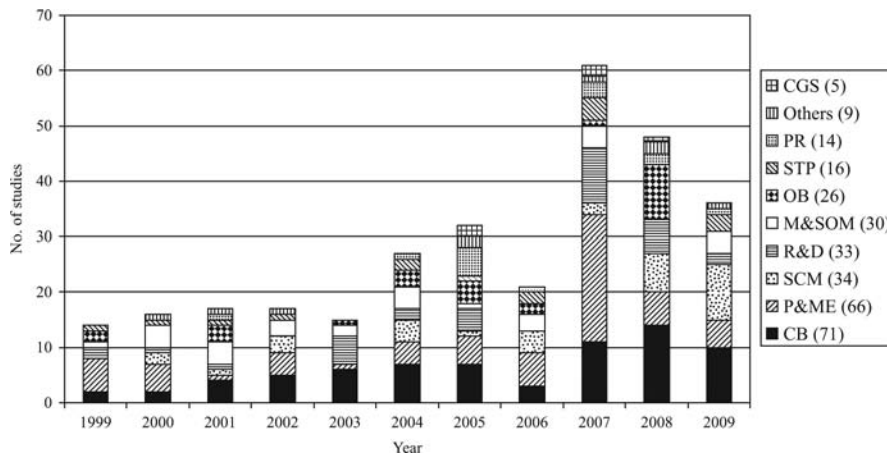⊞ SCM (34)
⧄ P&ME (66)
■ CB (71)

Figure 2.
Distribution of various
managerial issues studied
in the pharmaceutical
industry (1999-2009)

- From Figure 1 it can be observed that around 64 percent of the collated literature focuses on the studies that are non-behavioral in nature. Studies on pricing, R&D and SCM are the main contributors to this perspective. Studies on pricing and medical expenditures, advertising and promotion and STP strategies are purely non-behavioral in nature. Behavioral aspects of pricing and marketing are classified under studies on consumer/physician level behaviors (CB). Studies on organizational behaviors and other behavioral aspects of SCM, manufacturing and service operations management, R&D, corporate growth strategies and other strategic issues of interest are also present. These focus on the relationships and interaction among different actors in the industry. While increased competition requires optimized handling of material/financial/technological resources, behavioral studies at the individual and organizational levels are vital to understand, rigorously, the implications of the non-behavioral issues in practice.

- The major issues that have been studied are concerned with consumer/physician behaviors and pricing issues (Figures 1 and 2). The presence of several sub-issues in both behavioral and non-behavioral themes also indicates somewhat in-depth understanding of these issues. The spurt in studies on pricing-related issues in 2007 maybe partly attributed to the introduction of a new Medicare Drug Benefit in the USA in 2006. Nevertheless, the high focus on pricing indicates increasing concerns regarding the rising prices of medicines and their effect on access to affordable healthcare. The large number of studies on consumer/physician level behaviors indicates the importance of the role of the physician and pharmacists in acting as an agent for the end-consumer (Canton and Westerhout, 1999) as well as increasing customization in the industry (Gupta *et al.*, 2007).

- Figures 1 and 2 indicate that the number of studies on SCM, R&D and the management of manufacturing and service operations in the organizations have increased over the last few years, with a comparable interest in each of them. It also appears that research in manufacturing and service operations at

Year	CB	P&ME	SCM	R&D	Major issue M&SOM	OB	STP	PR	Others	CGS	Total number of studies
1999											
n	2	6	–	2	1	2	1	–	–	–	14
%	0.7	2.0	–	0.7	0.3	0.7	0.3	–	–	–	4.6
2000											
n	2	5	2	1	4	–	1	–	1	–	16
%	0.7	1.6	0.7	0.3	1.3	–	0.3	–	0.3	–	5.3
2001											
n	4	1	1	1	4	3	1	1	1	–	17
%	1.3	0.3	0.3	0.3	1.3	1.0	0.3	0.3	0.3	–	5.6
2002											
n	5	4	3	–	3	–	1	–	1	–	17
%	1.6	1.3	1.0	–	1.0	–	0.3	–	0.3	–	5.6
2003											
n	6	1	–	5	2	1	–	–	–	–	15
%	2.0	0.3	–	1.6	0.7	0.3	–	–	–	–	4.9
2004											
n	7	4	4	2	4	3	2	1	–	–	27
%	2.3	1.3	1.3	0.7	1.3	1.0	0.7	0.3	–	–	8.9
2005											
n	7	5	1	4	1	4	1	5	2	2	32
%	2.3	1.6	0.3	1.3	0.3	1.3	0.3	1.6	0.7	0.7	10.5
2006											
n	3	6	4	–	3	2	2	1	–	–	21
%	1.0	2.0	1.3	–	1.0	0.7	0.7	0.3	–	–	6.9
2007											
n	11	23	2	10	4	1	4	3	1	2	61
%	3.6	7.6	0.7	3.3	1.3	0.3	0.3	1.0	0.3	0.7	20.1
2008											
n	14	6	7	6	–	10	–	2	2	1	48
%	4.6	2.0	2.3	2.0	–	3.3	–	0.7	0.7	0.3	15.8
2009											
n	10	5	10	2	4	–	3	1	1	–	36
%	3.3	1.6	3.3	0.7	1.3	–	1.0	0.3	0.3	–	11.8
Total number of studies											
n	71	66	34	33	30	26	16	14	9	5	Grand total = 304
%	23.4	21.7	11.2	10.9	9.9	8.6	5.3	4.6	3.0	1.6	

Table II.
Distribution of various managerial issues studied in the pharmaceutical industry (1999-2009)

organizational levels is giving way to focus on the extended enterprise in the pharmaceutical industry. These efforts indicate the move towards technology and efficiency-based systems in the pharmaceutical industry.

- The remaining studies focus generally on organizational behaviors, STP, advertising and promotions, corporate growth strategies and other upcoming issues of strategic interest. The number of these studies also seems to be sporadic over the last few years (Figure 2). Studies on advertising and promotion and corporate growth strategies like mergers and acquisitions (M&A) have picked up pace over the last few years, indicating new avenues for research.

3.2 Geographical comparison of research methodologies applied
In this section, the studies have been analyzed at an aggregate level across the geographical spread and the research methodologies applied. Figures 3 and 4 depict the distribution of the studies over time across geographical zones and the research methodologies applied, respectively (Table III).

The healthcare systems and pharmaceutical markets in the American and European regions are generally well developed in terms of regulation, funding and provision mechanisms which are publicly/privately managed by risk pooling through insurance schemes. Also, these regions garner around 80 percent of the global pharmaceuticals market, by value (Datamonitor, 2009a). Thus, these factors make the regions prime movers of business in the industry as well as in research. This is also supported by Figure 3, which shows that around 80 percent of the studies in this review are from these regions, contributing greatly to the peak in studies in 2007.

Of the remaining studies, the focus is more on the Asia-Pacific region but it has been sporadic over the last few years. In this region, Japan dominates the pharmaceuticals market, by value, with China and India lagging far behind (Datamonitor, 2009b). Though out-of-pocket expenditures form a large portion of private spending in all the three countries (WHO, 2009), the burden on healthcare expenditures is greater in China and India where public spending is much less. The semi-regulated pharmaceutical industries of China and India are particularly popular for low-cost manufacturing and contract research, but are criticized for focusing development efforts towards the Western markets (Rao, 2008). This moderate level of focus on development is also depicted in the quantum of research efforts in these regions.

Compared to the Western and Asia-Pacific regions, the Middle Eastern and African regions have been historically facing poor economic and healthcare development, which is also the case today (WHO, 2009). However, there are very few studies on the Middle Eastern and African pharmaceutical industries in the available literature (Figure 3), which parallels a negligible focus on their markets in industry reports as well (e.g. Datamonitor (2009a)). The quantum of trans-continental research is also low and reflects inequity in research efforts across the regions.

The classification of studies based on the research methodologies adopted can be used to gauge the aggregate maturity level of research (Table IV). The rationale for this is the observation that research in any field generally follows a cyclic process, beginning with exploratory studies using interviews/surveys, followed by case studies that are further enriched using theory and mathematical models. Finally, literature reviews help in assessing the progress of such research to further the studies through the cyclic process. Subsequently, it can be seen that there is a gradual increase in the
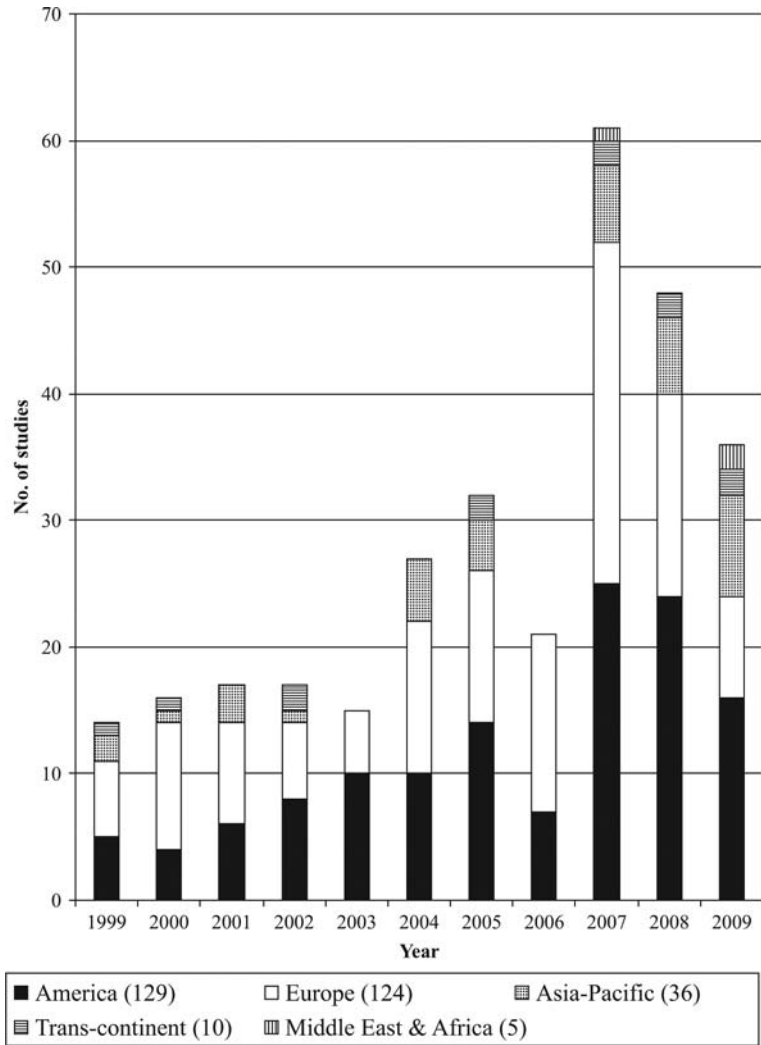
Figure 3.
Geographical distribution of studies management in the pharmaceutical industry (1999-2009)

number of field studies using case research and opinion surveys/interviews, which are cumulatively more in number than the studies using mathematical modeling/secondary data analysis (Figure 4). Perhaps, this higher quantity of field research has aided in the increase of studies using mathematical modeling/secondary data analysis, in the last few years, through the identification of more issues and the collection of data. A gradual increase in literature reviews and conceptual studies indicates a progress towards maturity in the research over the last few years, which may lead to new insights and reveal research gaps (Table V).

The comparison of the geographical focus on research methodologies employed can be used to track the level of maturity of research in those regions, with the help of
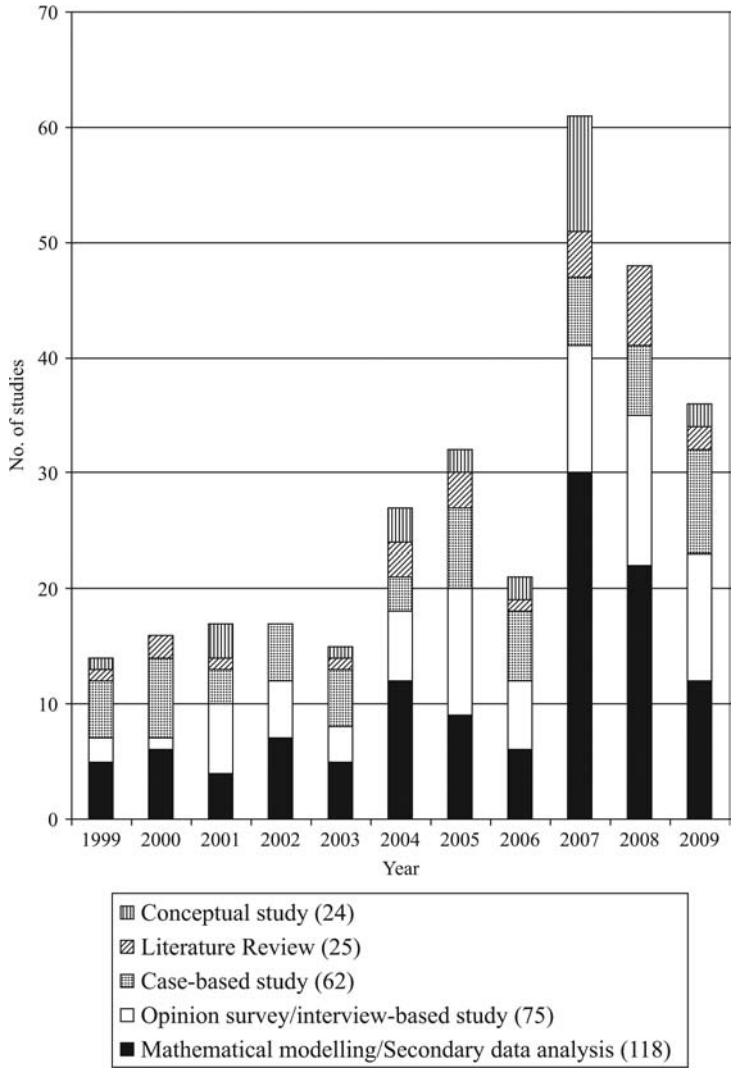
Figure 4.
Research methodologies applied in studying managerial issues in the pharmaceutical industry (1999-2009)

Figure 5. The high prevalence of field research in all regions reflects the context-specific nature of research that can be attributed to the presence of differing regulatory and market environments across regions. In the case of the American and European regions, the large amount of field research has strongly supported mathematical modeling and data analysis, which is applied in most studies, from these regions. In the Asia-Pacific, Middle East and African regions, opinion surveys/interview methods have been used in most studies, suggesting that these regions are at an exploratory stage of research.

A larger number of studies in the American regions and on trans-continental issues have applied mathematical modeling/secondary data analysis rather than other

Year	America		Europe		Region Asia Pacific		Trans-continent		Middle East & Africa		Total number of studies	
	n	%	n	%	n	%	n	%	n	%	n	%
1999	5	1.6	6	2.0	2	0.7	1	0.3	–	–	14	4.6
2000	4	1.3	10	3.3	1	0.3	1	0.3	–	–	16	5.3
2001	6	2.0	8	2.6	3	1.0	–	–	–	–	17	5.6
2002	8	2.6	6	2.0	1	0.3	–	–	2	0.7	17	5.6
2003	10	3.3	5	1.6	–	–	–	–	–	–		4.9
2004	10	3.3	12	3.9	5	1.6	–	–	–	–	27	8.9
2005	14	4.6	12	3.9	4	1.3	2	0.7	–	–	32	10.5
2006	7	2.3	14	4.6	–	–	–	–	21	6.9		
2007	25	8.2	27	8.9	6	2.0	2	0.7	1	0.3	61	20.1
2008	24	7.9	16	5.3	6	2.0	2	0.7	–	–	48	15.8
2009	16	5.3	8	2.6	8	2.6	2	0.7	2	0.7	36	11.8
Total number of studies	129	42.4	124	40.8	36	11.8	10	3.3	5	1.6	Grand total = 304	

Table III.
Geographical distribution of studies on management in the pharmaceutical industry (1999-2009)

Research methodology

Year	Mathematical modeling/ secondary data analysis		Opinion survey/ interview- based study		Case-based study		Literature review		Conceptual study		Total number of studies	
	n	%	n	%	n	%	n	%	n	%	n	%
1999	5	1.6	2	0.7	5	1.6	1	0.3	1	0.3	14	4.6
2000	6	2.0	1	0.3	7	2.3	2	0.7	–	–	16	5.3
2001	4	1.3	6	2.0	3	1.0	1	0.3	3	1.0	17	5.6
2002	7	2.3	5	1.6	5	1.6	–	–	–	–	17	5.6
2003	5	1.6	3	1.0	5	1.6	1	0.3	1	0.3	15	4.9
2004	12	3.9	6	2.0	3	1.0	3	1.0	3	1.0	27	8.9
2005	9	3.0	11	3.6	7	2.3	3	1.0	2	0.7	32	10.5
2006	6	2.0	6	2.0	6	2.0	1	0.3	2	0.7	21	6.9
2007	30	9.9	11	3.6	6	2.0	4	1.3	10	3.3	61	20.1
2008	22	7.2	13	4.3	6	2.0	7	2.3	–	–	48	15.8
2009	12	3.9	11	3.6	9	3.0	2	0.7	2	0.7	36	11.8
Total number of studies	118	38.8	75	24.7	62	20.4	25	8.2	24	7.9	Grand total = 304	

Table IV.
Research methodologies applied in studying managerial issues in the pharmaceutical industry (1999-2009)

	Mathematical models/ secondary data analysis		Opinion survey/ interview-based study		Case-based study		Literature review		Conceptual study		Total number of studies	
Region	n	%	n	%	n	%	n	%	n	%	n	%
America	69	22.7	24	7.9	16	5.3	9	3.0	11	3.6	129	42.4
Europe	34	11.2	32	10.5	35	11.5	12	3.9	11	3.6	124	40.8
Asia-Pacific	8	2.6	14	4.6	9	3.0	3	1.0	2	0.7	36	11.8
Trans-continent	7	2.3	–	–	–	0.7	1	0.3	–	–	10	3.3
Middle East & Africa	–	–	5	1.6	–	–	–	–	–	–	5	1.6
Total number of studies	118	38.8	75	24.7	62	20.4	25	8.2	24	7.9	Grand total = 304	

(Research methodology)

Table V.
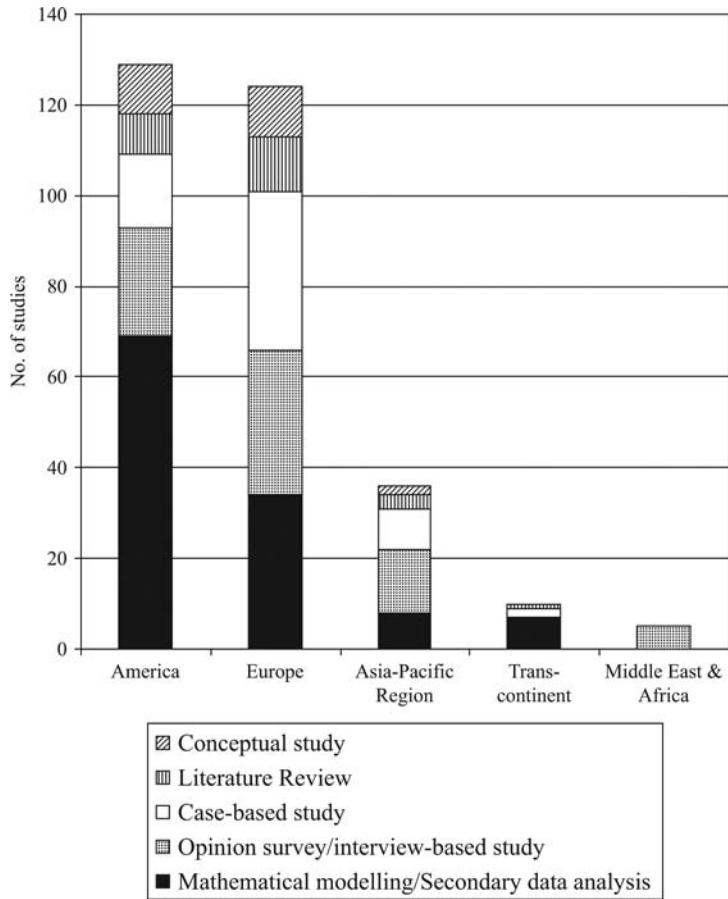Distribution of studies across geography and research methodologies

Figure 5.
Distribution of studies across geography and research methodologies applied

methods. In Europe and Asia-Pacific, the extent of application of this methodology is on par with that of field-based methods. The greater use of this methodology in the developed countries reflects their progress of research through modeling industry-specific issues and behaviors for the effective, efficient and competitive development of their pharmaceutical industries.

The presence of literature reviews and conceptual studies in most of the developed and developing regions indicates the efforts towards both, research consolidation and identification of newer avenues for improvement. Overall, research efforts in the regions of Europe and America appear to have progressed with the development of the healthcare systems by evolving through a large quantum of field research to conceptual clarity regarding the pharmaceutical industry. Subsequently, the overall presence of mathematical modeling studies has increased over time as well. In the Asia-Pacific region, the nature and quantum of research efforts depict stronger foundations in recent years for understanding and resolving issues related to the

moderately developed pharmaceutical markets and healthcare systems. However, in the Middle East and African regions, which comprise of under-developed and developing economies, the research efforts exhibit a consistently weak and exploratory understanding of the pharmaceutical industry through field research.

3.3 Research focus on issues according to geography
In this section, the studies dealing with various issues in the pharmaceutical industry have been analyzed according to their geographical spread (Figure 6 and Table VI):

- Through the focus on major issues, the studies from the American and European regions have displayed greater depth and spread through a study of various sub-issues, when compared to the other regions. The presence of different pricing
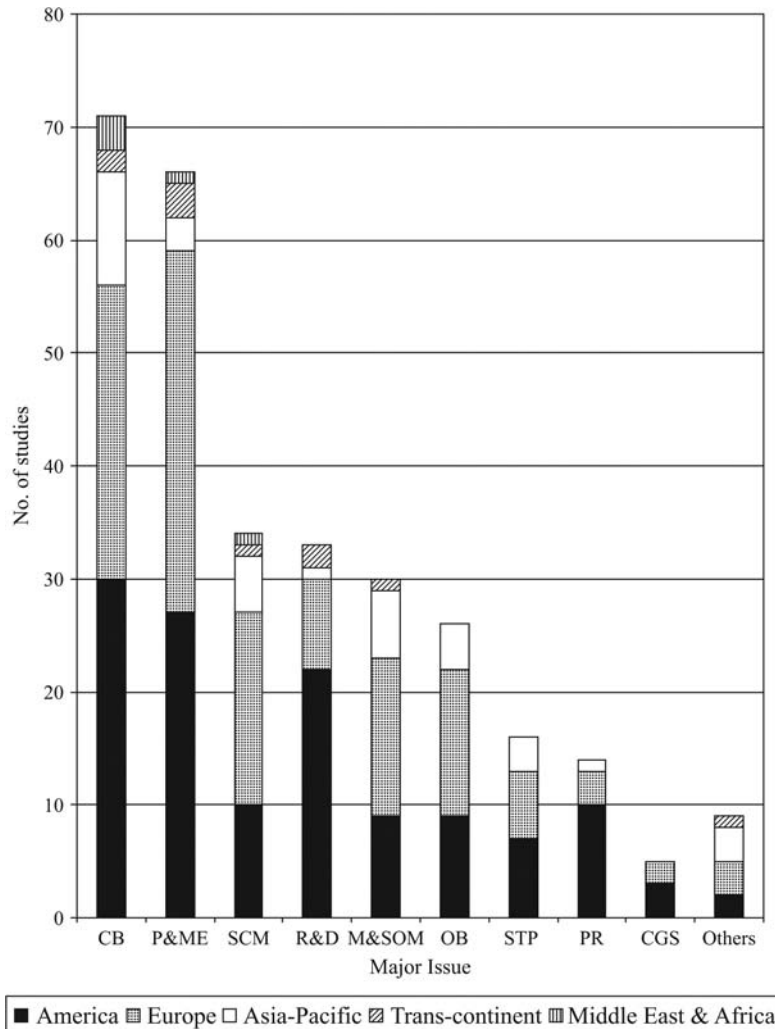
Figure 6.
Geographical distribution of managerial issues studied in the pharmaceutical industry

Major issue	Region											
	America		Europe		Asia-Pacific		Trans-continent		Middle East & Africa		Total number of studies	
	n	%	n	%	n	%	n	%	n	%	n	%
CB	30	9.9	26	8.6	10	3.3	2	0.7	3	1.0	71	23.4
P&ME	27	8.9	32	10.5	3	1.0	3	1.0	1	0.3	66	21.7
SCM	10	3.3	17	5.6	5	1.6	1	0.3	1	0.3	34	11.2
R&D	22	7.2	8	2.6	1	0.3	2	0.7	–	–	33	10.9
M&SOM	9	3.0	14	4.6	6	2.0	1	0.3	–	–	30	9.9
OB	9	3.0	13	4.3	4	1.3	–	–	–	–	26	8.6
STP	7	2.3	6	2.0	3	1.0	–	–	–	–	16	5.3
PR	10	3.3	3	1.0	1	0.3	–	–	–	–	14	4.6
CGS	3	1.0	2	0.7	–	–	–	–	–	–	5	1.6
Others	2	0.7	3	1.0	3	1.0	1	0.3	–	–	9	3.0
Total number of studies	129	42.4	124	40.8	36	11.8	10	3.3	5	1.6	Grand total = 304	

Table VI.
Geographical distribution of managerial issues studied in the pharmaceutical industry

and healthcare systems and stringent policies in these regions is reflected through the higher focus on pricing and medical expenditures. Higher focus on SCM and operations management in manufacturing and services in the European industry indicates that studies in this region focus more on the processes of manufacturing and delivery of products to the markets. The number of studies from the American region, whereas, are more on issues such as R&D, marketing issues and corporate growth strategies, which indicates focus on cost-intensive product development and marketing activities. Relative to other regions, research in these two regions depicts more interest in consumer/physician level behaviors. However, the American region focuses more on the behavioral studies at the consumer/physician levels whereas the European region focuses more on entity behaviors and relationships in the industry through a study of organizational behaviors, supply chain issues and operations management at the organizational level.

- Research in the Asia-Pacific region is spread thinly over many issues like marketing, pricing and medical expenditures, organizational behaviors, SCM and manufacturing and service operations management. Subsequently, the research focus is more on the manufacturing and delivery process of the pharmaceutical products, through studies on operations management at the organizational and supply chain level. However, the low focus on R&D should be remedied to address the need for developing innovative medicines in this emerging market. The number of studies on other strategic issues is the highest in this region, indicating that considerable initiative is being taken in studying the industry from different perspectives.

- There are very few studies in the Middle East and the African region on issues of consumer/physician behaviors, pricing and medical expenditures and SCM. These are not adequate for gaining very substantial insights. However, the focus on pricing and supply chain issues is progressive, considering that this region comprises of the lower-income countries suffering from low access to cheap medicines and poor distribution systems. Absence of studies on either advertising and promotion or STP strategies suggests that though there have been attempts to understand the needs of the market through studies on consumer/physician level behaviors, there is very little strategic focus on tapping the market potential.

- Although trans-continental studies are fewer in number as compared to other regions, they have focused on the major issues of interest. Like the American region, there is more focus on behavioral issues at the individual consumer levels rather than the organizational levels.

In addition to sections 3.1 and 3.2, these findings suggest that the development of the healthcare systems and markets are related to the progress of research across regions and issues. America and Europe have contributed to increased research efforts in recent times on primary issues such as consumer level behaviors, pricing, R&D and SCM. This reflects the development of self sufficient and sophisticated healthcare systems in these regions where the policies focus more on developing a healthy society. In recent times, the research efforts in Asia-Pacific also moderately add to the focus on these issues, which depicts the move towards building competitive pharmaceutical

markets and well-developed healthcare systems in this region. The sparse research focus on important issues in the pharmaceutical industries of Middle East and Africa over the years suggests that along with low-development of the healthcare systems, there is also little understanding of major issues in these regions.

3.4 Research focus on issues according to research methodologies employed
The studies on various issues are also analyzed in this paper according to the research methodologies employed in those studies, as depicted in Figure 7 and Table VII.

The following insights can be obtained regarding the nature of research, beginning with field studies that are important for conducting exploratory research:
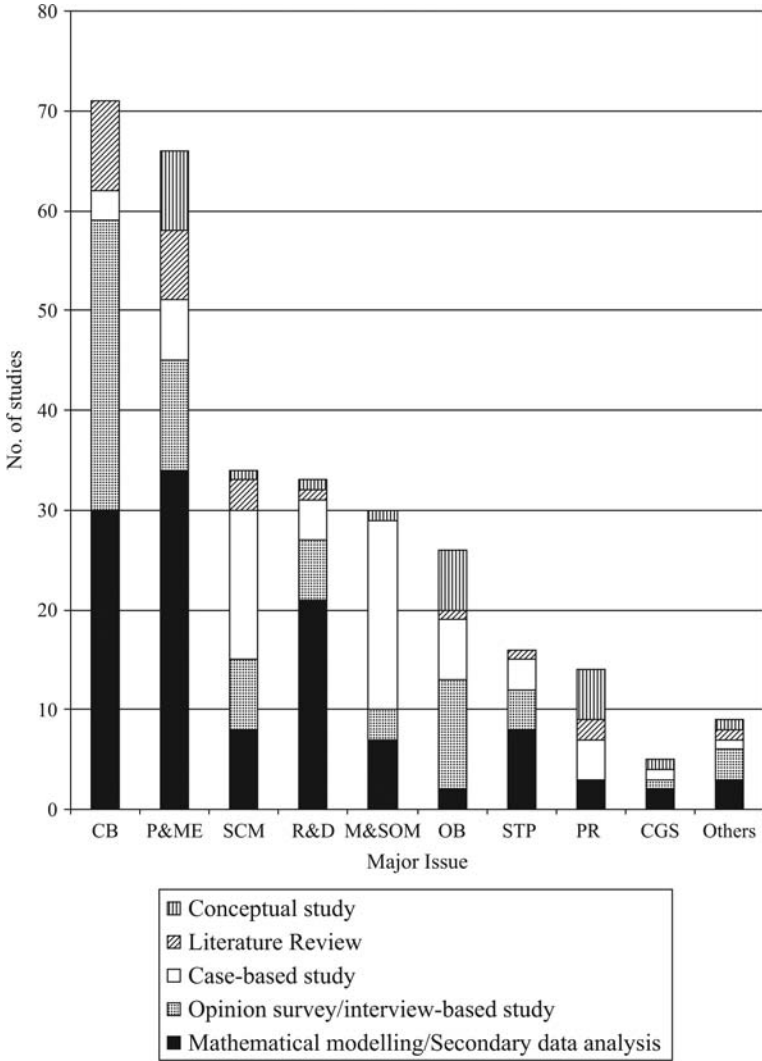

Figure 7.
Research methodologies applied across managerial issues studied in the pharmaceutical industry

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Research methodology

Major issue	Mathematical modeling/secondary data analysis		Opinion survey/interview-based study		Case-based study		Literature review		Conceptual study		Total number of studies	
	n	%	n	%	n	%	n	%	n	%	n	%
CB	30	9.9	29	9.5	3	1.0	9	3.0	–	–	71	23.4
P&ME	34	11.2	11	3.6	6	2.0	7	2.3	8	2.6	66	21.7
SCM	8	2.6	7	2.3	15	4.9	3	1.0	1	0.3	34	11.2
R&D	21	6.9	6	2.0	4	1.3	1	0.3	1	0.3	33	10.9
M&SOM	7	2.3	3	1.0	19	6.3%	–	–	1	0.3	30	9.9
OB	2	0.7	11	3.6	6	2.0	1	0.3	6	2.0	26	8.6
STP	8	2.6	4	1.3	3	1.0	1	0.3	–	–	16	5.3
PR	3	1.0	–	–	4	1.3	2	0.7	5	1.6	14	4.6
CGS	2	0.7	1	0.3	1	0.3	–	–	1	0.3	5	1.6
Others	3	1.0	3	1.0	1	0.3	1	0.3	1	0.3	9	3.0
Total number of studies	118	38.8	75	24.7	62	20.4	25	8.2	24	7.9	Grand total = 304	

Table VII.
Research methodologies applied across managerial issues studied in the pharmaceutical industry

- Opinion surveys/interview based studies are present, largely, on issues of pricing, consumer/physician and organizational level behaviors, R&D and other strategies. Typically, the focus is on behavioral sub-issues related to consumer-physician interactions, consumption patterns and relationships between stakeholders while the primary purpose in the study of pricing is the collection of price data.

- Case studies are found to be very popular in analyzing supply-chain issues and management of operations at organization levels. Though such case studies can provide the context-specific behavior of the manufacturing activities in the industry using proven modeling techniques, they may be useful only to a specific company's supply chain or manufacturing facility. In the case of these issues and organizational behavior studies, the combined use of case research and survey studies is considerably higher than the other methods. This, perhaps, reflects the behavioral nature of these studies or an exploratory nature of research. There are a few case studies in well researched topics like pricing, consumer behaviors as well, that focus on changes brought about through new policies or regulations. This indicates progress of research to a stage of analytical and conceptual clarity.

- Mathematical modeling/secondary data analysis is applied, largely, in studying predominantly non-behavioral issues of pricing and medical expenses, R&D, STP and corporate growth strategies. Studies on pricing, STP and corporate growth strategies are mostly dependent on economic modeling of the industry. Efficiency improvement is the goal of most studies related to operations management, and R&D and advertising and promotion techniques (like DTCA). Studies in pricing have attempted to connect pricing strategies with medical expenses. It can also be noted that among behavioral studies, there is substantial application in studying consumer behavior with respect to consumption patterns and medical expenses, indicating scope for both psychometric and econometric modeling efforts. The extensive use of field research has provided the strong support for modeling efforts in studying consumer behaviors, R&D and pricing issues, especially in the developed nations. Thus, there is considerable maturity and understanding of these issues, at least in the developed nations.

- Maturity of research on an issue can be further gauged by the presence of literature reviews. Studies on consumer behaviors, pricing and medical expenses and R&D show significant progress on this front. These studies encompass prescribing methods, pricing techniques and regulatory reforms in the industry. The presence of review studies also indicates the emergence of research interest in topics that have been studied more frequently in recent times, such as SCM, organizational behaviors, STP and advertising and promotions. These efforts should be extrapolated to the developing and underdeveloped nations to consolidate research work and to identify corresponding research gaps.

- Conceptual studies are present largely on issues of pricing, advertising and promotions, organizational behaviors and corporate growth strategies. These display a predominantly American/European perspective because of higher focus on these issues and the methodology in these regions. However, it may be difficult to apply these research approaches in the developing regions, especially

in policy making and devising market strategies. The study of advertising and promotion has a more conceptual/review perspective as compared to other marketing issues like consumer/physician behaviors and STP. As corporate growth activities, like M&A in the pharmaceutical industry, are a recent phenomenon, conceptual studies indicate a rather initial stage of research on this issue. Fewer studies on issues in R&D, SCM and operations management in organizations are conceptual nature. However, presence of many field research studies suggests that these studies are more application oriented.

In addition to sections 3.1 and 3.2, the findings in this section further support the hypothesis that the level of maturity of research on a particular issue is related to nature of methodologies applied. Specifically, in the case of consumer-level behaviors and pricing studies, field research has helped in characterizing the issues that have aided the increasing use of mathematical modeling in recent times. Subsequently, such efforts help in making analytical and informed decisions regarding healthcare policies. The increased focus on SCM and R&D issues in recent times displays a "middle-ground" with respect to methodological evolution. The increased focus on organizational behavior has also contributed moderately to the continued application of field research in the last two to three years. Other issues reflect nascent stages of methodological development.

4. Conclusion

The healthcare systems across the world are constantly being subjected to differing needs of consumers and funding and infrastructural constraints. Hence, the supporting role of the pharmaceutical industry in developing and delivering good quality medical supplies to the population is critical to the success of the healthcare initiatives taken up by various public and private organizations. Subsequently, the issues of management in the pharmaceutical industry are of vital interest to both practitioners as well as researchers. Considering the need for a holistic review of these major issues, this paper has attempted a review of literature of the same, over the last decade (1999-2009).

A content analysis of the literature on managerial research in the pharmaceutical industry has been presented via the three basic categories, namely, the basic issues of interest, geographical spread of the research and predominant research methodologies applied. The use of the inverted tree diagram helps in providing a snapshot of all the basic issues and sub-issues with respect to the pharmaceutical industry.

The basic issues and sub-issues studied in the management of the pharmaceutical industry, which were identified, reflect a predominantly non-behavioral perspective focused on management of assets/information/knowledge. The studies reflect research interest mainly in the critical role played by the consumers and physicians through a high focus on their behaviors, and the importance of pricing and medical expenditures in shaping industry decisions and policies. Extensive field research has supported the application of mathematical modeling in these issues, which has contributed to better conceptual clarity, especially in the American and European regions. There is also an increasing emphasis on research and development and manufacturing activities at the level of the firm and supply chain through an application-oriented perspective. An emerging focus on organizational behaviors and non-behavioral studies of marketing strategies and other issues of strategic interest is indicated through the presence of

field studies and conceptual/review studies. The studies depict an evolution in research focus from efficiency management and specific actors (such as consumers or physicians) in the industry towards a balanced and holistic approach in understanding and dealing with issues in the industry as whole.

Further, in terms of research on the issues, there is scope for:

- in-depth review study of the each basic issue and its sub-issues, in recent times;
- exploring current and best practices in non-behavioral themes (manufacturing, SCM, etc.);
- understanding impact of emerging issues related to environmental management, anti-counterfeiting strategies, corporate growth strategies, etc. on the industry; and
- conjunction of research efforts and insights across themes and players in the industry.

The large amount of literature from the regions in Europe and America depicts a high and mature research interest in the pharmaceutical industry. The evolution of research interest across critical issues through different methodologies suggests that research efforts have contributed to the development of competitive and sophisticated healthcare systems in these regions.

The developing and emerging economies of the Asia-Pacific, Middle East and Africa reveal moderate to nascent focus on research, which is in an exploratory stage, through lower quantum of research and greater dependence on field studies. Additionally, studies in these regions are thinly distributed over a variety of issues, with very little focus on development and marketing activities. The findings indicate a need for more research focus on the pharmaceutical industries in these regions. Such efforts are required to facilitate sustainable development of their respective healthcare systems and to explore their hitherto unexplored market potential.

Future research efforts in these regions should attempt to:

- understand the behavior of industry entities, consumer needs, and the funding/infrastructure constraints;
- develop the R&D, manufacturing and distribution industry to produce low-cost and good quality drugs for the domestic markets; and
- develop and analyze market strategies using STP, advertising and promotion by incorporating consumer-physician interactions.

The fragmented approach to research in developing and underdeveloped regions is present even in trans-continental studies and further reveals the inequity in research interest across regions. The need for trans-continental studies is higher in the present competitive scenario, in order to review the general trends and challenges in the pharmaceuticals industry, compare industry behaviors, identify global market potential and especially through benchmarking, provide insights for lower-income countries to develop their healthcare systems. Field research (case-based and survey-based) is of paramount importance in order to characterize these issues in the developing regions and trans-continental studies. This can aid future analysis through mathematical modeling/secondary data analysis.

One of the limitations of this study is that the literature is limited to a sample of publications in the mentioned online journals, in the given time frame, and is not exhaustive of all publications including market reports, conference proceedings, unpublished lectures, etc. This is primarily because the aim of this study is to provide a snapshot of peer-reviewed scholarly research related to specific issues of management in the pharmaceutical industry, across geography and research methodologies applied. It is hoped that the insights obtained from this review will guide future efforts in research and practice to improve the healthcare systems around the world.

Note

1. The complete list of the 304 studies, including their references and classification across issues, geography and research methodologies, can be obtained from the first named author at: sushmita.narayana@gmail.com

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About the authors
Sushmita A. Narayana is a student pursuing the Fellow Programme in Management (equivalent to PhD) in the area of Quantitative Methods and Operations Management from the Indian Institute of Management Kozhikode, India. She received her Bachelor of Engineering degree in Industrial Production Engineering (gold medallist) from Osmania University, Hyderabad. She has also been a Summer Research Fellow in the Engineering Mechanics Unit at the Jawaharlal Nehru Center for Advanced Scientific Research, India. Her research interests include supply chain management, operations research and healthcare management. Sushmita A. Narayana is the corresponding author and can be contacted at: sushmita.narayana@gmail.com

Rupesh Kumar Pati is Faculty in the area of Operations Management and Quantitative Methods at Indian Institute of Management Kozhikode, India. He received a doctorate in the area of supply chain management from Indian Institute of Technology Roorkee and, post-graduate (gold medallist) in Industrial Engineering and Management from the Indian School of Mines (ISM), Dhanbad. His academic interests include the areas of logistics and supply chain management, industrial engineering, operations management, operations research, project management, and service operations management. He has several publications in various peer-reviewed international journals and international conferences.

Prem Vrat has been the Director of IIT Roorkee and Vice Chancellor of UP Technical University Lucknow. He is currently a Professor of Eminence at MDI Gurgaon, India, in the Operations Management Area. He has supervized 37 PhD theses and published more than 385 research papers in journals and conference proceedings and co-authored four books and undertaken 32 consultancy projects. He is Fellow of INAE, NASI, WAPS, ISTE and IIIE. He has received many prestigious honors and awards including the Distinguished Alumnus Award of IIT Kharagpur and distinguished Service award of IIT Delhi.