Research Article

Usage of Computers by Managers and Doctors in Pharmaceutical Industries

A. B. Miranda[1], Dr. A. Chandra Mohan[2], Dr. R. Mohan[3], G. Kumar[4]
[1]Assistant Professor, School of Management, SRM University, Chennai, India.
[2]Professor of Management, School of Management, SRM University, Chennai, India.
[3]Professor of Management School of Management SRM University Chennai, India.
[4]Assistant Professor, School of Management, SRM University, Chennai, India.
***Corresponding author's E-mail:** dracmohan_mannava@yahoo.com

Accepted on: 02-12-2014; **Finalized on:** 31-01-2015.

ABSTRACT

The promotion of pharmaceutical company is enabled by effective decision making deciphered through computer packages like SAP, ERP, Data Warehouse. Its implementation and application across the entire system of pharma business transforms the pharma companies from just manufacturers of medicines into managers of health for all. The company can better serve the stakeholders such as doctors, physicians, surgeons, medical representatives and ultimately patients. These valued customers actually establish the products and enable emergence of a product as a "Brand Leader". Data analytics projects, brings forth the same type of pharma problems in the past and present statistics, and helps identify variegated alternatives so that decision is reached gradually. AHP software deals with decision problems that can be structured hierarchically. The desired goal is evaluated with respect to the criteria that each subsumes an entire set of alternatives. Questionnaire administered to 70 pharmaceutical company managers resulted in the present study of use of data analytics in pharma business. The study mainly examine the utility of computers and the software pertaining to market potential assessment, identification of unmet medical need, the degree of market competition and the intellectual property positions of pharma companies in selecting their target for drug discovery. The computers today play an important role to get all required past and present statistics to analyze different alternatives and there by arrive at the decisions. So using a Questionnaire with sample size of 70 a study is done to find out various factors relating to usage of computers by various managers in their everyday business life. Significant advances in computer software and hardware have also played a major role by providing the "computer power" necessary to treat decision problems more realistically. In pharmaceutical research, especially in large pharmaceutical companies where many projects are going on simultaneously, many of the same types of decision problems exist.

Keywords: Computer, Managers, Doctors, Pharmaceutical industry, Decision making, Market condition.

INTRODUCTION

The decision 'Alternatives,' on the other hand, are ranked with respect to each criterion using an absolute measurement scale appropriate to that criterion. For example, 'very high,' 'high,' 'medium,' 'low,' and 'very low' represent a possible scale, which could be given values 5, 4, 3, 2, 1, respectively. As has been noted by many cognitive psychologists this is well within the range of nine levels that humans can effectively discriminate (1, 2, 3). The final decision is achieved by weighing the result obtained for a given alternative by the relative ranking of the corresponding criterion and then summing over the three criteria.

Each alternative is then placed in an ordered list with respect to its overall "score". Importantly, computing the score for a new alternative can be carried out independently of all other previously scored alternatives, which is a significant benefit when large numbers of alternatives are being considered as illustrated by the example described in this work.

Back to the future, Pharmaceutical companies are not just the makers of medicines. Now they manage diseases. Doctors still have a role, and pharmaceutical companies market to them, but they're not in charge. Thirty eight percent of physicians report being influenced by patient requests pertaining to their pharmaceutical needs. To be effective, pharmaceutical companies need to address a host of different audiences.

The new pharmaceutical company is marketing too many different audiences, including managed care, insurers, pharmacists, allied health plans, executives and employers, patient advocates, voluntary organizations, and consumers. Companies need to know a lot more about consumers.

An encompassing definition of medical informatics is: **"the science of using system analytic tools to develop procedures (algorithms) for management, process control, decision making and scientific analysis of medical knowledge. A variety of applications and sub fields comprise a diverse science like medical informatics. For example, the following lists several categories."**

Objectives of the Paper

1. To analyze the usage of computers in decision making
2. To explain managers and usage of computers relating to distribution of products conditions.

3. To evaluate the usage of computers in decision making relating to research and development.
4. To examine the perception regarding usage of computers by physician / surgeons and G.Ps.

Review of Literature

In the seventies Thomas Saaty developed a decision-theoretic methodology **(Saaty, 1990)**[1] called the ***Analytic Hierarchy Process***, that is relatively simple conceptually and thus, may be more suitable to research-based decision problems. The AHP represents a fundamental approach that is based upon pair wise comparisons, is designed to cope with both the *rational* and *intuitive* aspects of a decision problem, and is capable of selecting the best alternatives with respect to a number of competing criteria. Importantly, the AHP allows for inconsistencies in judgments and affords a means for improving consistency.

Even before the latest scientific breakthroughs, IT was already integral to drug development. In the mid-1990s, Aventis' Roehr recalls, robotic screening machines could test 96 separate compounds contained in individual wells on a plate the size of an index card. Since then, miniaturization of the equipment has squeezed 1,536 tiny test tubes onto the same size plate. Pharmaceutical companies have several other reasons to augment their computer systems. One is the need to produce the next generation of profit-reaping drugs. A 2-year-old joint study by investment house Lehman Brothers and consulting firm McKinsey & Co. concluded that patents will expire on a record number of drugs by 2011, lighting a fire under the pharmaceutical industry to come up with new proprietary treatments. At the same time though, research and development costs are climbing. R&D spending per new drug which includes the costs of failed drug candidates rose from $700 million in 1995 to $800 million in 2001. By 2005, the figure is expected to balloon to as much as $1.6 billion.

In the 1800's, one discovery was ether, an anesthetic that was quickly adopted worldwide for use in operations. Chloroform found favor after it was used on one particular patient, Queen Victoria. Then Ignatz Semmelveiss reduced the postpartum death rate at his hospital from 18 percent to 1.2 percent by a remarkable innovation: washing hands between patients. Prior to the 1800's, there were no facilities for washing hands before a procedure. Doctors would routinely go straight to an obstetrics patient from the necropsy room. Pasteur persuaded the world to view medicine through a scientific lens, and the door to discovery was opened wide. Dr. Joseph Lister, immortalized in the name Listerine, treated a compound fracture with carbolic acid and had it heal with no infection, which was unheard of at the time. By the 1860's, hospitals had become houses of healing instead of horror shows. In 1880, immunization was discovered, and many diseases that had once been fatal were no longer a threat. And an accident produced the discovery of X-rays, a wonderful diagnostic tool, by 1896. This provided a helpful diagnosis for tuberculosis, before acute symptoms began, and prompted widespread screening of the population. Over the next decade, 15 antibiotics rendered a century's illnesses moot. Disease no longer invariably killed oneself. One just had a doctor take care of it. Tuberculosis is a microcosm of how we take medicine for granted. Under its earlier name, consumption spawned an industry of health spas where sufferers could rest in the outdoors. Victims were romanticized as heroes. Then the cure came in 1949, and by the 1950's what was known then as the white plague had receded from national consciousness. After Salk found the vaccine for polio in 1955, this disease, too, vanished. We see our task as being the creation of multiple integrated platforms where people can get information on issues affecting them.

Clear criteria make it easier to garner support. Otto Salguero, Vice President, Information Services for Bon Secours Health System told us that this multi-state health care system business stumbled on the difficult integration of newly acquired medical centers. He explains that "we have been able to get the results we expected, even with a lot of pain and a lot of problems. We defined and achieved success in a standard IT implementation across the entire system of hospitals. We have been able to implement our pharmacy on budget with high level of customer satisfaction." Why? Because the criteria for success were clearly defined and well understood by the users, who became strong advocates for change.

Furthermore, the inefficiencies and frustrations associated with the use of paper-based medical records have become increasingly clear [Dick & Steen, 1991 (Revised 1997**)**] especially when inadequate access to clinical information is one of the principal barriers that clinicians encounter when trying to increase their efficiency in order to meet productivity goals.

Before 2003, Lupin had disparate systems where none of the locations were connected. The first technology piece used was the e-mailing system. It started with the Lotus Notes implementation that is today being used by almost 1,500 people. Lupin also implemented Lotus Workflow with all employee specific services, appraisal systems and capex approvals, along with complete wide area networking across locations of the company which has six factories, 30 to 35 depots, three central warehouses and several marketing offices connected by VSATs or leased lines. It is in the process of developing an organization-wide portal—SAP Enterprise Portal—which will integrate all these systems i.e. Lotus Mail, Workflow, SAP, BW. With the portal it plans to have role-based home pages (workplace) for users, anywhere systems access, and single sign-on to all systems, duly implementing adequate access control and other security measures. Next year will also be a year of SAP and BW upgrades, with systems roll-outs at foreign offices. Lupin is also restructuring its wide area network, and enhancing bandwidth to improve

response to the growing user base and applications. It has also recently hosted all its critical systems and servers at an international data centre.

In Biocon company, **System details**

The core application includes ERP, which has been developed in-house in April 2001 and caters to 400 users. Earlier, it was using FoxPro-based applications for its ERP requirements. The ERP and their Laboratory Information Management System (LIMS) was developed in-house with Visual Basic as the front-end and SQL server 2000 as the back-end. Since 1996 it has invested in 16 HP-Compaq Proliant servers, and in December 2005 it invested in eight blade servers. The core applications are residing on HP blade servers which consist of four P-20s and four P-30s. Biocon invested in blades for consolidation and ease of manageability purposes. This secondary sales information is required to ensure that a pharma company's marketing personnel do not dump unnecessary stock onto distributors. For this, field representatives have to be in a position to access information and push updates back to the HO. To this end, pharmas are planning to spend on Sales Force Automation (SFA). This, along with Supply Chain Management, is the next step in their effort to plan by geographical territory.

Less than two years ago, a leading manufacturer of over-the-counter pharmaceutical and personal care products decided to improve its data warehouse. The products division knew that understanding market trends and consumers' changing needs was critical to its success. Through its Business Intelligence National Practice, CIBER, Inc. (NYSE: CBR) resolved the division's dilemma by conducting an initial needs assessment and rapid scoping of the company's business drivers and objectives. CIBER collaborated with the pharmaceutical company's management to develop a vision for the enhanced data warehouse and its functional specifications based on the division's evolving marketing and sales function. The resulting plan – the technologies, schedules and deliverables – was conceived with an eye to scalability, to support not only the division's new business model, but projected growth, as well. **Turning Competitive Intelligence into Strategy** profiles a class of companies that demonstrate successful practices in their competitive intelligence functions. By studying these companies, your organization can gain a deeper understanding of how leading companies collect, analyze and integrate competitor information into strategy.

Scope of the Study

Business Issues are concerned with four major factors, Market Potential, Unmet Medical Need, Intellectual Property Position, and External Competition. Scientific Issues, namely Freedom to Operate, Target Validation, and Current Therapeutic Research Programs, have a more complex hierarchy in that Target Validation is further ramified into four subordinate decision criteria, namely Biochemical & Physiological Data, Structural Data, Pharmacological Data, and Medical Data. Database management systems in software that permits an organization to centralize data, manage them efficiently and provide access to the stored data by application program. Businesses use their databases to keep track of basic transaction such as paying suppliers, processing orders, keeping track of customers and paying employees). Importantly, the relative contribution of each of the criteria used to rank the possible targets (i.e., alternatives) with respect to all of the business and scientific criteria can easily be modified to assess their effect on the relative rankings at the various levels of the hierarchy. This is a type a sensitivity analysis that plays a crucial role in the decision process as will be seen in the sequel.

Doctors learn to interpret information in the background and absorb it quickly. Organization and their managers need to practice data resource management, management activity that applies information system, system technologies like "database management", data warehousing and other data management tools.

Information adds to a representation, corrects or confirms previous information or has "surprise" value in that it tells something the receiver did not know or couldn't predict) Patients do not have that ability. But if you tailor the information to the specifics of this individual's situation, he or she knows the specifics better than anyone. The patient can take a printout home and spend time learning it. And when they go on the Internet and talk about it, they can come up to speed and become more knowledgeable than I am as a general practitioner. Consequently, the patient becomes an enormously productive partner.

The question came up about new roles for physicians. When you bring computers into the picture, you have the potential to solve problems. But a problem is that we bring more uncertainty with complete knowledge, and there is no doubt that someone with experience in recognizing problem patterns is of high value. In the coming era, doctors will not be ancillary.

There is something archetypal in the doctor-patient relationship. If you take away the doctor's role as an important partner and healer, the patients lose valued expertise. But if the era of parentalism is over, we must replace it with collegiality and get rid of authoritarianism (but not the authority of the doctor).

Telemedicine

Communicating digital images is essential to enable remote viewing, interpretation, and consultation. It allows physicians to practice medicine from a distance, giving rural areas access to specialty services.

Health-care organizations are finding their systems lacking the ability to answer questions that are crucially important for strategic planning and to better understand

how they compare with other provider groups in their local or regional district. In the past, systems have been developed around encounters of care and were based on information needed to collect for bills and services.

Comprehensive clinical data is important for institutional self-analysis and strategic planning.

The database is central to MIS. The term database is often used to refer any data available for information processing or retrieval operations, the term implies a particular structuring of the data.

Companies offer medical-record software packages, but they are limited in their capabilities and seldom seem to meet the full range of needs defined within an organization.

The record system must make it easy to access and display needed data, to analyze them, and to share them among colleagues and with secondary users of the record.

When a patient comes in for a visit, doctors can instantly access their records from a keyboard and a flat-panel screen in an examination room.

Doctors use computers to type up notes and flip through records of previous treatments, x-rays, or charts.

Information is zipped over dedicated phone lines to a central database in each region.

The savings from this system are coming from the containment of pharmaceutical costs because the network automatically offers any available lower-cost alternatives.

Patients log in to a private Web site, provide information about the status of their chronic disease (for example, blood glucose readings in diabetes), and later obtain feedback from their physician or from disease managers who seek to keep the patients healthy at home, thereby decreasing the need for emergency-room or clinic visits.

Developers of systems must have a through grasp of users needs to produce systems that help health care providers use these tools efficiently to deliver care.

Requirements of physicians entering data are different from clerks entering patient charges.

Developers must focus on specific sets of users and must define and address their unique information needs.

Research Methodology

The study has been focused on usage of computers by managers and doctors in pharmaceuticals industries. The data has been collected based on primary and secondary sources.

The information has been collected through structural questionnaire prepared and distributed to 70 respondents random sampling has been used to collect the data from managers / doctors.

Data Analysis

A Descriptive study is done by adopting Convenience sampling using a questionnaire and collecting information from 70 Managers of Pharmaceutical Companies in Chennai like Dabur Pharma, Unicham Pharma, VHB, Sunofy-Aventis and Biocon, United Biotech, Apex Lab, Nestle, Cipla, Torrent, Stancare, Wockhardt, Ranbaxy, Glenmark, Micro, Dr Reddy Labs, MAYOR Organics, Dabur Oncology and Alembic. Analysis is done using tools like Simple Percentages and Weighted Average Method.

Table 1: Age Wise Classification

S. No.	Age (years)	Number of Respondents	Percentage Of Respondents
1	21-30	24	35
2	31-40	36	52
3	41-50	10	13
Total		**70**	**100**

The above table clearly reveals that majority of managers are belonging to age group of 31-40 years.

Table 2: Gender Wise Classification

S. No.	Gender	Number of Respondents	Percentage of Respondents
1	Male	70	100
2	Female	0	0
Total		**70**	**100**

Table 2 clearly depicts that Majority of Respondents belong to Male Gender.

Table 3: Experience Wise Classification

S. No.	Experience (years)	Number of Respondents	Percentage of Respondents
1	0-10	40	57
2	11-20	28	40
3	21-30	2	3
Total		**70**	**100**

It is very clear that Majority of Respondents are having experience of less than 10 years, which is evident from above Table 3.

Table 4: Whether Computers are required or Not

S. No.	Requirement of Computers	Number of Respondents	Percentage of Respondents
1	Yes	70	100
2	No	0	0
Total		**70**	**100**

It is very clear from Table 4 that all the respondents said that computers are required.

Table 5: Managers and their Usage of Computers in Decision Making Relating to Market Conditions

S. No.	Aspect	Extent of usage of Computers						
		Very Low (1)	Low (2)	Medium (3)	High (4)	Very High (5)	∑WX/∑W	Rank
1	To know Market Potential	0	0	2	30	3	141/15=9.4	II
2	To meet "un-met Medical Need"	6	6	3	11	9	116/15=7.9	V
3	To know company's "Intellectual Property Position"	0	0	10	21	4	134/15=9	1V
4	To know "Global Priorities"	0	2	6	21	6	136/15=9.1	III
5	To know about "External Competition"	0	0	5	20	10	145/15=9.6	I

$\sum W = 1+2+3+4+5 = 15$

The above table 5 clearly depicts that "To Know about External Competition" is Ranked 1 and "To meet un-met Medical Need" is ranked 5.

Table 6: Managers and their Usage of Computers in Decision Making Relating to Distribution Conditions

S. No.	Aspect	Extent of usage of Computers						
		Very Low (1)	Low (2)	Medium (3)	High (4)	Very High (5)	∑WX/∑W	Rank
1	In Impressing & Influencing Dealers	2	1	1	23	8	139/15=9.5	V
2	In Preventing dumping of unnecessary Stock with Distributers	0	3	6	12	14	142/15=9.65	IV
3	For Assessing Sales Force' achievement	0	0	2	21	12	150/15=10	I
4	For making a new Drug absorbed in the Market	0	0	3	24	8	145/15=9.75	III
5	For managing Delivery date correctly regarding various drugs	0	0	3	23	9	146/15=9.8	II

The above table 6 clearly depicts that "For assessing Sales Force's achievement" is Ranked 1 and "In Impressing an Influencing dealer" is ranked 5.

Table 7: Managers and their Usage of Computers in Decision Making Relating to Research and Development

S. No.	Aspect	Extent of usage of Computers						
		Very Low (1)	Low (2)	Medium (3)	High (4)	Very High (5)	∑WX/∑W	Rank
1	Assessing Molecular Quality	2	1	22	4	6	116/15=7.9	II
2	Evaluating Molecular docking Software	2	10	14	9	0	100/15=6.75	III
3	Assessing Progress of Research & Development wing	0	14	8	13	0	94/15=6.25	IV
4	Assess Biochemical & Physiological Data		6	14	12	3	117/15=7.85	I

The above table 7 clearly depicts that "Assess Biochemical & Physiological Data" is Ranked 1 and "Assessing progress of Research and Development Wing" is ranked 4.

Table 8: Managers and their Perception Regarding Usage of Computers by Doctors and Managers in their Decision Making Relating to Activities of Doctors

S. No.	Aspect	Extent of usage of Computers						
		Very Low (1)	Low (2)	Medium (3)	High (4)	Very High (5)	$\sum WX/\sum W$	Rank
1	For impressing & Influencing Doctors with cds carrying valuable information relating to Pharmaceutical sector	0	0	2	24	9	147/15=9.85	III
2	For Doctors in verifying Records of Patients (X-Ray reports etc)	0	0	6	15	14	148/15=9.9	II
3	For Doctors in preparing Notes	0	0	4	24	7	143/15=9.75	IV
4	For Managers in validating Target Doctors	0	0	3	19	13	150/15=10	I
5	For Managers in Obtaining Appointment from Doctors	0	1	5	22	7	140/15=9.6	V

The above table 8 clearly depicts that "For Managers in Validating Target Doctors" is Ranked 1 and "For Managers in Obtaining Appointing from Doctors" is ranked 5.

Findings

Majority of managers are belonging to age group of 31-40 years. Majority of Respondents belong to Male Gender. Majority of Respondents are having experience of less than 10 years. All the Managers said that computers are required. "To Know about External Competition" is Ranked 1 and "To meet un-met Medical Need" is ranked 5 by Managers. "For assessing Sales Force's achievement" is Ranked 1 and "In Impressing an Influencing dealers" is ranked 5 by Manager. "Assess Biochemical & Physiological Data" is Ranked 1 and "Assessing progress of Research and Development Wing" is ranked 4 by Managers. "For Managers in Validating Target Doctors" is Ranked 1 and "For Managers in Obtaining Appointing from Doctors" is ranked 5 by Managers.

CONCLUSION

Pharmaceutical research spans a wide range of activities from the initial selection of an appropriate drug target, to the identification and optimization of a set of lead compounds, to studies of drug absorption, distribution, metabolism, excretion, and toxicity, usually called ADMET, to the various clinical phases. In principle, the AHP can be applied throughout this process, although such applications are extremely rare and are non-existent in drug discovery.

As research environments become more and more complex the need for computer-aided decision making methods will gain in importance. As seen in the present work, the AHP is a flexible decision-making tool that is capable of dealing with the types of subjective and objective data that are typically associated with many scientific decisions. Importantly, sensitivity analysis provides an appropriate means for assessing the robustness of a given decision model.

It is also important to note that the usefulness and applicability of each decision model depends heavily on the domain knowledge of the decision makers. In fact, the results afforded by any decision model built without appropriate domain knowledge are at best likely to be misleading and at worst likely to be entirely meaningless.

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Source of Support: Nil, **Conflict of Interest:** None.