

Importance of Marketing Information system in Pharmaceutical Decision Making

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Abstract

In the present scenario, Pharmaceutical sector is growing at a very high speed. The pharmaceutical sector is considered as one of the most dynamic sectors in the world. In India, pharmaceutical sector is growing with the growth of the economy. Due to increase in complex activities, advancement of technology and increase in competition, almost all big and medium pharmaceutical companies are using MKIS to perform their duties in most effective and efficient manner. One of the reasons of increasing popularity of MKIS in Pharmaceutical sector is its efficiency in efficient DM. This research study focuses on the MKIS and its effect on DM. It was found that all factors except DSS have significant effect on DM.

Keywords: Marketing Information System, Decision Making, Marketing Research

1. Introduction

The marketing function of an organization is the process of planning and executing the conception, pricing, promotion, and distribution of ideas, goods, and services to create exchanges that satisfy individual and organisational objectives. Any organisation that wants to be successful must satisfy their customers while outperforming their competitors. To be able to stay ahead in this competitive environment, the ability to gather and analyse important information is inescapable.

Marketing Information System (MKIS) plays an important role in increasing the efficiency of economic performance of companies in highly competitive environment, by providing the necessary information for various administrative levels [6]. MKIS is needed by marketing management for the purpose of identifying, measuring, and forecasting marketing opportunities, besides analysing different market segments [6]. From management information system (MIS), marketing academicians tailored the MKIS concept according to their needs and term this concept as MKIS [13]. The main functions of an MKIS are data collection, storage retrieval and display functions [16]. The main purpose to develop information systems was to directly assist the managers in planning and Decision Making (DM) activities by combining computer science, statistics, management science and market data into an integrated decision-information system [16]. MKIS is an information process that collects valuable information and data from marketing environment, analyse and process the data, and finally communicate the results to the marketing managers in the form of management information [13].

MKIS is traditionally proposed to provide marketing managers a thorough process of intelligence gathering [7]. It harness critical information on market trends and sizes, changing customer needs, competitor and government policies that are likely to affect

business operations [5]. The ultimate purpose of an MKIS is to facilitate managers in making decisions at all levels of operations based upon the information flow [2].

In view of the above discussion, the main question addressed in the study is to check the impact of MKIS on DM. It was expected that the results of the study provided significant insights on regarding MKIS among pharmaceutical companies. It is implied that methodology and findings obtained will assist future research on MKIS and its role in DM.

The remainder of this article is structured as follows. Next section presents a brief review of literature of the prior research. The methodology used in the study is described next. The data collected are analysed and interpreted before the final discussions and implications. Finally, results and implications for future research and practice are discussed.

2. Literature Review

The origin of MKIS concept is quite difficult to trace [15]. In 1950s, as the competition soars, gathering and management of marketing information become very important [11]. and the performance of a company largely depends on the executives marketing information [10]. Managers often complaint about the difficulties faced by them in taking operating decisions due to insufficient, inappropriate or untimely information [3]. During 1960s, MKIS is often considered as outgrowth of Marketing Research (MR) [11]. Announcement of third generation software in 1964 makes MKIS popular and within 2 years business managers and marketers were the ones that quickly adapt the MKIS bandwagon [11]. Improvement in information technology makes the way for computer assisted information systems [3].

In 1971, First study on actual implementation of MKIS was conducted by Boone and Kurtz in U.S corporations [3]. At that time, 39 % of the organizations reported MKIS usage and another 38 % were implementing MKIS in their premises. In 1985, McLeod and Rogers (1985) conducted a survey of fortune 1000 companies. They identified that 76 % of the US firms are using a MKIS, out of which 89 % are computer based. Li (1995) conducted survey in top U.S. companies and compared the results with earlier studies. Li et al. (2000/01) conducted the same kind of survey in Taiwan top 1000 companies.

Kotler (1966) was the first researcher that clearly identified four subsystems of MKIS. Internal Records System (IRS), Marketing research (MR), Marketing Intelligence (MI) and Decision Support System (DSS) are the four subsystems of MKIS. Internal accounting system and MR activities generally creates Customer data. Whereas, information related to competitors and potential customers comes from MI activities (McLeod and Rogers 1985). Internal accounting/ Data processing is the most popular source of information for MKIS, followed by MI (29%) and MR (17%) [11]. Talvynen and Saarinen (1995) divided operational MKIS sub-systems into four sub-systems i.e. salesperson productivity tools, and sales and marketing management systems were extensively used but other two direct mail and telemarketing systems were less popular and least used. It has been found that use of direct mail and telemarketing systems are quite high in implementing and controlling marketing efforts [17]. The components of an MKIS (internal records, MR and MI are the important sources in obtaining marketing information [6] MKIS is fully capable of conducting MR, analysing internal records and in conducting MI [1].

A. Marketing Research

MR is a planned activity developed on scientific basis that deals with the problems and opportunities in front of a firm [6]. MR generally involves special studies focusing on consumer activities using mail surveys [15]. MR is very helpful in getting information related to consumer behaviour and market size Apart from collecting data, MR also helps in product development stages. It helps in screen product ideas before serious product development work starts. It helps in determining whether the product is compatible with company objectives of profit, sales growth rate, diversification plan and overall company image. MR consists of collecting both qualitative and quantitative data relating to the market processes. Data is then analysed and interpreted to solve marketing issues concerning the company's products and services [1]. Along with collection and analysis of data, another purpose of research and development people is to seek rival organizations while safeguarding their own data [18].

B. Internal Records System

Various important opportunities and potential problems can be easily spotted with the help of IRS of the company [10]. Internal reports of orders, sales, prices, costs, inventory levels, receivables and payables are important methods of data collection from within the firm [10]. Maintaining accurate up to date records ensure efficient and reliable information which helps in making cost effective functions [14]. Internal and external data is generally stored in the database. Internal data consists of information from customer surveys and formal investigations of local competitors, whereas external data focuses on personal contacts and irregular monitoring. Majority of MKIS utilise internal data as it is easy to obtain, however research indicates that managers need external information that is essential for long term decisions.

Information from marketing/sales departments include total sales, sales by products, territorial sales, sales by trade classification and channel of distribution, price information, communication mix information, sales representatives records and reports. The components of Internal Records System include the order to payment cycle,, sales information system, database and mining, etc.

C. Marketing intelligence

MI is defined as "Knowledge derived from analysis and interpretation of certain business information necessary for planning strategy and tactical decisions for all of the business functions". A MI system includes procedures and sources that marketing managers use to obtain information related to the developments in the marketing environment [10]. Market intelligence is used interchangeably for business intelligence, MI, competitor intelligence.

MI is the information flow on dealers, competitors, customers, government actions, pricing, advertising effectiveness [10]. The internal records system supplies results data whereas, MI provide information regarding various happenings in the environment [10]. Major sources of MI include reading newspapers, trade publications, reading books, talking to customers, suppliers and distributors; monitoring social media on the internet and meeting with other company managers [10].

Kelly (1965) identified that MI involve external and internal information flow. External information flow involves inward flow of communication of market and economic information. Market information evaluates shorter-run tendencies in the immediate marketing environment, with special reference to market factors affecting the company's product and services. Whereas, economic research collects strategic

information for the long run. Internal information flows in four directions: downward; upward; and horizontal, both back and forth. Collecting internal information is difficult as there are substantial barriers to upward communication in any organisation

D. Decision Support System

By the time, other fields involved in the information systems loses their value, a new application called the DSS emerged which is widely available for taking decisions [13]. A Marketing DSS (MkDSS) is a Co-ordinated collection of data, systems, tools and techniques with supporting software and hardware.

MkDSS allows decision makers to make marketing decisions by directly connecting them to the database consisting of computers and communication networks [8]. An MkDSS is effective in identifying important decision variables and thus making better decision based on those variables [4]. DSSs are not competitive mechanisms to MR and MI, but are rather complementary ones. With the emergence of new software's DSSs become more powerful which enhances marketing managers ability to analyse, plan and control operations.

3. Research Methodology

3.1 Sampling Method and Respondents' Demographic Information

The study targeted 400 respondents based on convenience sampling technique. 324 respondents return the filled questionnaire. The responses were obtained in the month of May and June 2018. In order to ensure accurate findings, 20 invalid responses were eliminated and therefore 304 responses were considered complete and valid for the final analysis. The data was analysed with the help of Statistical Package for Social Sciences (SPSS) Version 18 and AMOS package version 22. Table 1 shows the demographic profile of the respondents. It indicates that male respondents are high in number. In terms of age group, majority of respondents are from 30-40 age groups.

Table 1 Demographic Profile of respondents

	Descriptor	Distribution	Percentile
Age	Less than 30 years	79	26
	30 to 40 years	117	38
	40 to 50 years	69	23
	More than 50 years	39	13
Gender	Male	206	68
	Female	98	32
Education	Graduation	74	24
	Post-Graduation	120	39
	Professional Degree	49	16
	Any other	55	18
Designation	Asstt. Manager	119	39
	Manager	75	25
	Gen. Manager	20	6
	Marketing Specialist	90	30

3.2 Survey Instrument

To answer the research questions, primary data was collected by using a self-administered questionnaire. A questionnaire based on research model was developed and used in the study. The questionnaire is divided into two parts. The first part focused on

respondent's demographic data, such as age, gender, education, and designation. The second part solicited 34 five-point Likert scale type questions ranging from "Strongly Disagree" (1) to "Strongly agree" (5) for measuring the main constructs of the study. The items were adapted and later modified from different studies. Table 2 shows variables with factor loading scores of each measurement item under various constructs. The factors were extracted using Principal Component Analysis (PCA) with Varimax with Kaiser Normalization rotation method.

Table 2 Factors/variables with Factor Loadings

Factor/Variables	Factor Code	Factor Loading
Factor 1 MKIS		
MKIS supplies useful information	MKIS1	.851
Information requested from MKIS received quickly	MKIS2	.833
MKIS produces wide range of information	MKIS3	.814
Reports generated using MKIS are easy to read and understand	MKIS4	.801
Information provided by MKIS is up to date usually	MKIS5	.794
MKIS performs comprehensive statistical analyses	MKIS6	.655
Factor 2 DM		
MKIS has improved DM effectiveness	DM1	.805
MKIS led to better-informed DM	DM2	.775
MKIS permitted better control over marketing plans	DM3	.753
MKIS provides data on which decisions are made	DM4	.750
MKIS increased confidence in decision or recommendation	DM5	.735
Overall, I'm satisfied with the MKIS ability to enables me to make better decisions	DM6	.656
The information provided by MKIS was of value in the DM situation	DM7	.598
Factor 3 MI		
MI get better feedback of the market	MI1	.867
MI acquires valuable knowledge of our customers' needs	MI2	.849
MI improve communication between the marketing department personnel	MI3	.842
MI increases sales promotion activities	MI4	.829
MI creates efficient marketing reporting	MI5	.767
Chapter 4 DSSs		
The company uses DSSs in forecasting and future planning for the expansion of company programs.	DSS1	.838
The company uses a set of tactical models databases in various functional areas.	DSS2	.834
Decisions support systems works on maximum participation in the various resources to achieve the greatest added value.	DSS3	.763
The system allows employees to exchange e-mails for the development of the various recommendations.	DSS4	.758
The company uses a set of rules models of different applications such as financial, accounting and marketing applications.	DSS5	.735
The company uses a set of operational models databases to support decisions in the structured operational management level.	DSS6	.671
Factor 5 IRS		
The IRS provides sufficient information	IRS1	.859
The IRS allows information to be readily accessible to me	IRS2	.852

Data provided by IRS can be easily modified, corrected or improved.	IRS3	.810
Information provided by the IRS is easy to understand	IRS4	.805
The IRS provide reports that seem to be just about exactly what I need	IRS5	.702
Factor 6 MR		
MR results provides new knowledge about something.	MR1	.868
MR is used to promote awareness and appreciation for an issue of importance.	MR2	.861
MR is used to validate or confirm our understanding of something.	MR3	.796
MR results is used to learn something new about our business.	MR4	.766
One or more findings of the MR study had a significant direct impact on a decision.	MR5	.747
Extraction Method: Principal Component Analysis.		
Rotation Method: Varimax with Kaiser Normalization.		
a. Rotation converged in 7 iterations.		

3.3 Reliability and Validity Analysis

In order to ensure validity, the questionnaire was piloted on 20 respondents. Some questions were eliminated and wording of some questions was changed. To check the construct validity of the questionnaire, Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was used. Results shown in table 3 indicated that the sampling adequacy for all the variables is above 0.60, therefore, making it suitable for factor analysis. With Eigen values over 1 and total variance explained 67.36%, five independent and one dependent factors have emerged. Factor loadings of all variables are over 0.50. Content (internal) validity is satisfied with the fact that this study is based on extensive relevant literature and researchers employ extensive amount of time to frame the measurement items by using relevant literature.

In addition, reliability was assessed by using the most common test of measuring the internal consistency of a scale i.e. Cronbach alpha. A value of 0.70 or greater is considered to be an indicator of high scale reliability. The Cronbach α score for six constructs are shown in table 3. All values are higher than 0.60 (cut value point in social studies) which implies excellent reliability.

TABLE 3 Validity and Reliability rates for dependent and independent variables

Measure	Items	KMO	Eigen Value	Variance Explained (%)	Cronbach's α
MKIS	6	0.865	8.202	24.123	0.912
DM	7		4.637	13.637	0.880
MI	5		3.032	8.919	0.920
DSS	6		3.005	8.837	0.867
IRS	5		2.256	6.635	0.877
MR	5		1.772	5.211	0.878

4. Data Analysis and Interpretation

The structural Equation model in Figure 1 shows the impact of MKIS on DM. The standardised regression weights and squared multiple correlations are shown in table 4. The results indicates that the problem of multicollinearity seems to be reduced as the

variation inflation factor (VIF) for all the independent variables are well below 10, indicating that the variables can be used for regression analysis.

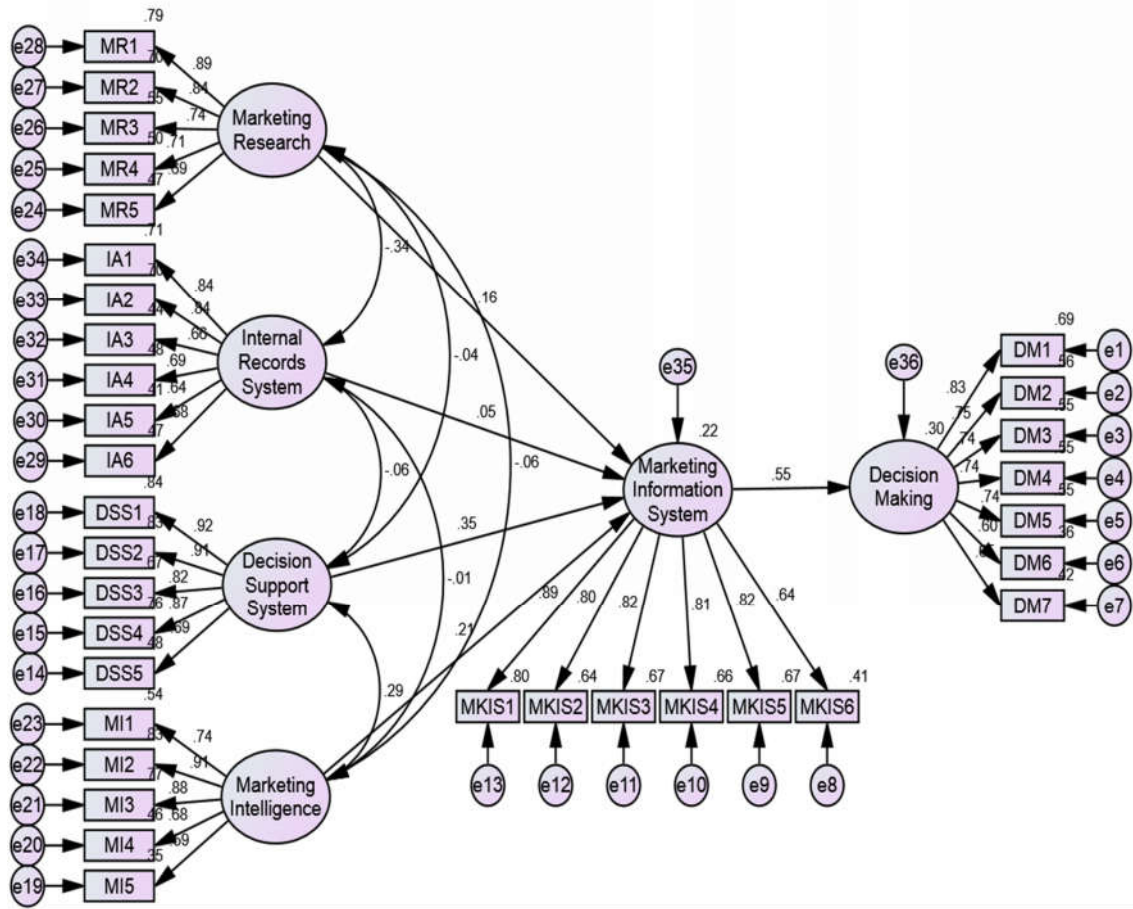


Figure 1 Diagrammatic representation of Structural Equation Modelling

Table 4. Regression Weight of Structural Equation Modelling

Dependent	Independent	Unstandardized Regression Weight	Standardised Regression Weight	Composite Reliability	Remark
MKIS	MR	0.281	0.162	2.607	0.009 (S)
MKIS	DSS	0.043	0.046	0.743	0.457(NS)
MKIS	MI	0.239	0.348	5.834	0.000 (S)
MKIS	IRS	0.236	0.209	3.446	0.000 (S)
DM	MKIS	0.476	0.548	9.112	0.000 (S)

The model fit statistics is shown in table 5. The model summary indicates that the model is fit as CFI value is way above the threshold limit of 0.9. The Overall model -Chi-Square is 1017.200 with 516 DOF. The p-value associated with the result is significant. Further, the rule of thumb suggested that the model should be focused on at least one absolute fit index and one incremental fit index. The RMSEA (root mean square error of

approximation), which is also an indicator of badness of fit, reports a value of 0.057. Goodness of fit can be measured by using Comparative Fit Index (CFI), Goodness of Fit Index (GFI) and Adjusted Goodness of Fit Index (AGFI). CFI is the most widely used index to measure goodness of fit. In the present model, the CFI has a value of 0.927, which exceeds the guideline of 0.90 for a model of this complexity. A model is termed as complex when it assesses more than three constructs and a sample size of more than 300. The GFI and AGFI values are 0.841 and 0.816 subsequently, which are reasonably good. Overall, the results indicate that the model provides a reasonably good fit, and is suitable for further examination of the model results. The other values are also good, depicting good robustness of the model.

Table 5 Model Fit Summary

Estimates	GFI	AGFI	CFI	NFI	RMSEA	L090
Observed	0.841	0.816	0.921	0.852	0.057	0.051
Standard	0.80 _ value < 0.90		0.90 _ value < 0.95		0.05 < value _ 0.08	

4.1 Testing Hypotheses on the basis of Structural Equational Modelling (SEM)

H01: There is no significant effect of MR on MKIS.

HA1: There is a significant effect of MR on MKIS.

According to the model, MR is the significant predictor of MKIS. For the endogenous variable of MKIS, results from the SEM shows that the MR is positively and significantly related to MKIS, as anticipated with standardised regression weights of 0.162. The positive un-standardised regression coefficient of 0.281 shows that as the MR goes up by 1 SD; MKIS goes up by 0.281 SD. The Findings indicate that there is positive and significant relationship between MR and MKIS ($\beta = 0.16$, $p \leq 0.05$). Thus, the first null hypothesis that there is no significant effect of MR in MKIS is rejected and alternative hypothesis is accepted that there is a significant effect of MR in MKIS

H02: There is no significant effect of DSS on MKIS.

HA2: There is a significant effect of DSS on MKIS.

According to the model, DSS is not a significant predictor of MKIS. For the endogenous variable of MKIS, results from the SEM shows that the DSS is positively but not significantly related to MKIS, as anticipated with standardised regression weights of 0.046. The positive un-standardised regression coefficient of 0.043 shows that as the DSS goes up by 1 SD; MKIS goes up by 0.043 SD only. The Findings indicate that there is positive but not a significant relationship between DSS and MKIS ($\beta = 0.046$, $p \leq 0.05$). Thus, the first null hypothesis that there is no significant effect of DSS in MKIS is accepted and alternative hypothesis is rejected that there is a significant effect of DSS in MKIS

H03: There is no significant effect of MI on MKIS.

HA3: There is a significant effect of MI on MKIS.

According to the model, MI is the significant predictor of MKIS. For the endogenous variable of MKIS, results from the SEM shows that the MI is positively and significantly related to MKIS, as anticipated with standardised regression weights of 0.348. The positive un-standardised regression coefficient of 0.239 shows that as the MI goes up by 1 SD; MKIS goes up by 0.239 SD. The Findings indicate that there is positive and

significant relationship between MI and MKIS ($\beta = 0.35$, $p \leq 0.05$). Thus, the first null hypothesis that there is no significant effect of MI in MKIS is rejected and alternative hypothesis is accepted that there is a significant effect of MI in MKIS.

H04: There is no significant effect of IRS on MKIS.

HA4: There is a significant effect of IRS on MKIS.

According to the model, IRS is the significant predictor of MKIS. For the endogenous variable of MKIS, results from the SEM shows that the IRS is positively and significantly related to MKIS, as anticipated with standardised regression weights of 0.209. The positive un-standardised regression coefficient of 0.236 shows that as the MI goes up by 1 SD; MKIS goes up by 0.236 SD. The Findings indicate that there is positive and significant relationship between IRS and MKIS ($\beta = 0.21$, $p \leq 0.05$). Thus, the first null hypothesis that there is no significant effect of IRS in MKIS is rejected and alternative hypothesis is accepted that there is a significant effect of IRS in MKIS

H05: There is no significant effect of MKIS on DM.

HA5: There is a significant effect of MKIS on DM.

According to the model, MKIS is the significant predictor of DM. For the endogenous variable of DM, results from the SEM shows that the MKIS is positively and significantly related to DM, as anticipated with standardised regression weights of 0.548. It indicates that MKIS significantly contributes towards DM. The positive un-standardised regression coefficient of 0.476 shows that as the MKIS goes up by 1 SD; DM goes up by 0.48 SD. The Findings indicate that there is positive and significant relationship between MKIS and DM ($\beta = 0.55$, $p \leq 0.05$). Thus, the first null hypothesis that there is no significant effect of MKIS in DM is rejected and alternative hypothesis is accepted that there is a significant effect of MKIS in DM.

5. Conclusion

The purpose of the study was to diagnose the impact of Marketing Information System on decision making in pharmaceutical companies in India. Results reveal that Marketing Information System strongly impacts the decision making in pharmaceutical companies. Out of Four sub-systems of Marketing Information System only Decision Support System doesn't impact decision making. In last 10 years, the usage of Marketing Information System has increased. Reasons behind this exponential growth includes various initiatives towards digitalization, strong security measures taken by companies and various campaigns to encourage companies towards digital ways to connect to the world. Results indicate that Marketing research; Marketing Intelligence and Internal record System has strongly impacted the decision making.

It is concluded that all the factors included in the study are the most important and can impact decision making in pharmaceutical sector in India. The study provides an insight into managers needs which may be essential for policymakers in providing better services. This study can be used for further research in exploring other determinants of Marketing Information System and decision making.

6. References

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