

# USE OF INFORMATION TECHNOLOGY IN PAKISTANI AND MULTINATIONAL PHARMACEUTICAL FIRMS IN KORANGI INDUSTRIAL AREA

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## Abstract

*This research explores the extent of usage of Informational Technology within the pharmaceutical firms based at Korangi Industrial Area. The findings substantiate the view that merely adding computing power will not add to productivity unless the employees are well trained and the usage is dispersed in all the business processes simultaneously. The design of the research is based on instruments which have a high validity and the results show that there is no significant difference in the level of competence of employees between the Pakistani and the MNC. This may be so since the employees are from the same labour market where they have similar educational background and the firms (both national and multinational) have not adequately invested in upgrading their IT capabilities..*

## UTILIZATION OF INFORMATION TECHNOLOGY IN LOCAL AND MNC PHARMACEUTICAL COMPANIES IN KORANGI INDUSTRIAL AREA

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### **I. Introduction:**

Organizational structure and informational technology (IT) are considered to be 20<sup>th</sup> century's gifts to mankind. In recent years IT has transformed the business world. In today's highly competitive and turbulent marketplace computer-based information systems (IS) technologies may well be the primary strategic resource for sustaining competitive advantage (Sabherwal and King 1991; McGee and Prusak 1993). Bechtel a major US construction company has been part of virtually every major project in 2000

due to its reliance on IT and is building warehouses for Web van Group and fortified Internet hubs for Equinox (Bennett 2000).

The effective use of information system (IS) in manufacturing industry has become a critical enabling factor for a firm's success. Advanced pharmaceutical companies are realizing that the implementation of information management technologies in their operations can greatly enhance their chances for success by reducing their time-to-market and enhancing efficiency in their production runs. All four dimensions of competitive advantage; cost competitiveness, quality, speed and innovation can be refined by using information technology. Dell Computers is one leading group, who took on giants like IBM, Apple and Compaq and captured the computer market merely by exploiting the capabilities of IT.

Pakistan has been slow to use information technology in manufacturing process. The pharmaceutical industry of Pakistan was probably the first industry to venture into this field perhaps due to the preponderant presence of multinational companies. By the mid of the 1990's, many other industries followed. Today advanced pharmaceutical companies are realizing that IT infrastructure and efficient information flows are dependent upon focusing on the business processes of information generation, data management and content distribution. (CDIT Industry Spotlight-2005)

## **II. Objectives of this research**

Pharmaceutical industry is one of Pakistan's major manufacturing sectors growing at an annual rate of over 11% since 2000 (Special Report 2004 on Pharmaceutical industry of Pakistan 2005). The Special Report states that there are nearly 600 firms including MNCs and local firms operating within this industry for a market worth Rs 60 billion. This mature and stable industry has been chosen for research to identify the extent of usage of IT in manufacturing operations. This study will focus on the following questions: -

- Is there a difference in usage of information technology amongst MNCs and national firms?
- How can information system (IS) and information technology (IT) be exploited to enhance the competitive advantage for managerial excellence in this industry?
- Do the users of IT possess the requisite technical know-how, to exploit the capabilities of IT?

This paper is divided into five sections:-

1. Section III presents an overview of the pharmaceutical industry of Pakistan and a review of the literature.
2. Section IV explains the methodology of research.
3. Section V discusses the rationale and profile of the surveyed firms.
4. Section VI deliberates upon the findings of research and its analysis.

5. Section VII covers the concluding remarks.

### III. Pharmaceutical Industry in Pakistan

According to a survey carried out in 2004 (Special Report, 2005) the market size of the pharmaceutical industry in Pakistan is \$1.1 billion in sales (at 2004 Rupee-Dollar percent values and prices) growing at a rate of 11.4%, which includes sales to retailers and institutions in the ratio of 88:22. Companies in Pakistan however are involved more in processing, packaging and distribution rather than in R&D. The total companies sharing this market are 586. The medi-care needs of the country are met upto 80% from indigenous production. Exports amounted \$ 49 million; nearly 5% of total production in 2004. Table–1 provides further statistical data.

**TABLE: 1**  
**Pharmaceutical Companies in Pakistan 2004**

Pharma Units	No of firms.	Market share		Vol of Business 2004	Karachi Based			Korangi Based	
		1980	2004		No.	Market share	Products	No	Market Share
Multi Nationals	29	80%	55%	\$602 million	22	49%	884	5	10.93%
Nationals	557	20%	45%	\$500 million	68	26%	2064	17	8.07%
<b>Total</b>	<b>586</b>			<b>\$1.1 billion</b>	<b>90</b>	<b>76%</b>		<b>22</b>	<b>18%</b>
<i>Source: Special Report, Pharmaceutical Industry, Investment and Marketing, Vol 40, No.12, Apr 2005</i>									

An analysis of Table–1 shows that the concentration of firms is in the region of Sindh and in particular in Karachi due to close proximity of port facilities, availability of skilled labor and market. During the past two decades the operations of MNC's have declined either due to mergers or stiffer competition by local firms. Between the period 1996 and 2005, eleven MNC companies have undergone mergers (Pharma Guide 2005). This industry provided about 50,000 white collared jobs in 2004.

### IV. Review of Literature

A base document chosen for this study is a paper presented by Irfan Hyder in Pakistan's National IT Conference in Oct 1997 on, "The rate of computerization in Pakistani businesses". Since the pharma units in the sample chosen by Hyder are only 7% of over 200 respondents the findings need to be further validated as IT has experienced tremendous change during the past decade. The main finding of the Hyder's study are:-

- The application of IT is mostly in the functions of transaction processing and reporting. There is little usage in the decision support systems.
- Only 10% users indicated that computers could propose and execute decisions.
- Although the usage in accounting and finance functions was to the extent of 80%, in other functions the usage was restricted to less than 50%.
- The businesses relied on more than one operating system, which provided them flexibility. Systems like UNIX and Windows were most popular.

- MIS specialist was restricted to IT depts. The study recommended across the board use of MIS specialists.
- Significant usage of emails by the employees for intra firm communication purposes was noted.
- Databases were upgraded to third generation languages.
- Most local firms were currently using segregated application modules for recording and reporting of information.

Since this Study's findings are not representative of the pharmaceutical sector in Pakistan some other papers have also been reviewed. The earlier empirical studies of IS usage were characterized by a narrow and quantitative conceptualization of usage, such as hours of usage (Ettema, 1985) and the frequency of usage (Benbasnat, 1981). However it was showing that more use does not necessarily mean better use. Therefore later studies conducted in the 1990's and onwards shifted to more qualitative variables of IS usage. One of the most well-known research streams is that of the Technology Acceptance Models. However their definition of information security is mostly at the individual level emphasizing user satisfaction and individual performance. These issues are beyond the scope of this study. A comprehensive and reliable measurement scale for IS usage at both individual and firm level is necessary. Doll and Torkzadeh in 1995 were the first to develop such an instrument and identified five dimensions -:

- Problem solving
- Customer service
- Decision rationalization
- Vertical integration
- Horizontal integration

Another important study has been conducted by Qiang Tu (2001). We have selected this as a model with some variations. This study suggests that the IS usage concept has not been adequately linked to manufacturing processes. The study identified the following four major dimensions of organizational –level IS usage, which should be examined: -

- Operational Decision Support (ODS). This assesses how the firm use IS to monitor and improve daily operational decision processes (Doll and Torkzadeh, 1995 and Boynton, 1994).
- Strategic Planning Support (SPS). The extent to which information systems is used by the firm to help formulate and improve long term planning processes (Boynton, 1994)
- Internal integration (II). The extent to which IS are used by the firm to facilitate information sharing and coordinate work activities within an organization. (Doll and Torkzadeh, 1995)
- External integration (EI). The extent to which IS are being used to service and communicate with external constituencies such as suppliers and customers.

The study by Qiang Tu (2001) developed a valid and reliable instrument for assessing organizational level IS usage through a large-scale questionnaire survey of senior manufacturing managers. The linkage between IS usage and manufacturing performance was then examined using structural equation modeling analysis. At the manufacturing performance level he identified five dimensions 1) cost reduction 2) quality

performance<sup>3</sup>) delivery performance 4) flexibility performance 5) innovation performance. These are regarded as the criteria of excellence at manufacturing concerns.

The IS usage (ISU) construct represented the first four dimensions mentioned above, i.e., operation decision support, strategic planning support, internal integration and external integration in concurrence with manufacturing performance . To test the relationships between IS and manufacturing performance LISREL<sup>1</sup> equations were used. He also used several statistics like Root Mean Square Residual (RMSR), Goodness-of fit index (GFI) etc. The results of the structural equation model showed that organizations with high levels of information system usage have high levels of manufacturing performance. This study is being selected as a benchmark for evaluating the level of utilization of IT in Pakistan. Results will be presented in a subsequent paper.

There are two aspects, which warrant further examination in the Pakistani context. Firstly what is the level of competence of employees as far as IT is concerned. Secondly some attempt ought to be made to isolate the impact of ISU as one amongst several determinants of variations in firm's productivity and profitability.

In order to address this issue two instruments were relied upon which measures the degree of IT awareness and MIS style at individual level. The Information Management Awareness Index is a 13 items instrument used by Paul Davidson and Ricky W. Griffin (2000) to assess the degree of awareness of employees on the issues surrounding information management. They are of the view that information can become a competitive advantage only if managers can utilize information systems effectively to meet the needs of their organizations. This Index includes statements of general nature on different dimensions of information management, business intelligence and development of software to evaluate the beliefs of individuals. The instrument is reproduced in **Appendix-I**.

The second instrument is a 14-item instrument developed by Richard Daft and Norman Macintosh (1981). The authors believe that the information processing style of the individual actually determines the extent to which a person will benefit from computer based information systems. They have categorized two dimensions namely the "amount of Information" and the "focus of information"; simply interpreted as the quantum of data a person prefers to use in decision making and the comfort an individual feels with ambiguous and multi-focused information. They have further amalgamated the questions on these two dimensions on a Likert scale of 1 to 5 and have also presented a scale of measurement. A person who prefers a large amount of information; (score > than 28) and still remains focussed, (score < than 14) are the IT specialists who are expected to greatly benefit from the MIS of the company. This questionnaire reproduced in **Appendix-II**.

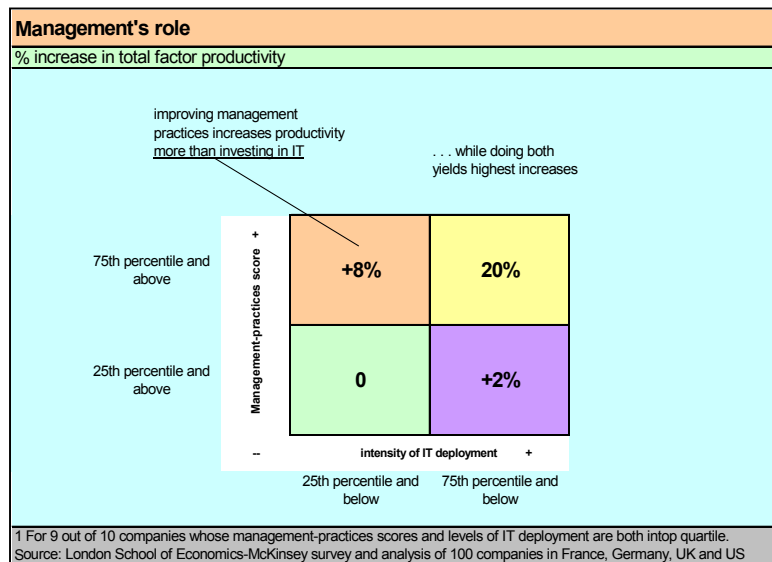
These two quantitative tools help in profiling the MIS sensibility of the employees in the pharmaceutical sector.

It is generally assumed that the operations of MNC are superior to those of local firms in IT and ISU. Most MNC's are using sophisticated centralized international applications of IT received from their principals since their operations are coordinated at global level.

The local pharmaceuticals firms are unable to maximize effectively ISU since their operations are more localized and there is a shortage of investment. However a recent study carried out in London School of Economics points that it is not merely adding more computing power that adds to productivity. This study of 100 manufacturing companies in developed countries supports the view that IT expenditure has little impact unless it is accompanied by better management practices (Dorgan and Dowdy, 2004).

### Box – 3

These findings are based on research directed by Mckinsey at the London School of Economics of 100 manufacturing companies in 2004 to measure how effectively they used three important tools: lean manufacturing, performance management and talent management. They additionally compared IT investments. Companies with increased computing power and improved management practices achieved 20% higher productivity while firms which only intensified IT deployment managed a productivity increase of only 2%.



## V. Methodology

Based on the objective of this research and the review of the secondary literature the following hypotheses were examined: -

Information technology is a management tool and its exploitation is dependent upon the skills of the employees: -

- H-1. IT knowledge has a positive relationship with the utilization of IT.

A need to identify the variance between multinationals and national pharmaceutical firms is also necessary in order to benchmark organizations and pinpoint areas where the lower order firms can set appropriate standards and adapt their practices therefore: -

- H-2. There is a significant difference on the IT capability between MNC and national companies.

Increase in capital investment in information technology is another factor that is in the long run expected to pay dividends. Therefore: -

- H-3. Investment in IT is positively related to attaining manufacturing excellence

Finally we examine the relationship between ISU and firm's performance

- H-4. Firms having better utilization of ISU in business processes will have superior performance.

H-1 and H-2 are tested in this paper while H-3 and H-4 will be evaluated in subsequent paper.

The research has two dimensions; firstly what is the level of competence of the employees in the surveyed companies. How do they measure on the MIS Style and the IT Awareness Index developed by Richard Daft (1981) and Paul Davidson and Ricky Griffin (2000)? It is also the intent to observe if there is any relationship between these two instruments.

Secondly the correlation of ISU and business processes (BP) will be gathered through another survey instrument similar to the one utilized by Qiang Tu in which essentially the managers of pharmaceutical firms will comment on the extent of usage of ISU in a range of business processes applicable to their organizations. This study will be undertaken in the second phase.

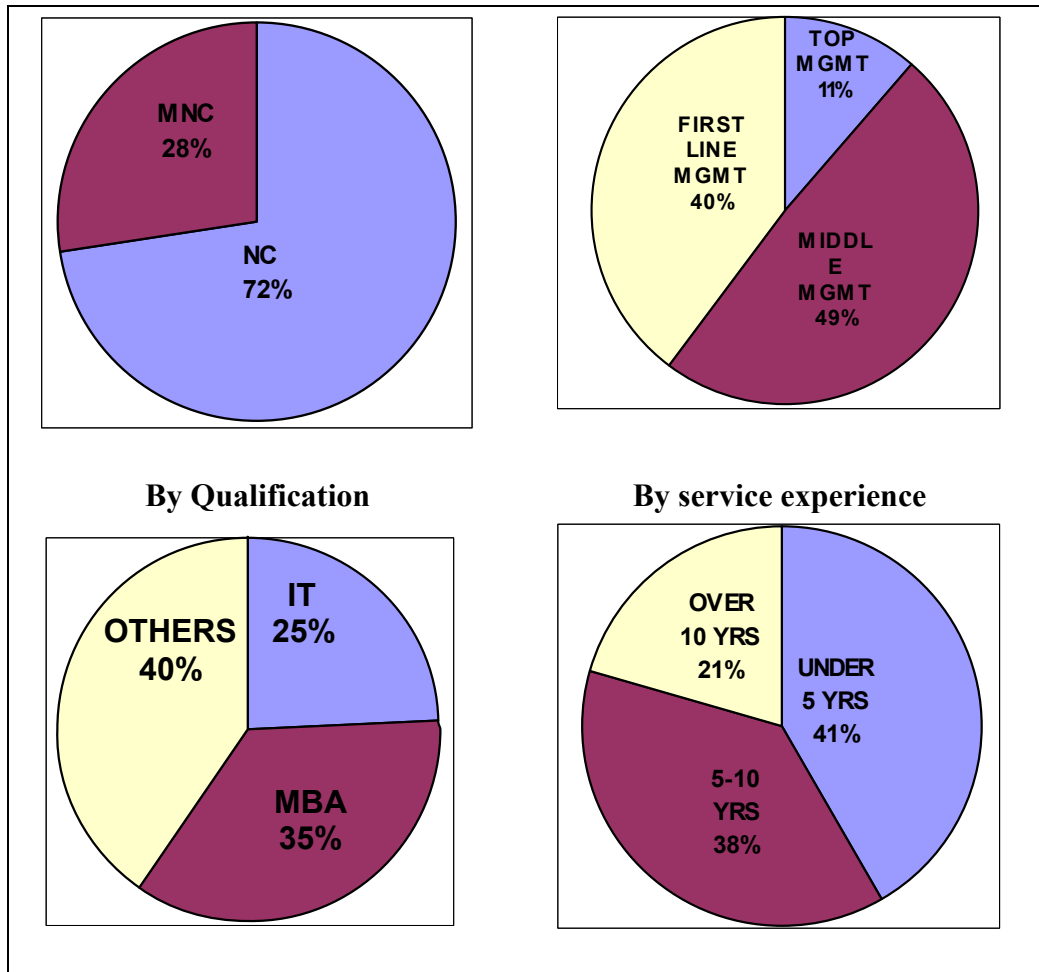
Since both the Awareness Index and the MIS style are reliable and validated instruments; an attempt has been made to establish the degree of competence of the users of IT of the surveyed firms. We also examine if these two instruments are related i.e. whether respondents scoring high on Awareness Index also score high on MIS Style. In case the correlation is not apparent, more reliance will be given to the MIS style developed by Daft, since the scale of measurement seems more reliable.

A non- probability cluster sample from 19 pharmaceutical firms has been selected from the industrial area of Korangi Industrial Site which houses 22 pharmaceutical firms, having 18% (Rs 16 billion) of the national industry market share (Rs 80 billion) in terms of revenues in year 2004 (Table-1), has a growth rate which exceeds the industrial growth rate (11%). The sample includes a MNC's and national firms; 7 of these companies ranked amongst the top 50 pharma companies in terms of profitability. The national companies account for approximately 78% in sales by unit, whereas it account for 43% in sales volume. (Special Report, 2005) Each of the company manufactures from 30 to 60 products

For the first survey 10 individuals from each company were randomly selected making sample size of 190 respondents. The profile of the sample is given below:

**BOX-4**  
**PROFILE OF THE SAMPLE (190 RESPONDENTS)**

By Company	By level of Management
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The profile of the respondents is a fair representation of the population by proportion of type of company, qualification, level of management and experience.

The second survey was administered at the managerial level where the extent of usage and the application in different functions was measured along with the opinion of these managers about where their own firm stands in terms of managerial excellence. In this connection three employees of each company were selected. It measures each firm on the extent of usage of IT by department, area of production and utilization in business processes. The findings of this survey will be presented in a separate paper.

The survey questionnaires were administered by students of PAF-KIET under the guidance of the authors of these papers during the first quarter of 2005<sup>2</sup>.

#### **The Study has the following limitation**

- The research instrument was not piloted.
- Students had limited ability to conduct the survey.
- The veracity of the responses to survey questions is not fully authenticated.

## **VI. Results**



### VI.I Employee Findings (90% of the sample)

The result of 180 respondents from 3 MNC's and 15 national companies on the survey related to the Awareness Index and MIS style is tabulated in Table 2. The Awareness Index represents the general awareness of the employees on issues surrounding information technology while MIS style has been measured on two dimensions, the "quantity of information" a person prefers while collecting information, i.e. does he feel comfortable with a large amount of information or vice versa. The second dimension is the "focus of information", i.e. comfort with the ambiguity of the situation. The results were as under: -

**TABLE: 2**  
**OVER ALL RESULTS**

Type	Avg awareness Score Highest 13	MIS style		No of Respondents
		Avg. Qty of info Ideal 28	Focus of info Ideal 14	
National	7.04	22.68	21.72	134
Multinational	7.29	21.33	21.41	51
Overall	7.11	22.32	21.63	185
<b>By qualification</b>				
IT	7.42	22	22.42	40
MBA	7.22	22.47	24.37	57
Others	6.79	22.5	21.7	66
<b>By level of management</b>				
Top	7.64	23.36	23.23	21
Middle	7.18	22.55	21.39	90
First line	6.875	21.69	21.44	73
<b>By experience</b>				
< 5 years	6.83	22.47	21.95	75
5-10 years	7.32	21.93	21.59	68
>10 years	7.45	21.87	21.79	37

- There is little difference in the Awareness level and the MIS style between the employees of MNC's and national companies, which negates the hypothesis-2 that the quality of employees of MNC's is superior to that of National Companies.
- Hypothesis-2: Respondent's opinions on the "quantity of information" were taken both from local and multinational companies to ascertain which segment has greater computer orientation. The hypothesis developed in this context is presented below:  
H<sub>1</sub>: There is a significant difference on the IT capability between MNC and national companies.

The above hypothesis was tested through Z test as the numbers of respondents were more than 30, and the numbers of variables were more than two. The summarized result is presented in Table-3:

**Table-3**  
**Hypothesis-2**

	MNC's	NC's
Mean	21.19	22.52
Standard Deviation	.67	4.68
Confidence Level	95%	
Z-Critical value (two tail)	+1.96	
Z-Calculated value	40	

- At 95% confidence level, the Z critical value is 1.96, and Z calculated value is 40 which falls in the critical region therefore the null hypothesis is rejected. Hence it could be concluded that there is no significant variation between the MNCs and the national companies.
- Similarly no significant difference is observed amongst the employees on the basis of qualification, experience or level of management.

- The benchmark optimum score as recommended by Daft on the “amount of information” and “Focus of Information” is a score of > than 28 and < than 14 respectively. In our sample there were only 5 employees who fell in this range and their profile emerges as under: -

<div>TABLE: 4</div> <div>SAMPLE FINDINGS - EFFECTIVE USE OF MIS</div> <div>AS PER BENCHMARK STANDARDS</div>											
Ideal Candidate	No. Of Respondents	% Of sample	Awareness index	Type of co.	By level of mgmt		By Svc		Qualification		Highest ranking co.
Quantity of Information > 28	5	3%	8								
Focus of Information < 14											
Quantity of Information > 28	20	11%	6.5	100% NC	FIRST LINE	25%	<5 yrs	60%	IT	25%	EPOCH
					MID LEVEL	50%	5-10 yrs	35%	MBA	30%	INDUS
					TOP MGMT	25%	>10 yrs	5%	Other	58%	
Focus of Information < 14	18	10%	6.5	99% NC	FIRST LINE	50%	<5 yrs	56%	IT	17%	NABI QASIM
				1% MNC	MID LEVEL	45%	5-10 yrs	33%	MBA	39%	
					TOP MGMT	5%	>10 yrs	6%	Other	33%	
Awareness Index > 7	121	66%		69% NC	FIRST LINE	31%	<5 yrs	35%	IT	25%	No significant difference each co have 6 to 7 Employees
					MID LEVEL	52%	5-10 yrs	41%	MBA	34%	
				31% MNC	TOP MGMT	17%	>10 yrs	24%	Others	31%	
									Engr	9%	

- Those respondents who have conformed to the Benchmark standards of MIS Style have also scored high on the Awareness Index. This establishes a correlation between the two instruments.
- Most of the IT specialists in the pharmaceutical industry do not conform to the benchmark standards. There is a need for extensive training to upgrade the technical skills of managers and other employees associated with computers. It is also pertinent to mention that IT specialists may hold technical acumen but the decision support criteria should be determined by the line managers
- It is encouraging to observe that those employees who have more hands-on experience on MIS have higher awareness score than employees who have higher qualifications like MBA.

## VI.II. Company Findings

The company ranking in Table-5 below is shown in descending order according to Daft's MIS Style. The survey also indicates that there is no relationship between the Awareness Index and MIS's Style. (This maybe so since the Awareness Index was simpler in design).

**TABLE: 5**  
**MIS STYLE RANKING INDEX BY COMPANY**

COMPANY	TYPE OF CO.	AWARENESS	MIS Style		RANKING CO.	MKT SHARE %	Growth Rate %	
			QTY OF INFO	FOCUS OF INFO				
EPOCH	NC	4.56	31.22	20.89		0.0	2.8	
INDUS	NC	7.56	31.11	15.56	TOP 50	0.70%	15.8	
NABI QASIM	NC	6.10	24.90	12.60	TOP 50	0.80%	8.7	
EROS	NC	7.56	24.44	24.22		0.01%	(.9)	
EFROZE	NC	7.90	24.10	24.70		.34	(3.9)	
DRUG PHARMA	NC	7.80	23.70	22.40		0.00%	37.2	
BOSCH	NC	7.44	23.67	22.22	TOP 50	0.85%	12.6	
OPAL LABS	NC	6.00	22.44	21.67		.07%	18.8	
JOHNSONS & JOHNSONS	MNC	6.90	22.30	22.10				
ROCHE	MNC	6.90	21.30	21.20	TOP 50	2.30%	18.3	
BRISTOL MYERS SQUIBB	MNC	7.70	21.00	20.60	TOP 50	2.20%	18	
AVENTIS LTD.	MNC	8.10	20.70	23.50	TOP 50	4.50%	15.6	
BAYER	MNC	7.22	20.67	19.00	TOP 50	0.75%	6.1	
MENDOZA	NC	6.00	20.00	19.88		0.25%	(.1)	
ALI GOHAR LTD.	NC	7.80	19.40	20.10		2.17	20.4	
MANHATTAN	NC	7.00	19.00	21.40				
MEDICAIDS	NC	7.27	18.91	25.27		0.06%	58.4	
UNI FEROZE	NC	7.44	16.44	27.33				
GEOFMAN	NC	8.00	16.00	28.20		0.15%	(19.2)	

- The above ranking reflects the fact that the MIS Style is not significantly different between the local firms and the MNCs. The assumption that the quality of MNC's employees is better is negated by these findings. (H-2)
- The MNCs companies lie within the median range, however they control the major market share in term of revenue (55%). This supports the Dorgan point of view that other factors like managerial skills and excellence in business processes are the major factors rather than mere IT computing power in determining performance.
- The companies which scored high on the MIS Style are also amongst the top 50 pharma companies in Pakistan by market share and growth rate. This substantiates the view that better utilization of IT is dependent upon general employee skills. (H-1). The details are presented in Appendix III.
- The employees of Indus and Nabi Qasim are rated the best within the sample. These two companies are also amongst the top 50 companies of the industry. Their market share is also high. The MIS department of Nabi Qasim has automated the entire

supply chain organization by supporting their sales operations. Another massive investment by them has been in the area of networking where connectivity between the three production facilities has been enhanced.

**TABLE: 6**  
**RANKING BY AWARENESS INDEX**

COMPANY	TYPE OF CO.	AWARENESS	MIS STYPE		RANKING CO.	MKT SHARE
			QTY OF INFO	FOCUS OF INFO		
AVENTIS LTD.	MNC	8.10	20.70	23.50	TOP 50	4.50%
GEOFMAN	NC	8.00	16.00	28.20		0.15%
EFROZE	NC	7.90	24.10	24.70		
DRUG PHARMA	NC	A	23.70	22.40		0.00%
ALI GOHAR LTD.	NC	7.80	19.40	20.10		
BRISTOL MYERS SQUIBB	MNC	7.70	21.00	20.60	TOP 50	2.20%
INDUS	NC	7.56	31.11	15.56	TOP 50	0.70%
EROS	NC	7.56	24.44	24.22		0.01%
BOSCH	NC	7.44	23.67	22.22	TOP 50	0.85%
UNI FEROZE	NC	7.44	16.44	27.33		
MEDICAIDS	NC	7.27	18.91	25.27		0.06%
BAYER	MNC	7.22	20.67	19.00	TOP 50	0.75%
MANHATTAN	NC	7.00	19.00	21.40		
JOHNSONS & JOHNSONS	MNC	6.90	22.30	22.10		
ROCHE	MNC	6.90	21.30	21.20	TOP 50	2.30%
NABI QASIM	NC	6.10	24.90	12.60	TOP 50	0.80%
OPAL LABS	NC	6.00	22.44	21.67		
MENDOZA	NC	6.00	20.00	19.88		0.25%
EPOCH	NC	4.56	31.22	20.89		0.01%

- The result presented in Table-6 again shows that there is no correlation between the Awareness Index and the MIS Style.
- The Awareness Index instrument was a simple technique and probably the respondents were able to understand it in a better way as compared to the Daft instrument.

## VII. CONCLUSION

This research concludes that IT can become a competitive advantage for businesses only if the employees have the ability to exploit the technical characteristics of the computers. This must be coupled with better management practices. Only adding computing power and raising IT expenditure will not give an edge to firms to compete with advanced firms who mesh better management practices like data management and utilization in decision support systems. Companies should therefore focus on improving their management practices before embarking upon IT spending sprees. (Dorgan, 2004).

Since there is no significant variation in the measurement of IT skills as reflected by this survey amongst the MNCs and national firms it reaffirms the fact there are other intervening factors that dictate productivity excellence. However the pharmaceutical industry of Pakistan is well poised to increase training expenditure to reap dividends of sophisticated IT. The firm which invests in its employees to upgrade their competencies will be the ones who would be able to better manage their information, improve their communication with their sales staff, eliminate costly paper duplication of documents and share information on multiple databases for better decision making.

The extent of usage of IT in business processes and its measurement may be the acid test to determine the progress made in the utilization of this sophisticated tool since the 1980's and to identify the benchmark leaders in the pharmaceutical industry. The second stage of this research will be directed to determine the linkage between ISU with BP, which will be presented subsequently.

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## FOOTNOTES

1. LISREL is a computer based program which computes the fit measures of different chi-squares and decides which combinations of chi-squares should be used to compute the fit measures. It has at least five estimation methods to measure the fit. Lisrel 8.70 an advanced version has corrected many anomalies of this model. (Karl Joreskog 2004)

2. Names of Students: BCS students who helped in this survey are Omer Wahid, Qurat-ul-Ain, Salman Khan, Usman Huda, Madiha Mahmood, Haseeb-ur-Rehman, Zeeshan Khan, Zaki Raza, Jamila Naseem, Inam Jamil, Bilal Kazim, Anjum Kaiser, Arslan Iqbal, Saneaa Siddiqui, Shiraz, Amjad, Talha Siddiqui, Faraz Ali, Majid, Mohamad Zeeshan, Siraj, Afnan, Waqas, Rameez, Ammad Ishaque, Waqar Ahsan, Waseem, David, Shujaat, Naeem Sadiq, Owais Yahya, Adeel Iqbal, Wajeeha Arbab, Subheen Javed, Umair Hassan, Zafar Ziadi and Wajeeha Khalid. Their efforts are acknowledged.

## APPENDICES

I. Questionnaire –1. Survey –Information Management Awareness Index

II. Questionnaire-2. Survey- What is your MIS Style.

III. Details of the Firms included in the Survey.

## REFERENCES

### Books

1. Daft, R. 2002, Management, 5th Edition, Singapore, Thomson Asia Pte Ltd.
2. Davidson, P. and Griffin, R. 2000, Management, Australia in a global context, Singapore, John Wiley & Sons.

### Articles

3. Hyder, I. "Rate of Computerization in Pakistan", Computer Society of Pakistan's National IT conf, Karachi, Oct 1997.
4. Tu, Q. "Measuring Organizational Level IS usage and its impact on Manufacturing Performance", 8<sup>th</sup> Americas Conference on Information Systems 2001. pp.2188-2194.
5. Special Report 2005, Pharmaceutical Industry of Pakistan, Investment and Marketing Volume-40.
6. Bennett, S. "Wings and a Prayer," *Business2.0*, Jun 13, 2000
7. Dorgan, S. & Dowdy, J. "When IT lifts productivity", *McKinsey Journal*, 2004, Pp9-11.
8. Boynton, A.C. and Jacobs, G.C. "The Influences of IT Management Practice on IT in Use in Large Organizations", *MIS Quarterly*, 1994, pp.299-318.
9. Doll, W.J. and Torkzadeh, G. "The Development of a Tool for Measuring the Effective Use of Information Technology in an Organizational Context", Working Paper, The University of Toledo, 1995.
10. Sabherwal, R. and King, W.R. "Towards a Theory of Strategic use of Information Resources", *Information and Management* (20) 1991, pp.191-212.

## Appendix-I

### QUESTIONNAIRE – 1

#### SURVEY-INFORMATION MANAGEMENT AWARENESS INDEX

This assessment measures our awareness of the issues surrounding information management

**Instructions:** Respond 'T' (true) or 'F' False to indicate how closely each of the following statements corresponds to your beliefs

S/No	Questions
1.	The specific information that is of most value to a manager is determined by among other things, the role of the manager and the objectives of the organization.
2.	Effective management of all the processes associated with the acquisition and implementation of information systems is essential to ensure that the desired outcomes are attained.
3.	To a manager, accuracy, completeness and relevance of information are more critical than its timeliness.
4.	Testing of a new applications system is unnecessary when it is purchased from an independent vendor rather than developed in-house.
5.	Information technology professionals are most important people in the development, acquisition and implementation of any major new information systems project.
6.	The more information available to a manager, the better quality is his or her decision-making.
7.	Business intelligence aims to turn data into usable information targeted at the needs of individual employees and the organization as a whole.
8.	The software with which managers interact and which helps them perform the specific tasks required by their work is called application software.
9.	Addressing the issues arising from the reaction of people to change is a key component in any large information systems project.
10	Computers are an essential prerequisite for establishing an information system.
11	Data are of greater value to a manager than information.
12	E- commerce is rapidly altering the way all business is conducted.
13	Managers should rely on their organization's IT department to keep abreast of new and changing technologies so that they can position their organizations to take advantage of the opportunities these present.

**Sources:** The questionnaire is adapted from Paul Davidson and Ricky Griffin, *Management* 2000. pp803.



**QUESTIONNAIRE – 2**  
**WHAT IS YOUR MIS STYLE**

**Circle the number that indicates how much you agree that each statement is characteristics of you.**

S/no	Question	Disagree Strongly	Agree Strongly
1	I like to wait until all relevant information is examined before deciding something.	1 2 3	4 5
2	I prefer information that can be interpreted in several ways and leads to different but acceptable solutions.	1 2 3	4 5
3	I like to keep gathering data until an excellent solution emerges.	1 2 3	4 5
4	To make decisions, I often use information that means different things to different people.	1 2 3	4 5
5	I want just enough data to make a decision quickly.	5 4 3	2 1
6	I act on logical analysis of the situation rather than on my “gut feelings” about the best alternatives.	5 4 3	2 1
7	I seek information sources or people that will provide me with many ideas and details.	1 2 3	4 5
8	I try to generate more than one satisfactory solution for the problem faced.	1 2 3	4 5
9	When reading something, I confine my thoughts to what is written rather than search for additional understanding.	5 4 3	2 1
10	When working on a project, I try to narrow, not broaden, the scope so it is clearly defined.	5 4 3	2 1
11	I typically acquire all possible information before making a final decision.	1 2 3	4 5
12	I like to work on something I’ve done before rather than take on a complicated problem	5 4 3	2 1
13	I prefer clear, precise data	5 4 3	2 1
14	When working on a project, I like to explore various options rather than maintain a narrow focus.	1 2 3	4 5

**Sources:** This questionnaire has been adapted from Richard L. Daft and Norman Macintosh, “A Tentative Exploration into the Amount and Equivocality of Information Processing in Organizational Work Units,” *Administrative Science Quarterly* 26 (1981), pp207-226

**I operate at:**

☐ Top Management

☐ Middle level Management

☐ First Line

**My Department:**

☐ IT

☐ Marketing / Sales

☐ Production

**My Tenure of employment:**

☐ Over 10 years

☐ between 5-10 years

☐ Under 5 years

**My Qualifications are:**

☐ IT related

☐ MBA

☐ Engineering

☐ Others

## SURVEYED COMPANIES AND THEIR RANKING

<b><u>TABLE-5</u></b> <b><u>MIS STYLE RANKING INDEX BY COMPANY</u></b>								
Ranking	COMPANY	TYPE OF CO.	OVER ALL RANKING SCORE	RANKING CO.	MKT SHARE %	Growth Rate %	Value (million)	# of Products
1	INDUS	NC	2	TOP 50	0.70%	15.8	4.46	33
2	NABI QASIM	NC	2	TOP 50	0.80%	8.7	5.07	47
3	EPOCH	NC	4		0	2.8	5.89	25
4	BAYER	MNC	8	TOP 50	0.75%	6.1	4.73	15
5	BRISTOL MYERS SQUIBB	MNC	8.5	TOP 50	2.20%	18	1.4b	34
6	MENDOZA	NC	9		0.25%	-0.1	1.72	33
7	OPAL LABS	NC	9		0.07%	18.8	45	38
8	ROCHE	MNC	9	TOP 50	2.30%	18.3	1.47b	46
9	BOSCH	NC	9.5	TOP 50	0.86%	12.6	555	51
10	DRUG PHARMA	NC	9.5		0.00%	37.2	2.9	3
11	EROS	NC	9.5		0.01%	-0.9	4.2	23
12	ALI GOHAR LTD.	NC	10		2.17%	20.4	1.39b	53
13	JOHNSONS & JOHNSONS	MNC	10					
14	EFROZE	NC	10.5		0.34%	(3.9)	215	36
15	MANHATTAN	NC	12.5					
16	AVENTIS LTD.	MNC	13	TOP 50	4.50%	15.6	2.86b	56
17	MEDICAIDS	NC	17		0.06%	58.4	36	35
18	UNI FEROZE	NC	18					
19	GEOFMAN	NC	19		0.15%	-19.2	88	65