

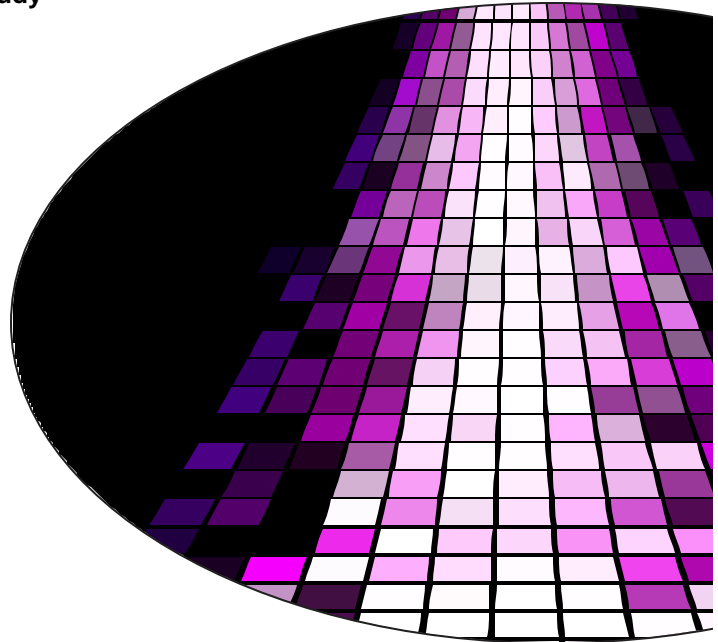
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**Information Systems and Quality Management in Healthcare
Organization: An Empirical Study**

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Information Systems and Quality Management in Healthcare Organization: An Empirical Study

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Abstract

The paper explores current status of information systems, identifies gaps in the current information systems and assessment in healthcare organization. This paper is based on Critical Analysis of literature and a questionnaire is administered on administrative level employees of South Indian healthcare organizations. It has been identified that healthcare organization should have specific strategy and must implement measures derived from strategy. Data and information systems should be seen as business resources. The knowledge base of medical field is large and it is growing rapidly. Hence information system must be integrated across the enterprise. The results of the study determined the relationship between measurement, analysis and knowledge Management on performance. The Information system is the newest dimension among the MBNQA (Malcolm Baldrige National Quality Award) criteria. The Information system performance was assessed in terms of management relevant data and information. The outcomes suggest that there is a growing recognition of the administrators about the importance and use of information systems as a critical resource in healthcare organizations. From the study it is inferred that information system analysis continues to be a challenge. The higher utilization of technology, computerization and the Internet has resulted in dramatic change in the quality performance of the Healthcare Organizations. The paper provides an empirical evidence that information system has an impact on performance in the context of healthcare organizations. The information system is a key performance area of Quality management and it has received limited attention in improving quality performance including MBNQA. Finally, the study concludes that there is an immense scope for altering current information systems and it should be aligned with the quality management environment.

Keywords: Information system, Quality Management, Performance, Healthcare Organization.

INTRODUCTION

The globalization and liberalisation policies have significantly changed the healthcare scenario in India. The healthcare industry is going through a transition and the future is likely to see significant changes in the nature of provision of healthcare and roles of various players in the industry. The healthcare industry is worth INR 820,000 million today.

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With global revenues approximately USD 2.8 trillion, the healthcare industry is world's largest industry and India is emerging as a major player because of its high population (Pestonjee et. al, 2005). The healthcare market is estimated to touch USD 77 billion by 2013 (IBEF, 2009). According to WHO report, India needs to add 80,000 hospital beds each year to meet the demand of its population. Healthcare organizations are considered the focal points for health services' delivery and they consume nearly thirty percent of the national healthcare budget (Pestonjee et. al, 2005). Moreover, service based economy growth is accomplished by technological advances, thus reinforcing service quality as an important and sustaining competitive advantage (Bharadwaj et.al, 1993). Service quality has emerging as a key issue in Indian services industries (Kunal et.al, 2005). In the healthcare environment, changes such as mature markets, alternatives of delivery systems, competitive health plans, powerful payer coalitions, increasing knowledgeable consumers and technology have placed a demand on hospital managers to have better understanding of service quality (O'Connor et. al, 1989). India's IT capability has a significant contribution in healthcare administration, and it has helped in improving efficiencies and facilitated control of delivery cost. Information system can add value by enhancing service quality as well as soft ware quality. Today Information system needs to look beyond system building and there is a need to examine how they can increase the quality of their service and enhance the performance of the organization.

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Quality management relies on large amounts of information to evaluate the effectiveness of the patient care, the efficiency of hospital operations, the appropriate use of resources and the degree to which the expectations of patients, physicians and other hospital customers are met (Lengnick-Hall, 1995). Successful implementation of Quality management (QM) requires a transportation of the healthcare organization's information system infrastructure and other management systems in alignment with QM environment. The information systems in healthcare organizations need to have seven objectives in relation to quality management: medical quality assurance, cost control and productivity enrichment, utilization analysis and demand estimation, programme planning and evaluation, simplification of internal and external planning, clinical research, and education (Austin, 1988). The information systems investments can contribute to a great extent in improving service quality, operational efficiency, patient satisfaction and patient care (DesRoches et.al, 2008). The importance of quality information system to the overall quality and productivity of an organization is evident from the inclusion of a dimension on Information and Analysis in the Malcolm Baldrige National Quality Award (NIST, 2000). While

defining or measuring the effectiveness of the information systems (IS) function, there is also a need for IS assessment for effective management and continuous improvement (Prybutok, 1997). In addition, there is a need for investigating the relationship among the established IS assessment tools to better reconcile their existing differences. This research examines Malcolm Baldrige National Quality Award (MBNQA) framework and its new dimension, 'Information Systems' in relation with organizational quality. There is also a need to examine the interaction between the information system and the other quality management dimensions based on the MBNQA framework.

LITERATURE REVIEW

The purpose of an Information System is to support decision making in an organization and to enhance organizational efficiency, quality, and productivity (Davis and Olson, 1985). Several models have attempted to determine how information systems aid individual decision making by specifying the decision making process and some models have focused on organizational decision making. In recognition of the importance of information systems as a critical decision and operational tool in an organization, several research efforts have focused on the development of an IS assessment framework (Beise, 1989). The simple decision making model has five components; task, decision maker, decision process, decision environment, and decision outcome. Further, the IS - performance evaluation model has the following dimensions in order of importance 1) IS function impact on strategic direction, 2) integration of the IS function planning with corporate planning, 3) the quality of information outputs, and 4) the IS function's contribution to organizational financial performance (Saunders and Jones, 1992). The IS function is evaluated in relation to top management and its contribution to the business results (Moad, 1993). In recognition of the importance of an emerging dimension of 'information service quality' in information systems assessment, Pitt et al. (1995) proposed a model of information system success similar to the model by DeLone and McLean (1992), except service quality was included as one of the dimension that affects both use and user satisfaction. Myers et al. (1997) proposed an Information Systems Assessment (ISA) framework with the inclusion of an additional dimension 'Work group impact' within IS success model by Pitt et al. (1995). The IS assessment efforts would allow for enhancement of IS quality and productivity and would ultimately influence organization's performance and profitability. However, the proposed models were developed from an information systems perspective and they reside in an information systems specific domain. There is a need

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to discuss information systems in relation to quality management using MBNQA framework.

MALCOLM BALDRIGE NATIONAL QUALITY AWARD

Malcolm Baldrige National Quality Award (MBNQA) was created by the United States Department of Commerce in 1987 to enhance competitiveness (Bell and Keys, 1998). The MBNQA has been accepted widely as service excellence standard in education and healthcare institutions (Chow-Chua and Goh, 2000). Specific goals of the award include promoting awareness of the relationship between quality and competitiveness, increasing understanding about the level of quality required to achieve world class recognition, and fostering the sharing of information about quality by world class organizations (N.I.S.T., 1995). According to MBNQA, the quality management and performance is embodied in leadership, strategic planning, customer focus, measurement, analysis, knowledge management, workforce focus; process management, and results (US Do CNBS, 2008).

Leadership examines how senior executives guide the organization and how the organization deals with its responsibilities to the public and practices good citizenship. Strategic planning examines how the organization sets strategic directions and how it determines key action plans. Customer and market focus examines how the organization determines the requirements and expectations of customers and markets, builds relationship with customers and acquires, satisfies and retains customers. Measurement, analysis and knowledge management (Information and analysis) is how organization selects, gathers, analyzes, manages, and improves its data, information, and knowledge assets and how it manages its information technology. Workforce focus is about how the organization engages, manages and develops workforce. Process management is how the organization designs its work systems to deliver value to patients and employees. Finally the results as performance outcomes healthcare outcomes, customer -focused outcomes, financial and market outcomes, workforce -focused outcomes, process effectiveness outcomes, and leadership outcomes. These dimensions are termed as seven categories and points (US Do CNBS, 2008). Information and Analysis is the newest among the MBNQA criteria and evaluates an organization's processes to measure its performance in terms of the scope, validity, and management of relevant data and information. Information and Analysis Category is critical to the effective management of an organization and to a fact-based system for improving performance and competitiveness. Information and analysis serves as a foundation for the performance management system and serves as a moderator in a systems perspective.

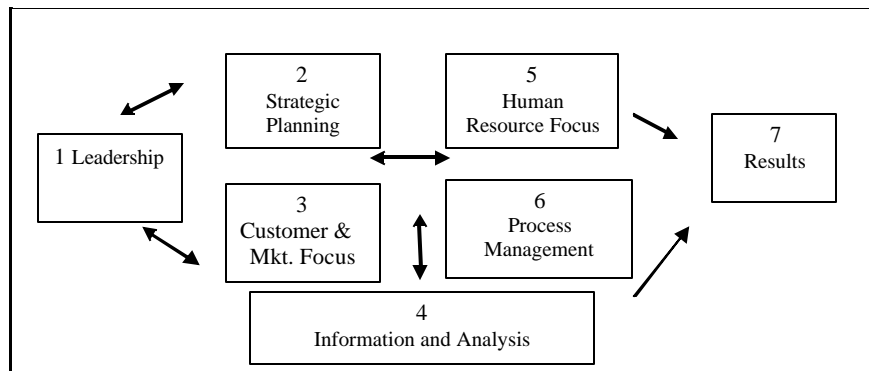


Figure 1: Malcolm Baldrige Criteria for Performance Excellence Framework (NIST, 2000)

IMPACT OF INFORMATION SYSTEM ON THE ORGANIZATIONAL PERFORMANCE

The impact of information system (IS) on organizations has been one of the main issues in the modern times. IS managers face the critical issue of assessing the impact of IS and there is a need of technology investment in organizations. Some of the research efforts have investigated the impact of IS investment on organisation's strategic and economic performance. Above-average spending on information system (IS) can enhance a firm's profitability (Norton and Company, 1985). The high-performance firms spend a significantly higher proportion of revenue for IS than low-performance firms (Harris and Katz, 1989). The individual IS investment variables were found to be only weakly related to organizational strategic and economic performance, they were significantly related to performance when grouped together (Mahmood and Mann, 1993). IS alone has not produced sustainable performance advantages but number of firms have benefited from using IS to leverage intangible, complementary human and business resources, such as flexible culture, strategic planning, IS integration, and supplier relationships (Powell and Dent, 1997). The firms with high IS capability tend to out-perform on a variety of profits and cost-based performance measures (Bharadwaj, 2000). A significant component of the value of IS is its ability to enable complementary organizational investments, such as business processes and work practices. These investments also lead to productivity by lowering costs and allowing firms to increase output quality in the form of new products or improvements in intangible aspects of existing products, such as convenience, timeliness, quality, and variety (Brynjolfsson and Hitt, 2000). There is a huge financial impact associated with lack of Information quality (Olson, 2003). There is a need of

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measuring this impact with the view of minimizing poor quality information (Adelman and Moss, 2005; Sangwan and Bass, 2007). MBNQA framework and IS are important indicators of business results in an organization wide perspective (Wilson and Collier, 2000). There is a need to investigate the impact of IS on business results with regard to other quality management dimensions of MBNQA framework.

DATA COLLECTION PROCEDURE

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The studied population covers the hospitals affiliated to medical colleges of southern India. There were seventy six medical college's hospitals (healthcare organizations) and the sample survey was derived from the database of healthcare organizations based on the official report of Medical Council of India (2009). One of the healthcare organization was selected for the unit of analysis to obtain an overall glimpse of administration, operations, standards and practices as it is uniform under the Medical Council of India. To obtain clear representation of samples from southern India, healthcare organizations of Karnataka, Kerala, Andhra Pradesh and Tamil Nadu were purposively selected based on inclusion and exclusion criteria for this study.

Inclusion criteria: Location, quality certification, willingness to participate, multi-specialty healthcare organization, minimum five years of service, emergency department, healthcare organization with more than 500 beds, and divisional/State representation of the Organisation.

Exclusion criteria: Unwillingness to participate, single specialty, super specialty, less than 500 bedded healthcare organization, and less than five years of service.

A total of twelve healthcare organizations participated in the study. The respondents selected for this survey were administrative level employees who have knowledge of Quality management and are exposed to organizational practices. In order to achieve sampling uniformity the respondents at administrative level consisted of 76 departmental heads, 38 administrative staff, 13 nursing superintendents, and 3 medical superintendents through purposive sampling technique. Out of 250 questionnaires, 130 were obtained in complete with a response rate of 52 percent. The validity of the survey instrument was done using expert's opinion and piloted for a small group of respondents and reliability by Cronbach's alpha. The analysis was done using SPSS package.

RESULTS AND DISCUSSIONS

Descriptive Statistics

The means and standard deviations for all variables in the data set were consistent (Table 1). Standard deviations indicated that the scores in the distribution

deviated or varied from the mean regarding the usefulness of Measurement, Analysis and Knowledge Management in healthcare organization. There was a strong response with means ranging from 3.5 to 4.2 and standard deviation was varied from 0.6 to 0.9. The results suggest that there is no strong response bias and the degree of variation is not very high.

Table 1: Descriptive statistics, means and Standard Deviations

Measurement, Analysis and Knowledge Management(MAK)	Mean	Standard Deviation
MAK1	3.74	.89
MAK2	3.84	.93
MAK3	3.83	.69
MAK4	3.91	.87
MAK5	3.66	.99
MAK6	3.63	.82
MAK7	3.70	.92
MAK8	3.53	.91
MAK9	3.59	.83
MAK10	3.77	.82
MAK11	3.73	.97
MAK12	3.77	.98
MAK13	3.90	.60
MAK14	4.25	.79
MAK15	3.56	.99
MAK16	3.67	.80
MAK17	3.68	.93

Source: Survey Results

Kaiser-Meyer-Olkin (KMO) and Bartlett's Test

The KMO measures the sampling adequacy and it was found greater than 0.5, satisfactory for a factor analysis. The KMO measure was found 0.940, indicating high sampling adequacy. The Bartlett's test of sphericity was significant and correlation matrix is not an identity matrix indicating that there is correlation among variables.

Table 2: KMO and Bartlett's Test Factor Analysis

Measurement, Analysis and Knowledge Management	Kaiser-Meyer-Olkin Measure of Sampling Adequacy	.838
	Approx. Chi-Square	1157.742
	df	136
	Sig.	0.000

Source: Survey Results

Factor analysis confirmed that the attributes on scale were reliable in their measurement and most of them were found above the adequacy level (Table 3). Factor loading of 0.50 and above on a specified factor has been considered to be acceptable (Hair et al., 1995), and thus this level was used as a cut off value within this paper. Reliability coefficient that assessed the consistency of the entire scale and Cronbach's alpha was found 0.9155, indicating high level of internal consistency (Table 3). The most important factors of Measurement, Analysis and Knowledge Management were : (i)The regular check of the software to make sure they are reliable and meet current healthcare needs(.713), (ii) Regular communication and sharing the knowledge/ skill through seminar or on site information (.747), and (iii) the data and information matches the current healthcare needs (.725).

Table 3: Measurement, analysis and knowledge management

Measurement, analysis and knowledge management	Loadings	Reliability
We regularly check the hardware to make sure they are reliable and meet current healthcare needs	.661	0.9155
We regularly check the software to make sure they are reliable and meet current healthcare needs	.713	
We have a comprehensive system to align measures of daily operations and hospital performance	.508	
Inter organization coordination is achieved using electronic links	.566	
Our information systems are standardized across the departments	.527	
Our systems support front line employees	.628	
Our performance analysis is aligned with senior leader's strategic planning	.480	
We communicate the analysis results to work in team/group at the functional level operations	.507	
Our data analysis shows improvement in cycle times (reducing length of stay)	.620	
We ensure that the needed data and information is available to the staff, suppliers, and customers	.507	
We regularly communicate and share the knowledge/ skill through seminar or on site information	.747	
We ensure that the data and information matches current healthcare needs	.725	
We ensure data and information integrity and accuracy	.616	
We effectively use comparative data and information to analyze the performance	.634	
We use the results to act as the basis for improvement and benchmarking	.615	
Patient preferences are analyzed when design new and revised patient services	.458	
We have a comprehensive system to gather and integrate information for decisions making	.644	

Source: Survey Results

MBNQA DIMENSIONS AND PERFORMANCE

Pearson Correlation Matrix indicated that there was significant correlation between MBNQA dimensions and performance (Table 4). Very high significant correlation was found between 'strategic planning and process management' and performance ($r=0.766$, $P<0.001$; $r=0.765$, $P<0.001$); 'measurement, analysis and knowledge management' and workforce focus ($r=0.671$, $P<0.001$; $r=0.765$, $P<0.001$); and 'customer focus and leadership' and performance ($r=0.479$, $P<0.001$; $r=0.593$, $P<0.001$). The correlation ranked highest for 'process management,' second for 'strategic planning,' third for 'workforce focus,' fourth for 'measurement, analysis and knowledge management,' fifth for 'leadership,' and sixth for 'customer focus on performance.' There was strong inter-group correlation between leadership and strategic planning ($r=0.665$, $P<0.001$); leadership and customer focus ($r=0.604$, $P<0.001$); leadership and measurement, analysis and knowledge management ($r=0.735$, $P<0.001$); leadership and workforce focus ($r=0.659$, $P<0.001$); leadership and process management ($r=0.659$, $P<0.001$); strategic planning and customer focus ($r=0.503$, $P<0.001$); strategic planning and measurement, analysis and knowledge management ($r=0.671$, $P<0.001$); strategic planning and workforce focus ($r=0.697$, $P<0.001$); strategic planning and process management ($r=0.753$, $P<0.001$); customer focus and measurement, analysis and knowledge management ($r=0.780$, $P<0.001$); customer focus and workforce focus ($r=0.657$, $P<0.001$); customer focus and process management ($r=0.604$, $P<0.001$); measurement, analysis and knowledge management and workforce focus ($r=0.847$, $p<0.001$); measurement, analysis and knowledge management and process management ($r=0.814$, $p<0.001$); and workforce focus and process management ($r=0.811$, $P<0.001$).

Table 4: Pearson Correlation Matrix - MBNQA Dimensions and Performance

		Leadership	Strategic planning	Customer focus	Measurement, Analysis and knowledge Management	Work -force focus	Process Management
Performance	r	0.593	0.766	0.479	0.638	0.671	0.765
	p	0.001	0.001	0.001	0.001	0.001	0.001
Leadership	r		0.665	0.604	0.735	0.659	0.659
	p		0.001	0.001	0.001	0.001	0.001
Strategic planning	r			0.503	0.671	0.697	0.753
	p			0.001	0.001	0.001	0.001
Customer focus	r				0.780	0.657	0.604
	p				0.001	0.001	0.001
Measurement, analysis and knowledge management	r					0.847	0.814
	p					0.001	0.001
Workforce focus	r						0.811
	p						0.001

Source: Survey Results

Note: r = Pearson Correlation coefficient; p is level of significance $P < 0.001$

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Among the six dimensions of MBNQA, measurement, analysis, and knowledge management yielded 38.9 percent explanatory power on performance (Table 5) and had a strong positive relationship on performance ($\beta=0.624$ for H mak) (Table 6).

Table 5: Model Summary of Measurement, Analysis and Knowledge Management

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Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics
					Sig. F. Change
Measurement, Analysis and Knowledge Management	.624	.389	.384	.44785	.000

Source: Survey Results

Table 6: Beta Coefficient of Measurement, Analysis and Knowledge Management

Relationship	r	β	p
Measurement, Analysis and Knowledge Management \rightarrow performance	.638	.624	.001

Source: Survey Results

Note: r = Pearson Correlation, β = regression coefficient and p level of significance ($P < 0.00$)

ALIGNMENT OF INFORMATION SYSTEMS IN HEALTHCARE ORGANIZATIONS

There is a need to integrate information systems with quality management (QM) environment. The bureaucratic systems must be transformed into QM friendly systems. The critical analysis identifies there are three categories that describe the scope of information systems with quality management:

- Clinical or medical information system - to be designed primarily to support patient care activities (i.e., patient vital signs monitoring, medical record retrieval)
- Operational Administrative system- to be designed to provide non patient- care activities (i.e., financial, personnel and payroll systems).
- Decision- support systems- to be designed to provide management with information for decision - making (i.e., Strategic planning, analysis and evaluation of specific programme).

The healthcare organization need to have well designed information systems and should be integrating with quality management dimensions. There is a need of systematic and on going performance reporting and monitoring.

There is a need to implement mechanisms that ensure reliability of data, accurate and up-to-date information for continuous quality improvement. There is a need to describe how an information system appears in QM environment. Primarily the Information regarding the patients and patient care should be given maximum importance. The care givers or clinical practioners are the initiators of the patient records and the information that they generate serves as core of patient medical record system. In level two, users begin compiling the information from financial, accounting and billing systems. Level III is third -order time frame and this information is used primarily by reviewers of the organization's quality, productivity and utilization functions. At this juncture many users involved with quality improvement may experience difficulty in accessing the information. It is observed that most of the information systems are not truly integrated to deliver quality performance. The last time frame is long-term strategy function that should include strategic planning, managed care-software, enterprise resource planning, case mix analysis, and marketing. This suggests that the healthcare systems need to promote improved customer services IS- design, judicious use of IT and re-engineering of conventional process so that it can align itself with continuous quality improvement.

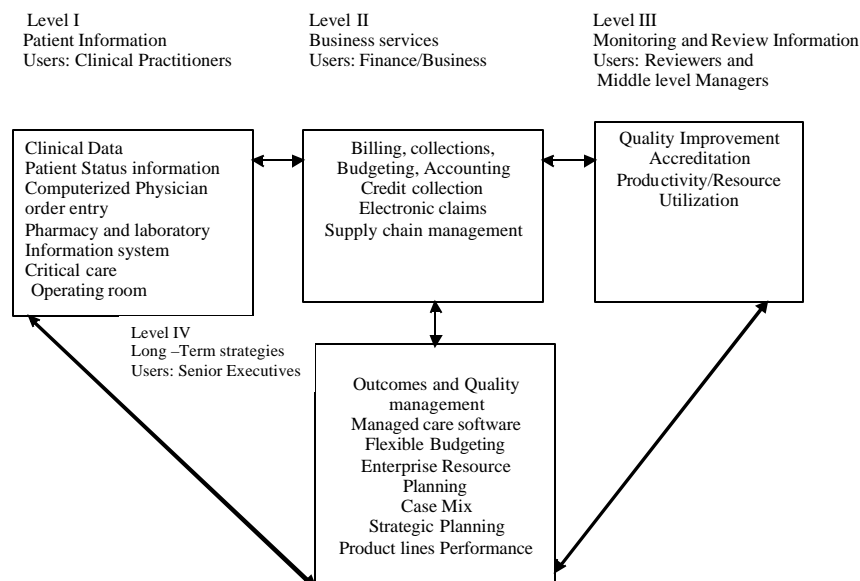


Figure 2: Management by information

CONCLUSION

The impact of information system (IS) on organization's performance excellence has been one of the main focus of service organisation. IS managers face a challenge in assessing the impact of IS on performance. The MBNQA survey was conducted to assist managers and researchers to adopt the Quality Management (QM) dimensions more efficiently in healthcare organizations and enhance the performance. The MBNQA -IS assessment may serve as a much more convenient and economical alternative to the full scale MBNQA evaluation. Healthcare organizations need to adopt MBNQA-IS results to assess and improve their strengths in the areas of total Information System quality. The result of this study also supports the use of MBNQA framework more effectively and emphasises the role of the information dimension as important dimensions of quality management in healthcare organization. Further, the results of this study also indicate that all the dimensions of MBNQA framework contribute to business results and information system is the most important quality management dimension of business results. Future research work needs to be extended towards evaluating technology investment and integration of various database for total information system quality in healthcare organizations.

REFERENCES

- Adelman, S., L. and Moss et al. (2005) 'Data Strategy', Addison-Wesley.
- Austin, C. (1988) 'Health Information system', Boston, MA, Houghton Muffin Company.
- Banerji, K., Gundersen, D.E. and Behara, R.S. (2005) 'Quality Management Practices in Indian Service Firms', *Total Quality Management*, 16:3, 321-330.
- Beise, C. M. (1989) 'Assessment of the information Systems Function: A study of the IS/Organizational Interface (Doctoral Dissertation, Georgia State University)', *Dissertation Abstracts International*, 50, 4010A.
- Bell, R. and Keys, B. (1998) 'A conversation with Curt W. Reimann on the background and future of the Baldrige Award', *Organizational Dynamics*, 26:4, 51-61.
- Bharadwaj, A.S. (2000) 'A resource-based perspective on information technology apability and firm performance: an empirical investigation', *MIS Quarterly*, 24:1, 169-196.
- Bharadwaj, S.G., Varadarajan, P.R. and Fahy, J. (1993) 'Sustainable Competitive Advantage in Service Industries: A Conceptual Model and Research Propositions', *Journal of Marketing*, 57:4, 83-89.
- Brynjolfsson, E. and Hitt, L.M. (2000) 'Beyond computation: information technology, Organizational transformation and business performance', *Journal of Economic Perspectives*, 14:4, 23-48.
- Cao, G., Clarke, S. and Lehaney, B. (2000) 'A Systemic View of Organizational Change and TQM', *The TQM Magazine*, 12:3, 186-194.
- Chow-Chua, C. and Goh, M., (2000) 'Quality improvement in the Healthcare Industry: Some evidence from Singapore', *International Journal of Health Care Quality Assurance*, 13:5, 223-229.

-
- DesRoches, C.M., Campbell, E.G., Rao, S.R., Donelean, K., Ferris, T.G., Jha, A., Kaushal, R., Levy, D.E., Rosenbaum, S., Shields, A.E. and Blumental, D. (2008) 'Electronic health records in ambulatory care - National survey of Physicians', *The New England Journal of Medicine* 359, 50-60.
- Delone, W.H., and McLean, E.R. (1992) 'Information Systems Success: The quest for dependent variable', *Information Systems Research*, 11:3, 43-63.
- Davis, G. B. and Olson, M. H. (1985) 'Management Information Systems: Conceptual Foundations, Structures, and Development', New York: McGraw-Hill Publishing Company.
- Hair, J. F., Anderson, R. E., Tatham, R.L. and Black, W. C. (1995) 'Multivariate Data Analysis', 4th ed., Prentice Hall, Englewood Cliffs, NJ.
- Harris, S.E. and Katz, J.L. (1989) 'Predicting organizational performance using information technology managerial control ratios', Proceedings of the Twenty- Second Annual Hawaii International Conference on Systems Sciences, 4, 197-204.
- Hunt, R.G., Krzystofiak, F. J., Meindle, J. R. and Yousry, A.M. (1989) 'Cognitive style and decision making', *Organizational Behavior and Human Decision Processes*, 44, 436-453.
- India Brand Equity Foundation (IBEF) (2009) 'Healthcare', online (cited on 4th Feb 2010). Available from <URL: <http://www.ibef.org>>
- Lengnick -Hall A.C.(1995) 'The patient as the pivot for quality healthcare delivery', *Journal of the foundation of the American college of health executives*, 40, 25-39.
- Mahmood, A. and Mann, G. (1993), 'Measuring the organizational impact of information technology investment: An exploratory study', *Journal of Management Information Systems*, 10:1, 97-122.
- Moad, J. (1993) 'New rules, new ratings as IS reengineers', *Datamation*, 39:21, 85-87.
- Myers, B. L., Kappelman L. A. and Prybutok, V. R. (1997) 'A comprehensive model for assessing the quality and productivity of the information systems function: toward a theory for information systems assessment', *Journal of Information Resources Management*, 10:2, 6-25.
- N.I.S.T. (1995) 'Malcolm Baldrige National Quality Award: Criteria for Performance Excellence', *Department of Commerce, National Institute of Standards and Technology*.
- N.I.S.T. (2000) 'Malcolm Baldrige National Quality Award: Criteria for Performance Excellence', *Department of Commerce, National Institute of Standards and Technology*.
- Nolan, Norton and Co. (1985) 'The economics of computing in the advanced stages' *Stage by Stage, European Issue (spring)*.
- O'Connor, S. and Shewchuk, R. (1989) 'The Influence of Perceived Hospital Service Quality on Patient Satisfaction and Intentions to Return', *Academy of Management*, Best papers: Forth-ninth Annual Meeting of Academy of Management, Washington.
- Pestonjee, D.M., Sharma K.H. and Patel, S. (2005) 'Image and Effectiveness of Hospital: An HR Analysis', *Journal of Health Management*, 7:1, 41-90.
- Pitt, L.F., Watson, R.T. and Kavan, C.B. (1995) 'Service quality: A measure of information systems effectiveness', *MIS Quarterly*, 19:2, 173-187.
- Powell, T. C. and Dent-Micallef, A. (1997) 'Information technology as competitive advantage: the role of human, business, and technology resources', *Strategic Management Journal*, 18:5, 375-405.
- Prybutok, V. R. and Stafford, M. (1997), 'Using the Baldrige criteria for self-assessment' *Marketing of Health Services*, 17:1, 45-48.
- S.Devaraj, R. Kohli (2000) 'Information technology payoff in the healthcare industry: longitudinal study', *Journal of management information systems* 16 (spring), 41-48.
- Saunders, C.S. and Jones, J.W. (1992) 'Measuring performance of the information systems function', *Journal of Management Information Systems*, 8:4, 63-82.
- Sangwan, R. and Bass, M. et al. (2007) 'Global software development', Hand Book , Auerbach Publication.

-
- D'Souza, S. C.
Sequeira, A.H.
- US DoCNBS (2003) 'U.S department of commerce national institute of standards and technology', *Malcolm Baldrige National Quality Award criteria for performance excellence*, Washington, DC.
- US DoCNBS (2008) 'U.S department of commerce national institute of standards and technology', *Malcolm Baldrige National Quality Award criteria for performance excellence*, Washington, DC.
- Wilson, D.D. and Collier, D.A. (2000), 'An empirical investigation of the Malcolm Baldrige National Quality Award causal model', *Decision Sciences*, 31: 2, 361-390.

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