

## The Survey of Business Intelligence in the Baqiyatallah Hospital: Our Experience and Literature Review (Tehran, 2014)

Shahram Tofighi<sup>1</sup>, Abbas Ebadi<sup>2</sup>, Roohollah Zaboli<sup>3</sup>, Sharareh Rostam Niakan Kalhori<sup>4</sup>, Manaf Abdi<sup>5\*</sup>, Mohammad Hossein Basirat<sup>6</sup>, Esmail Feyzi<sup>7</sup>

### Abstract

**Introduction:** one of the important aims was to provide services with the quality of organizational intelligence and aim of this study was to assess the organizational intelligence in Baqiyatallah hospital that conducted based on Karl Albrecht's Organizational intelligence components. We tried to evaluate the status of the quality of services based on these components.

**Methods-** the study was descriptive and was conducted through cross-sectional method. The sampling method was full enumeration from the top and middle managers of Baqiyatallah hospital in which 107 respondents were questioned. Data was collected by the Karl Albrecht's standard questionnaire of organizational intelligence that included 7 component and 49 questions. The validity of questionnaire assessed by face and content-related validity and reliability was obtained using Cronbach's alpha 0/92. Data was analyzed in SPSS 15. We used descriptive statistics such as mean, standard deviation and inferential statistics such as Pearson's test, t-test.

**Findings-** 57% of participants were male and 43% were female. Findings indicated that unity and agreement in hospital with mean 3.18, SD 0.4 and appetite for change with mean 2.61, SD 0.5 had highest and lowest rating respectively. The total score of organizational in the hospital had mean 2.92 and SD 0.4.

**Conclusion-** according to scores obtained, the organizational intelligence of the hospital (with mean 2.94 and SD 0.4) had the middle level. We can perform and implement the organizational intelligence through some corrective measures.

**Key words:** business intelligence- organizational intelligence- hospital- data- data mining

1. Health Management Research Center, Baqiyatallah University of Medical Sciences.

2. Nursing Faculty, Baqiyatallah University of Medical Sciences, Tehran, Iran

3. Health Services Management Department, Health School, Baqiyatallah University of Medical Sciences.

4. Department of Public Health, School of Health, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran

5. Health Services Management Department, Health School, Baqiyatallah University of Medical Sciences, Tehran, Iran

Corresponding author.Email:

6. Master of Statistics, Baqiyatallah Hospital, Tehran, Iran

7. Health Services Management Department, Baqiyatallah University of Medical Sciences, Tehran, Iran

#### \* Corresponding Author

**Manaf Abdi**, Health Services Management Department, Health School, Baqiyatallah University of Medical Sciences, Tehran, Iran  
E-mail: m\_abdi56@yahoo.com

**Keywords:** Business Intelligence, Organizational Intelligence, Hospital, data, data Mining.

Submission Date: 22/10/2014

Accepted Date: 20/12/2014

### Introduction

Organizational intelligence is one of the main components for improving the organizational performance. Organizational intelligence affects the quality of management decisions and thereby improves the quality of organizational performance (1). One of the basic infrastructures to improve the quality of hospital services is the use of information; manager of hospitals can analyze the quality and quantity of the organization by using clear and timely information and complicated technologies such as organizational intelligence and data mining (2). In current era, organizations do not concern about the collecting and storing information in huge databases. Nowadays, the main concern of the many organizations is the effective use of data stored in the huge databases. Daily, a massive data has been made in the different part of hospital (hospital as a complicated organization) (3).

Business intelligence refers to the process of converting the raw data to business and management information that helps the decision makers of organization to make faster and better decisions and to act on the correct information (8,9).

### Data mining

One of the tools used in organizational intelligence is data mining. Data mining is a process that uses a variety of analytical tools to discover patterns and relations between the data that are used for authenticating the forecasts (4). Nowadays, collecting a lot of data about various diseases is very important in medical knowledge. Medical centers collect these data with various purposes (5). Researching on these data and obtaining useful results and patterns about diseases is one of the goals of collecting data. The enormous volume of data and the confusion resulting from these data is a challenge that prevent from achieving of significant results (6,7).

### Data mining in healthcare

Healthcare is one of the important parts of industrial societies. Extracting knowledge from huge volumes of data related to diseases records and medical records of people via data mining can be resulted to identify the rules of development and spread of diseases and to provide the valuable information in relation to the causes, diagnosis, prediction and treatment of diseases by the current environmental factors and make them available to health practitioners and professionals (8,10).



### Stage of knowledge discovery:

Knowledge discovery included the following stages:  
 Data cleaning (eliminating noise and incompatibility of data)  
 Data integration (several data sources are combined)  
 Data selection (data related to the analysis are recoveries from databases)  
 Data conversion (converting the data to a form that are suitable for data mining such as summarization and matching)  
 Data mining (the main process included the smart procedures for extracting patterns from data)  
 Pattern evaluation (to determine the correct and desired patterns by measure factors)  
 Providing knowledge (visual representation, knowledge representation techniques are used to provide the knowledge discovered to users) (11,12).

Hospital as a complicated organization, collect and store large amount of data that in many cases do not use from this information. To be success in decision making and leading in organization, we should use new management technologies and tools that one of them is organizational intelligence. Organizational intelligence can extract the hidden knowledge by using massive data in databases and data mining (13,14). So far, the organizational intelligence and data mining has been widely used to detect and predict disease process (15,16). As for to use of any tools, the infrastructure must be prepared firstly; therefore the purpose of this study was to determine the situation of organizational intelligence in a hospital based on Albrecht's components. The study focused on the cultural of organizational intelligence from the perspective of hospital staffs, in order to analyze the current challenges in deploying of the system. Many studies have been done about organizational intelligence in various organizations. Some of which are mentioned below.

Keimasi in "comparative survey of organizational intelligence between private and governmental banks" (2011) indicated that the organizational intelligence in private banks is significantly higher than governmental banks.

In a study titled "The relationship between knowledge management and organizational intelligence components in the schools of Isfahan university of medical sciences" (2011) conducted by Keyvan R. it was shown that the use of knowledge management in organization enhances the organizational intelligence.

Mixell in "Organizational intelligence and life power: a systematic framework for organizational renewal" noted to important issues that improve an organization's compatibility and re-building (17,18).

Halal showed that how managers can use from organizational intelligence to improve their performance. He thought that organizational intelligence consisted of five subsystems. These subsystems are: organizational structure, culture, stakeholders' relations, knowledge management and strategic processes (19,20).

Matsuno Matsu in the comparative study of performance opportunities in smart organizations and organizations with

lower IQ said that performance opportunities in smart organizations is 5 times more than organizational with lower IQ (21,22,23).

Albrecht in his article "organizational intelligence and knowledge management" referred to four factors: leaders of ideas, stakeholders' community, adhocracy and platform of organizational intelligence's knowledge (24,25).

### Research methods

This study was a cross sectional-descriptive survey that was conducted in Baqiyatallah hospital by using the standard questionnaire of Albrecht's organizational intelligence. The questionnaire includes 7 components and 49 questions that its validity was verified by experienced professors and by using face and content-related validity and its reliability was obtained using Cronbach's alpha 0.92. The Albrecht's standards questionnaire for measuring organizational intelligence was designed with 7 components in 2003 that has been graded based on Likert's five items scale (from strongly disagree with 1 to strongly agree with 5). In this questionnaire, the good score is 3 and the performed analysis was compared with number 3 (16,22).

The studied population was included the top and middle managers of Baqiyatallah hospital that this population studied by full enumeration, because of the availability and small size of populations. After distributing of the questionnaire, total of 102 questionnaires completed and used for analysis.

Data was analyzed in SPSS 15 and analyzed by using Pearson's descriptive and inferential statistics and t-test.

### Research aims

Determining the status of organizational intelligence of Baqiyatallah hospital in terms of Albrecht's organizational intelligence components.

Determining the status of organizational intelligence of Baqiyatallah hospital in terms of gender of staffs.

Determining the status of organizational intelligence of Baqiyatallah hospital in terms of type of membership.

Determining the status of organizational intelligence of Baqiyatallah hospital in terms of type of job.

Determining the status of organizational intelligence of Baqiyatallah hospital in terms of work experiences.

### Findings

The participants were included the top and middle managers of Baqiyatallah hospital. The size of participant were 107, of whom 61 were male (57%) and 46 were females (46%). According to above table, the minimum work experience of participant was 1 year and the maximum was 28 years.

Table above show that the mean and SD of organizational intelligence component. The average score of components "shared vision, shared fate and unity and agreement" was upper than the average score of 3 and the scores of other components were lower than the average score of 3.

**Table 1.** Descriptive statistics of work experience

Variable	Mean	SD	Lowest	Highest
Years' work experience	11.6	7.1	1	28

**Table 2.** Findings related to organizational intelligence in the Baqiyatallah hospital

component	size	Mean	SD
Shared vision	106	3.0210	.49879
Shared fate	107	3.0107	.56863
Appetite for change	104	2.6140	.51791
Staffs' mood	106	2.8693	.54071
Unity and agreement	102	3.1827	.35606
Use of knowledge	106	2.7291	.62935
Performance pressure	107	2.8638	.56170
Total score of organizational intelligence	102	2.9400	.42015

**Table 3.** Comparing the means of organizational intelligence scores with the desirable score of 3

component	Mean	SD	t value	p value	Lower limit	Upper limit
Shared vision	3.0310	.49879	.640	.524	-.0651	.12710
Shared fate	3.0107	.56836	.194	.846	-.0983	.11970
Appetite for change	2.6140	.51791	-7.600	.001	-.4867	-.2853
Staffs' mood	2.8693	.54071	-2.489	.014	-.2349	-.0266
Unity and agreement	3.1821	.39606	4.643	.001	.1043	.2599
Knowledge application	2.7291	.62935	-4.432	.001	-.3921	-.1497
Performance pressure	2.8638	.56170	-2.508	.014	-.2438	-.0285
Total score of organizational intelligence	2.9400	.42015	-1.443	.152	-.1425	.0225

**Table 4.** Findings of Albrecht's organizational intelligence components at the hospital in terms of Gender

component	Gender	Size	Mean	SD	Std. Error mean
Shared vision	Male	58	3.1034	.43627	.05728
	female	48	2.9435	.55738	.08045
Shared fate	Male	59	3.0847	.57150	.07440
	female	48	2.9196	.55751	.08047
Appetite for change	Male	56	2.7679	.48393	.06467
	female	48	2.4345	.50267	.07255
Staffs' mood	Male	58	2.9606	.52492	.06893
	female	48	2.7589	.54431	.07856
Unity and agreement	Male	57	3.1855	.40403	.05351
	female	45	3.1778	.39023	.05817
Use of knowledge	Male	58	2.8621	.65052	.08542
	female	48	2.5685	.56875	.08209
Performance pressure	Male	59	2.8935	.54404	.07083
	female	48	2.8274	.58640	.08464
Total	Male	58	2.9870	.45003	.05909
	female	44	2.8780	.37317	.05626

**Table 5.** Compromise of organizational intelligence in terms of gender

component	Degree of freedom	t value	p value
Shared vision	104	1.658	0.1
Shared fate	105	1.503	0.136
Appetite for change	102	3.44	0.001
Staffs' mood	104	1.936	0.056
Unity and agreement	100	0.097	0.923
Use of knowledge	104	2.447	0.016
Performance pressure	105	0.603	0.548
Total score of organizational intelligence	100	1.302	0.196

The total score of organizational intelligence was lower than the average score of 3.

According to the result obtained, the component of unity and agreement with the mean 3.18, SD 0.4 and p=0.001 was upper than the desired level. The score of appetite for change with the mean 2.6, SD=0.5 and p=0.001 was lower than the desirable level. Staffs' mood with the mean=2.9, SD=0.5 and p=0.01, use of knowledge with the mean=2.7, SD=0.6, p=0.001 and performance pressure with the mean

=2.9, SD=0.6 and p=0.014 were lower than the desirable level. The score of shared vision with the mean 3, SD=0.7 and p= 0.5 was moderate; component of shared fate with the mean 2, SD=0.7 and p= 0.8 was desirable and the total score of organizational intelligence with the mean 3, SD=0.4 and p= 0.1 was at desirable level.

According to the table above, the average of organizational intelligence in men are more than women.

There is significant difference between the scores of appetite for change ( $p=0.003$ ), staff's mood ( $p=0.002$ ), use of knowledge ( $p=0.04$ ) and performance pressure ( $p=0.2$ ) in terms of education level. It means that with increasing the education level, appetite for change, staff's moral, use of knowledge and performance pressure also increased.

Job type has a significant difference with all components ( $p<0.005$ ) and top managers' organizational intelligence is lower than others.

The table above shows the results of comparison of the average of organizational intelligence in terms of gender. According to results obtained, there are significant differences between male and female's score in appetite for change ( $p=0.001$ ) and use of knowledge ( $p=0.016$ ) and these results showed that the men's score is more than women's score.

## Discussion

Haqiqat and et al. (2012) in a study "Effects of contextual dimensions of effectiveness with regard to the role of Business Intelligence Knowledge Management Case Study: Saman Bank" showed that there is dramatic and positive correlation between the contextual dimension and effectiveness of business intelligence; and knowledge management as a moderating variable can improve the relationship between the contextual dimensions and effectiveness of business intelligence (26). In our study, organizational intelligence in vision, shared fate and unity obtained very good point and but the scores in other components were good.

Babolhavaeji and et al. in a study "organizational intelligence testing of library's staffs of Astane Quds Razavi and Ferdowsi University of Mashhad" (2010) indicated that there are no significant differences between organizational intelligence in library of Astane Quds Razavi and library of Ferdowsi University of Mashhad, but this does not apply to shared vision (27). Ardalan and et al. (2012) in "knowledge of leadership: organizational intelligence and organizational effectiveness" showed that knowledge of leadership, organizational intelligence and organizational effectiveness are upper than the average level. Pearson correlation coefficient revealed that there is a dramatic and positive relation between knowledge of leadership, organizational intelligence and organizational effectiveness (28).

Ardalan and et al. (2012) in "relation between organizational intelligence and performance management" showed that there is no significant relation between organizational intelligence and performance management; but there is a significant relation between organizational intelligence and knowledge management as a subset (29).

## Conclusion

According to scores obtained, organizational intelligence of Baqiyatallah hospital with the mean= 2.94 and SD= 0.4 is average and organizational intelligence can implemented and applied by some corrective measures. For improving the scores of organizational intelligence in the hospital, we should focus more on the appetite for change, use of knowledge and performance pressure. By improving the scores of organizational intelligence and implementing the tools and culture of organizational intelligence, the hospital can be managed intellectually and appropriate decisions and

responses may be made in the face of the environmental changes.

## References

1. Beikzadeh J, Mohammadbagher A., Examine the relationship between organizational intelligence with their performance in governmental organizations Province. *Journal of Management*. 2011 ;3(8):20. [ Persian].
2. Torani S, shahbazi B. Factors affecting the implementation of Total Quality Management in University Hospitals Iran University of Medical Sciences. *Hakim Research Journal*. 2009 ;11(2):10. [ Persian].
3. Abdari T, esfidani MR. Take a business intelligence system in the insurance industry. *Journal of Supply Chain Management* 2013;15(40). [ Persian].
4. Mogadasi H, hosaini A. Data mining and its application in health. *Health Information Management*. 2011. 9(2). [ Persian].
5. Spil TA, Stegwee RA, Teitink CJ, editors. Business intelligence in healthcare organizations. *System Sciences, 2002 HICSS Proceedings of the 35th Annual Hawaii International Conference on*; 2002. 0-7695-1435-9/02 \$17.00 (c) 2002 IEEE
6. Malekzadeh G. Powerful business intelligence tools in the management of knowledge-based companies. *Journal of Technology*. 2010;6. [ Persian].
7. Mansmann S, Neumuth T, Scholl M. OLAP technology for business process intelligence: Challenges and solutions. *Data Warehousing and Knowledge Discovery*. 2007: -22.
8. Wisniewski MF, Kieszkowski P, Zagorski BM, Trick WE, Sommers M, Weinstein RA, et al. Development of a clinical data warehouse for hospital infection control. *Journal of the American Medical Informatics Association*. 2003;10(5):454-62.
9. Abolmsom F, Alizadeh S. Using data mining techniques to examine factors affecting the failure of treatment for infertility. 2014.;16(54):46-55. [ Persian].
10. Manf A, Shahram T. Application of Business Intelligence in hospital. *First International Conference on Organizational Intelligence*. Islamic Azad University, North Tehran. 2011. [ Persian].
11. GHazanfari M, Jafari M. Needs assessment of the Iran Trade Promotion Organization of business intelligence erp case study. *New Journal of Economics and Business*, Issue 13, Summer 2009, S45-22. [ Persian].
12. Goleman D, Boyatzis R. Social intelligence and the biology of leadership. *Harvard Business Review*. 2008;86(9):74-81.
13. Shirazi M, Godarzi H. Organizational change in the relationship between learning organization with business intelligence systems in the Telecommunication Company of Tehran, *Beyond Management*, Vol 5, Issue 18, 2011, S7-24. [ Persian].
14. Salsali M, Kamkar M. Relationship between intelligence and its components by reducing Developers OCB employees Spadan. [ Persian].
15. Sarafi A, Hafzi M. Study of the relationship between organizational intelligence and organizational learning among librarians at public universities in Tehran. *LIS research university*. 2013.;46(3):13-30. [ Persian].
16. Okkonen J, Pirttimäki V, Hannula M, Lönnqvist A, editors. *Triangle of Business Intelligence, Performance Measurement and Knowledge Management*. IInd Annual Conference on Innovative Research in Management, May 9-11, Stockholm, Sweden; 2002: Citeseer.
17. Adel A, Ahmadi P, Sebt M. Desining Model for Choosing human resources with data mining approach. *Journal of Iranian Technology* 2010; 2(4): 5. [ Persian].
18. Zavari MA. Business intelligence, business intelligence Origin. *Tadbir*. 2009. 1235-44; . [ Persian].

19. Spil TA, Stegwee RA, Teitink CJ, editors. Business intelligence in healthcare organizations. System Sciences, 2002 HICSS Proceedings of the 35th Annual Hawaii International Conference on; 2002. 0-7695-1435-9/02 \$17.00 (c) 2002 IEEE
20. Mans R, Schonenberg M, Song M, van der Aalst WM, Bakker PJ. Application of process mining in healthcare—a case study in a dutch hospital. Biomedical Engineering Systems and Technologies: Springer; 2009. p. 425-38.
21. Prevedello LM, Andriole KP, Hanson R, Kelly P, Khorasani R. Business intelligence tools for radiology: creating a prototype model using open-source tools. Journal of digital imaging. 2010;23(2):133-41.
22. Nabovati E, Azizi AA, Abbasi E, Vakili-Arki H, Zarei J, Razavi AR, et al. Application of data mining to predict mortality in burn patients: comparison of several algorithms. Health Information Management. 2012. 10(6):789-99.[ Persian].
23. M ME. Organizational Intelligence and Vitality: a systematic Framework for Organizational Renewal. 2008 .Available from: URL <http://www.Proquest,Umicom>
24. Canlas RD. Data Mining in Healthcare: Current Applications and Issues [Online]. 2009 [cited 2009 Aug 9]; Available from: URL: [http://mines.humanoriented.com/classes/2010/fall/csci568/papers/Data\\_Mining\\_Health.pdf](http://mines.humanoriented.com/classes/2010/fall/csci568/papers/Data_Mining_Health.pdf). 2012
25. Matheson D. Smart Organization Perform Better Research Technology Management Journal. 2009;1(1):1-16.
26. adidi.R, Memari F, Anbari Z. The relationship between organizational structure and organizational intelligence in teaching hospitals affiliated Arak University of Medical Sciences. Journal of Arak University of Medical Sciences. 2013. 8(77):10.[ Persian].
27. Hagigat monfared.J, SHaban M. Effects of contextual dimensions of effectiveness with regard to the role of Business Intelligence Knowledge Management Case Study: Saman Bank Quarterly Scientific Journal of Management Research. 85-65.(9)27; 20012 .[ Persian].
28. Alhavaeji F. Organizational intelligence testing Library of Astan Quds Razavi Mashhad University of Library and Information. 2011;1(13):12.[ Persian].
29. Ardalan M, Esksndari A. Knowledge of leadership, organizational intelligence and organizational effectiveness. Management of Strategic Studies. 2011. 12:71-100.[ Persian].