

## Agile design of public hospitals in Iran

Masoomeh Abdi,<sup>1</sup> Mohammad Ali Jahani,<sup>2</sup> Mousa Yaminfirooz,<sup>3</sup>  
Ghahraman Mahmoudi,<sup>4\*</sup> Mohammad Amin Bahrami<sup>5,6</sup>



### ABSTRACT

**Background:** Hospitals as a part of the organization, because of the sensitivity and importance of the treatment must have an today's dynamic agile structure to be able to adapt to environmental changes. Therefore this study was to provide a structural model of agility in hospitals.

**Methods:** This descriptive study conducted in the year 2015. A total of 260 peoples selected as a sample from mentioned the statistical population. The validity of the questionnaire through examination exploratory and confirmatory factor analysis and reliability tests with Cronbach's alpha was approved 0.97. Data software 18 SPSS and 8.5 listed a factor analysis using mathematical models the final model was developed based on confirmatory factor analysis confirmed the pattern was evaluated.

**Results:** Question-related to four agility (responsiveness, competence, flexibility, speed) measured at the agile of hospital and supply chain (independent variables) to correctly cover the variable and validity. Agile supply chain variable between maximum sensitivity and responsiveness ( $1.98 \pm 0.66$ ). To develop the skills of employees, found that the lowest average of ( $1.34 \pm 0.46$ ) as well as structural equation modeling, and all relationships were verified ( $P$ -value  $< 0.001$ ).

**Conclusions:** Therefore, it is suggested to apply that to be successful and better adapted to the environment and achieve enhanced service quality, employee satisfaction and patients, competitiveness, reduce costs, reduce time to service delivery and organizational agility.

**Keywords:** Agile manufacturing, Responsiveness, Competence, Speed

**Cite This Article:** Abdi, M., Jahani, M.A., Yaminfirooz, M., Mahmoudi, G., Bahrami, M.A. 2018. Agile design of public hospitals in Iran. *Bali Medical Journal* 7(2): 285-289. DOI:10.15562/bmj.v7i2.797

<sup>1</sup>MSc of Health Services Management, Babol University of Medical Sciences, Babol, Iran

<sup>2</sup>Social Determinants of Health Research Center, Health Research Institute, School of Medicine, Babol University of Medical Sciences, Babol, Iran

<sup>3</sup>Department of General Education, School of Medicine, Babol University of Medical Sciences, Babol, Iran

<sup>4</sup>Hospital Administration Research Center, Islamic Azad University, Sari Branch, Sari, Iran

<sup>5</sup>Associate Professor, Healthcare Management Department, Shahid Sadoughi University of Medical Sciences, Yazd, Iran

<sup>6</sup>Hospital Management Research Center, Shahid Sadoughi University of Medical Sciences, Yazd, Iran

\*Correspondence to:  
Ghahraman Mahmoudi, Hospital Administration Research Center, Islamic Azad University, Sari Branch, Sari, Iran

### INTRODUCTION

The business environment is unpredictable and variable in the current era, excellence in competition is the primary goal of any organization.<sup>1</sup> So that, the largely unpredictable and cannot be a pre-determined response, and a new level of flexibility and agility, they need it.<sup>2</sup> Agility pattern, to innovate products, in low volumes, supply chain highly volatile, in which customer needs are often unpredictable, and source control functionality and innovation is difficult to overcome such excellent health services.<sup>3</sup> But most organizations are an agile way to fail not because they did not respect the principles of agility, but just because there have not linkages between sectors.<sup>4</sup> In today's environment, every organization must be simultaneously producing different products and short lifespan, redesign of products, changes in production methods and called "agile organization," read the response can be effective to change.<sup>5</sup> Organizational agility is a significant business capability.<sup>6</sup> Health System hospitals and non-profit organizations that can manage with economic and administrative mechanisms should be considered because: If you look at the hospital with the attitude of an organization, it will change the perspective of the patient to stare at us.<sup>7</sup> That Organization of care covers access, waiting times, reliability and efficiency.<sup>8</sup> The hospitals that are part of the organization because of the

sensitivity and importance of the treatment must be agile to survive in today's dynamic and responsive to the needs and demands of their patients<sup>9</sup> for diagnosis and treatment of patients<sup>10</sup> and improve their service quality.<sup>11</sup> Agility in the supply chain can define as "the ability of a supply chain to react quickly to market changes and customer needs".<sup>12</sup> Supply chain agility is a key determinant of competitiveness in today's dynamic and turbulent business environment.<sup>13</sup> And able to respond worthily to the way the changes that happen in work environment.<sup>14</sup> With respect to work and achieve success factors in the supply chain of eleven components (development of staff skills, use of information technology, integration processes, sensitivity and responsiveness to market, appropriate planning, flexibility, new product introduction, speed of delivery, reduce costs, customer satisfaction, product quality) were identified that were more common.<sup>15</sup> Sherehiy et al., the study of the properties of the flexible global business agility, responsiveness, speed, culture change, integration and low complexity, good quality products and services and mobility introduce essential competencies.<sup>16</sup> Yang et al. announced that due to the numerous obstacles that environmental factors into their organizations.<sup>17</sup> Qumer and Henderson-Sellers in their study stated that agile methods are the way in which the focus

is on employees, relationship-oriented, flexible, fast, responsive and creative learning that managers rely on them to staff to deal with the instability.<sup>18</sup> Agile organizations are made to understand and predict changes in the business environment in this context, to re-structure their own.<sup>19</sup> In most developing countries 5-10 % of government expenditure allocated to the health sector.<sup>20</sup> This study is to investigate the factors influencing hospital agility provide a model for agility.

## METHODS&MATERIALS

Current research of studies applied and case studies in 2015, which was developed using structural equation modeling. The study population consisted of the directors, managers, and experts, including doctors, hospitals, university faculty members, senior experts and specialists in the field that have been in a hospital. The Kaiser- Meyer- Olkin (KMO) is used in structural equation modeling. If  $P$ -value  $< 0.05$ , it is sufficient to sample size in the method for determining the sample size that ranged from 10 - 20 times of the number of samples will act.<sup>21</sup> In the present study to determine the sample size based on the number of variables, multiplying  $13 \times 10-20$ . A total of 260 people were selected from the population.<sup>22</sup> Cluster sampling is used for the whole country into five regions (North, South, Central, East, and West) and each region are divided into four selected hospitals and 52 quotas were allocated to each region. Participation in this study is voluntary, and informed consent of the study subjects was taken for research. Using the study of books and articles in Persian and English and with the help of

scientific information, the internet, agile organizations that theoretical models have been examined. The health care system, including hospitals, schools and health organizations in the agile application patterns have been studied. Cronbach's alpha coefficient was calculated questionnaire of 0.97. The two-part questionnaire that included demographic data is the first part. The second part of the survey included questions on the agility of public hospitals is designed to examine the questionnaire contained 53 closed questions. The Scale used a Likert scale of 5 options. 280 questionnaires have been scholars and experts finally collected and analyzed 260 questionnaires were based on test hypotheses. Exploratory factor analysis was performed on data from the questionnaires and the final model was developed using mathematical models based on confirmatory factor analysis confirmed the pattern was evaluated. In combination with the use of SPSS version 18 and version 8 with LISREL using Kolmogorov-Smirnov test, regression test and Friedman to analyze, the data in a meaningful level of  $P$ - value  $\leq 0.05$  was used.

## RESULTS

According to the findings, the factors that affect the agility of the most scores in the hospitals of varying flexibility of  $(2.23 \pm 0.84)$  and the least average of the variable competence of  $(1.36 \pm 0.38)$ , respectively shown in Table 1.

Concerning the adequacy of the sample size appropriate use Kaiser- Meyer- Olkin (KMO) size for examples Bartlett, meaningful test data that suitable for factor analysis shown in Table 2.

**Table 1** Description of statistics for the variables of the supply chain of agility public hospitals and Kolmogorov-Smirnov test results

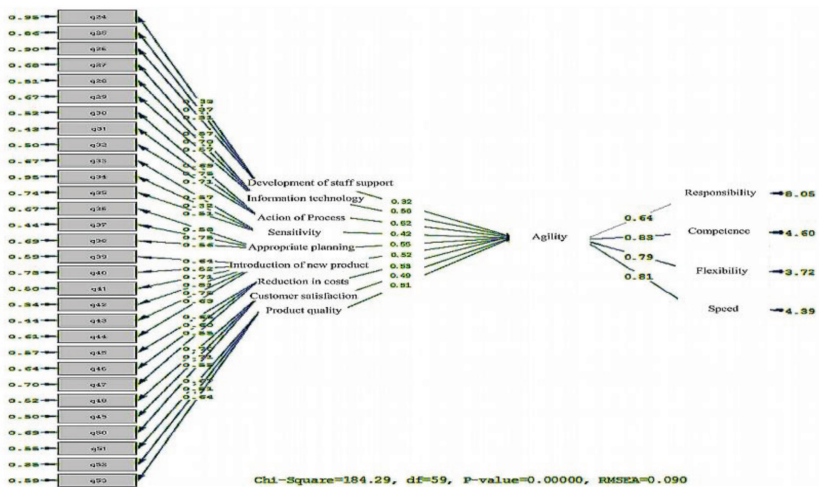
Statistics Variable	Number	At least	Up to	Average	Variance	P-value
Responses	260	1	3	$1.61 \pm 0.48$	0.23	0.000
Competency	260	1	3	$1.36 \pm 0.38$	0.14	0.000
Flexibility	260	1	3	$2.23 \pm 0.84$	0.70	0.000
Delivery speed	260	1	4	$1.49 \pm 0.78$	0.71	0.000
Agility (in general)	260	1	3	$1.51 \pm 0.37$	0.14	0.000
Employees develop skills	260	1	5	$1.37 \pm 0.46$	0.21	0.000
Application of Information Technology	260	1	3	$1.51 \pm 0.50$	0.25	0.000
Integration processes	260	1	4	$1.58 \pm 0.53$	0.28	0.000
Responsive to market	260	1	5	$1.98 \pm 0.66$	0.43	0.008
Planned accordingly	260	1	3	$1.45 \pm 0.47$	0.22	0.000
New product introductions	260	1	2	$1.56 \pm 0.54$	0.29	0.000
Lower costs	260	1	4	$1.74 \pm 0.67$	0.45	0.000
Customer satisfaction	260	1	3	$1.46 \pm 0.47$	0.22	0.000
Quality	260	1	4	$1.53 \pm 0.60$	0.36	0.012

**Table 2** Sizes of KMO solved Bartlett Sphericity test for the variable agility and agility of public hospitals in Iran

Index	Good value	Earned Value	
		Supply chain	Agility
K.M.O	$\geq 0.7$	0.813	0.851
Bartlett significant level	$\leq 0.05$	0.000	0.000
Test results		Suitable	Suitable

**Table 3** Indicators of the fitness and agility of the supply chain research model for public hospitals in Iran

Fitness index	$\chi^2/df$	SRMR	RMSEA	GFI	AGFI	NFI	CFI	IFI
Fitness research models	3.12	0.03	0.090	0.93	0.91	0.93	0.92	0.74

**Figure 1** Times the standard functional, of a structural model for the study of supply chain agility and public hospitals in Iran

According to the output listed software, fitness index values obtained are appropriate, and all the numbers and load factor greater than 0.5 is acceptable and desirable (Figure 1).

Table 3 shows the results of the research model that fit are indices in good condition. The goodness of fit index, which ranges between 0-1 with a value of 0.74 is an excellent reception.

## DISCUSSION

According to the results, confirmatory factor analysis showed diagrams and then the question of the four potential agility (responsiveness, competence, flexibility, speed) in total hospital assessment and supply chain agility (independent variables) to cover the variable to make it valid properly. Costs, customer satisfaction and product quality, agility public hospitals in Iran, like similar studies were confirmed, so that the supply chain agility factors can affect the hospitals.

Seyedhosseini et al., at the design of agility in the process of new product development models, using path analysis in Tehran, the conclusion is new product development agility and conquer of the market is effectively competitive.<sup>23</sup> Hesami et al. stated that the new product development and supplier management and development directly and indirectly, and delivery management only indirectly affected the agility of the supply chain.<sup>24</sup> Alzoubi et al. in their research, stated that the new product development process is significantly associated with agility.<sup>25</sup> Salimi et al., the studies in the IRIB industry stated that information technology and supply chain are the most ranking and human resources is the least ranking.<sup>26</sup> Molavi et al., the research in the Isfahan industry stated that information and management technology strategies compared to other industry have a positive effect on agility.<sup>27</sup> Ghorbanizadeh et al., was researched Bahman Group automotive companies stated that a learning culture and a significant positive are the impacts on organizational agility and knowledge management.<sup>28</sup> Zanjirchi et al., the research did in Yazd textile industry when the organization agility that knowledge management is the sense of balance and as a result of extreme weakness in the infrastructure of knowledge management in Yazd the textile industry companies have reduced agility.<sup>29</sup> Zanjirchi and Olfat research showed that the needs of the new business environment always create new ways to compete. Depending on the firm support of the theoretical and the need for organizations to be comprehensive, effective structures on the agility of Total Quality Management, information technology management and lean manufacturing.<sup>30</sup>

Ribeiro and Colombo in their study concluded that the operational agility of the intelligent and multi-skilled staff have a significant effect.<sup>31</sup> Zain M, Rose, the real use of information technology in research and considerable direct impact on organizational agility.<sup>32</sup> And hospitals also considered including organizations that are dependent desperate information technology.<sup>33</sup>

Studies have shown that agile organizations could gain an increased success rate (about 20%) than their counterparts in the implementation of development measures.<sup>34</sup> As well as in 2007, a report by the Institute Astndysh group showed that only 16 % of the time agile software projects were successful, but after the agile, Gartner report showed that 77% of projects were successful.<sup>35</sup> As well as a case study as the presentation of supply chain agility factors and evaluation of indicators National Iranian Oil Company, it represents the direct connection agile supply chain with agility organization. Investment in such companies with

high volume and having common resources and the importance of commitment to customers, no agile supply chain and the lack of timely supply of pieces cause damage and opportunity costs and discontent that is irreparable.<sup>36</sup> For many reasons, stated about the problems in the health system, such as getting into the competitive environment and the use of market mechanisms for the continued existence of the need for change is greater than ever.

## CONCLUSIONS

The program should be modified to achieve the objective of the health system and respond to the needs and expectations of the society had to be developed. The success and better adaptation to the environment and achieving increase service quality, satisfaction staff and customers, competitive advantage, reducing costs, reducing service time and organizational agility is recommended.

## ACKNOWLEDGEMENTS

In this way, the authorities of the University of Surrey, professors, doctors, and experts across the country to assist in the investigation, finally, we said thank you.

## REFERENCES

- Zeng J, Jumbo A, Zhang J. Embracing Agile Health Analytics: A Use Case for Stroke Registry. *International Journal of Health Research and Innovation*, 2014;2(2):1-10.
- Highsmith J. *Agile project management: creating innovative products*. 2nd Edition, Pearson Education; 2009;p:237.
- Lin C-T, Chiu H, Chu P-Y. Agility index in the supply chain. *International Journal of Production Economics*. 2006;100(2):285-99.
- Geraldi JG, Lee-Kelley L, Kutsch E. The Titanic sunk, so what? Project manager response to unexpected events. *International Journal of Project Management*. 2010;28(6):547-58.
- Pan F, Nagi R. Robust supply chain design under uncertain demand in agile manufacturing. *Computers & Operations Research*. 2010;37(4):668-83.
- Lee O-K, Sambamurthy V, Lim KH, Wei KK. How Does IT Ambidexterity Impact Organizational Agility? *Information Systems Research*. 2015;26(2):398-417.
- Raschke RL. Process-based view of agility: The value contribution of IT and the effects on process outcomes. *International Journal of Accounting Information Systems*. 2010;11(4):297-313.
- Benson T, Potts HW. A short generic patient experience questionnaire: how Rwe development and validation. *BMC health services research*. 2014;14(1):499.
- Yusuf YY, Gunasekaran A, Musa A, Dauda M, El-Berishy NM, Cang S. A relational study of supply chain agility, competitiveness and business performance in the oil and gas industry. *International Journal of Production Economics*. 2014;147:531-43.
- Raghupathi W, Raghupathi V. Big data analytics in health-care: promise and potential. *Health Information Science and Systems*. 2014;2(1):3.
- Popowich F. Using text mining and natural language processing for health care claims processing. *ACM SIGKDD Explorations Newsletter*. 2005;7(1):59-66.
- Christopher M, Lowson R, Peck H. Creating agile supply chains in the fashion industry. *International Journal of Retail & Distribution Management*. 2004;32(8):367-76.
- Sangari MS, Razmi J, Zolfaghari S. Developing a practical evaluation framework for identifying critical factors to achieve supply chain agility. *Measurement*. 2015;62:205-14.
- Agarwal A, Shankar R, Tiwari M. Modeling agility of supply chain. *Industrial Marketing Management*. 2007;36(4):443-57.
- Doz YL, Kosonen M. Embedding strategic agility: A leadership agenda for accelerating business model renewal. *Long range planning*. 2010;43(2):370-82.
- Sherehiy B, Karwowski W, Layer JK. A review of enterprise agility: Concepts, frameworks, and attributes. *International Journal of Industrial Ergonomics*. 2007;37(5):445-60.
- Yang C, Liu H-M. Boosting firm performance via enterprise agility and network structure. *Management Decision*. 2012;50(6):1022-44.
- Qumer A, Henderson-Sellers B. A framework to support the evaluation, adoption and improvement of agile methods in practice. *Journal of Systems and Software*. 2008;81(11):1899-919.
- Qumer A, Henderson-Sellers B. An evaluation of the degree of agility in six agile methods and its applicability for method engineering. *Information and software technology*. 2008;50(4):280-95.
- Sinimole K. Evaluation of the efficiency of national health systems of the members of World Health Organization. *Leadership in Health Services*. 2012;25(2):139-50.
- Mahmodi Gh, Khademlo M. Medical and health research for use by medical students. *Tehran: computer science, medicine Art in in*; 2013;p:38.
- Hooman HA. *Multivariate analysis of behavioral science research*. Press the peak of Persian. Tehran: 2006;p:72.
- Seyedhosseini S, Ahmadi AA, Fekri R, Fathian M. Agile New product Development Model Using path Analysis Method for Iranian Auto Industries. *Industrial Engineering and production management*. 2010;4(20):77-89.
- Hesami hZ, Rajabzadeh A, Tolouee A. Study of factors affecting supply chain agility and agile supply chain management concept model. *Quarterly Journal of Commerce*. 2010;4(10):15-22.
- Alzoubi AEH, Al-otoum FJ, Albatainah AKF. Factors associated affecting organization agility on product development. *International Journal of Research and Reviews in Applied Sciences*. 2011;9(3):503-16.
- Salimi M, Matin H, Vazin M, Jandaghi G. Check the status of the factors affecting the agility of the irib. *Quarterly journal of Islamic culture management* 2013;11(2):115-32.
- Molavi B, Ismailian M, Ansari R. Proposing a New Approach for Prioritization of Organizational Agility Strategies Using FTOPSIS and Fuzzy Inference System. *Vision Industrial Management*. 2013;5(1):123-138. (In persian)
- Ghorbanizadeh V, Hourmanesh F, Gholamhosseini H. The role of learning culture and knowledge management in organizational agility. *Journal of Management Studies in development and Evaluation*. 2011;21 (65):47-72.
- Zanjirchi M, Hatami S, Nejatian H. CHARACTERIZATION OF LIBRARIES' AGILITY NECESSITIES BASED UPON TOTAL QUALITY MANAGEMENT (TQM) APPROACH IN PUBLIC LIBRARIES OF YAZD CITY. *Scientific Research Public libraries in the Quarterly Journal*. 2011;17 (1):71-97. (In persian)
- Zanjirchi S, Olfat L. The role of technology in achieving agility in Iran's electronic companies. *Journal of science and technology policy*. 2010;3(1):29-44.
- Ribeiro L, Barata J, Colombo A. Supporting agile supply chains using a service-oriented shop floor. *Engineering Applications of Artificial Intelligence*. 2009;22(6):950-60.

32. Zain M, Rose RC, Abdullah I, Masrom M. The relationship between information technology acceptance and organizational agility in Malaysia. *Information & Management*. 2005;42(6):829-39.
33. Jahani MA, Naghshine A, Naghavian M, Bijani A, Hadad G, Abdi M. Effect of hospital information system on processes and personnel function from users' viewpoint in the hospital affiliated to Babol university of medical sciences, Iran; 2013. *Journal Babol University of Medical Sciences*. 2014;16(7):63-70.
34. Shahabi B, Jafarnejad A. *Introduction To Organizational Agility And Agile Manufacturing*. Tehran: Institute Good Book Publisher; 2007.
35. Rubinstein D. Standish group report: There's less development chaos today. *Software Development Times*. 2007;1.
36. Sohrabi R, Kazazi A. Designing the operational attributes and criteria for supply chain agility evaluation in national Iranian oil company. *Change management Bulletin*. 2009;2(4):142-65.



This work is licensed under a Creative Commons Attribution