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ORIGINAL ARTICLE

Modelling the Enablers of Agile Performance in Healthcare Organization: A TISM Approach

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Abstract *This study attempts to model the enablers of agility of healthcare organizations and interprets the interrelationship among them using total interpretive structural modelling (TISM). Its contribution to the knowledge base is twofold. First, it provides a hierarchical structure portraying the driving enablers and the dependent enablers. Second, it ranks the enablers based on their influence on organization agility. To accomplish the above objectives, ten enablers of organization agility have been identified through an extensive literature review followed by an expert interview to comprehend the interactions and transitivity between the enablers and finally an analysis of the interrelationship using TISM. The results suggest that organizational structure is the most crucial enabler of agile performance in healthcare organization. Apart from that, a motivated and flexible workforce, cooperation between management and employees, availability of training and implementation of employee and patient's suggestion play a significant role in healthcare organization agility. Eventually, limitations and future research avenues have been outlined to extend the current study.*

Keywords Agile performance · Healthcare agility · Healthcare operations · Total interpretive structural modelling

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Introduction

The term 'agility' came into existence in 1991 and has been defined and interpreted in several different ways since then. Naylor et al. (1999) defined agility as using market knowledge and a virtual corporation to exploit profitable opportunities in a volatile market place. Yusuf et al. (1999) defined agility as the successful exploration of competitive bases such as speed, flexibility, innovation and proactivity, quality and profitability through the integration of reconfigurable resources, and the best practices in a knowledge-rich environment to provide customer-driven products and services in a fast changing market environment. Christopher (2000) defined agility as, 'the ability of an organization to respond rapidly to changes in demand both in terms of volume and variety.' Kitzmiller et al. (2006) referred to agility as the power of moving quickly and having a quick resourceful and adaptable character. Despite the contextual variation, all of these definitions invariably translated agility as an organization's capability to cope up with changing market scenarios in terms of both range and quality of service. Basing further exploration on these grounds, agility has been studied in several different domains such as product and manufacturing systems design, process planning, production planning, scheduling and human factors (Sanchez and Nagi 2001). In service sector, especially in healthcare, agile concepts were found extremely useful in enhancing the service delivery. Pipe et al. (2012) suggested that resilience and agility are increasingly valuable in healthcare environment as it is changing quickly and unpredictably. Davies and Drake (2007) highlighted that in UK, contracts to deliver home care are awarded to only those providers who meet the stringent best value criteria and increasing agility. Similarly, Kitzmiller et al. (2006)

remarked that adoption of agile concepts in clinical system improves the conventional plan-driven implementation process. Apart from its usefulness in enhancing the service delivery, agility was also found imperative in addressing the current healthcare issues arising out of need-based and customized service requirements. Many studies such as Rahimnia and Moghadasian (2010), Aronsson et al. (2011), Guven-Uslu et al. (2014) and Olsson and Aronsson (2015) highlight such issues in healthcare literature. Rahimnia and Moghadasian (2010) discussed a case of trauma center and accentuated that such units where the actual treatment process varies from patient to patient depending on the condition and severity of the injury have to be agile to minimize death rate. Aronsson et al. (2011) further strengthened this argument and mentioned that the processes such as getting operated needs flexibility because the time to operate the patient varies from patient to patient and therefore healthcare organizations delivering such services need to be agile. Guven-Uslu et al. (2014) highlighted an issue where the clinicians favored laparoscopic surgery for all the patients and the management wanted to keep both open surgery and laparoscopic surgery in order to mitigate operational and financial risks. The study concluded that such an issue can be resolved only if the organization is agile toward open surgery. Similarly, Olsson and Aronsson (2015) discussed a case of University Hospital in Sweden and suggested that actions such as extending the use of a resource, altering the amount of a resource ahead of demand and altering the amount of a resource as a response to demand have to be agile in order to manage variable acute patient flow. Emphasizing the potential of agile concepts in dealing with the current healthcare issues, Towill and Christopher (2005) outlined that National Health Service in UK is moving toward an alternative pipeline perspective where some services are standardized and some are agile. Though the existing literature has acknowledged the potential of agile concepts in dealing with above healthcare issues, not much attention has been paid to the factors that enable the organization's agile performance. This gap entails a study on enablers of agile performance in health care and translates into the motivation behind this paper.

The paper is organized as follows: second section discusses the relevant literature pertaining to agility, third section briefs the literature related to total interpretive structural modelling (TISM), fourth section presents the enablers of organization agility identified from the literature, fifth section highlights the methodology, sixth section discusses the results, seventh section highlights managerial implications, and eighth section presents the conclusion of the study.

Literature Review on Agility

Scanning the literature, we find that the existing literature has predominantly looked at the enablers of organization agility in general without any specific connotation to a particular sector. A brief outline of those studies is presented below.

Katzenbach and Smith (1993) mentioned that team-based management was found to be a highly effective facilitator of organizational agility. In addition, the top management plays a pivotal role in obtaining the complete potential of the teams across an organization including its own group at the top. Similarly, Kidd (1995) explained that enhanced agility entails interdisciplinary integration of human resources, knowledge and mechanical technology. Gehani (1995) proposed six actions to implement agility-based strategy in an organization which include cross-functional team sharing, empowerment for frontline decision making, modular integration of available technologies, delayed design specification, product succession planning, and enterprise-wide integration of learning. In these lines, Yusuf et al. (1999) also suggested that organizations intending to become agile should formulate strategies which would help to develop a well-trained and motivated workforce and provide them with right set of skills, expertise and knowledge. Similarly, Christopher (2000) mentioned that in order to attain enhanced agility it is essential to develop a human resource strategy that leads to multi-skilling and encourages cross-functional working. Sherehiy et al. (2007) discussed the characteristics of organization agility and found that it spans over five different parameters such as authority, rules and procedures, coordination, structure and human resource management practices as shown in Table 1. In addition, the characteristics of workforce agility including proactivity, adaptivity and resiliency are presented in Table 2. Adding evidence to Sherehiy et al. (2007), Krishnamurthy and Yauch (2007) suggested that an agile organization capable of operating in a dynamic environment would benefit from having a decentralized organizational structure. With respect to implementation, Kitzmiller et al. (2006) suggested that an organization adopting agile approach needs to commit time for the implementation and a flexible workforce to execute the implementation. Similarly, Aravind Raj et al. (2013) suggested that use of IT technologies, organizational structure, availability of adequate training and workforce agility enhances agility of the organization. Exploring the determinants of agility, Gunasekaran et al. (2008) found that goals in terms of increased speed and flexibility, strategic planning in terms of core competencies, global outsourcing, virtual enterprises, organizational structure in terms of virtual enterprise, partnership formation based on

Table 1 Characteristics of organization agility (Sherehiy et al. 2007)

Sl. no.	Enabler	Sub-enablers
1	Authority	Fewer power differentials
		Less adherence to authority and control
		Decentralized knowledge
		Control influence organization agility
2	Rules and procedures	Few rules and procedures
		Low level of formal regulation
3	Coordination	Informal and personal coordination
		Delegation of tasks and decision making
		Goal directed coordination
4	Structure	Flat and horizontal structure
		Teamwork, cross-functional linkages
		Loose boundaries among function and units
5	HRM practices	Employee empowerment
		Autonomy in decision making
		Multiple skills trainings
		Workforce development
		Training enhanced organization agility

Table 2 Characteristics of workforce agility (Sherehiy et al. 2007)

Sl. no.	Parameter	Sub-parameter
1	Proactivity	Positive attitude toward changes in new technologies
		Tolerance to uncertain and unexpected situation
		Spontaneous collaboration
2	Adaptivity	Professional flexibility
		Learning new tasks and responsibilities
3	Resiliency	Personal initiative and anticipation of problems related to change enhance workforce agility

core competencies and knowledge and information technology in terms of agile and knowledgeable workforce and enterprise resource planning systems are the major determinants of agility.

From a generic point of discussion on organization agility, some studies such as Vinodh and Devadasan (2011) and Vinodh et al. (2012) extended it to contexts specific to manufacturing sector. Vinodh and Devadasan (2011) analyzed the obstacles for achieving agility in an electronics manufacturing organization and found that lack of clear definition of personnel's responsibility and authority, absence of goal specificity, non-availability of flexible workforce to adopt new technologies and absence of training program on time management, management–employee cohesion and employee empowerment to resolve customer problems are the impediments to enhance agility in manufacturing organizations. Similarly, Vinodh et al. (2012) proposed that flat organizational structure, adoption of IT technologies, frontline workforce training on agility, workforce cooperation/collaboration, flexible setups, concurrent processing, implementation of employee and customer's suggestion and improved cost management techniques enhance the agility of an organization.

Summarizing the above literature, we find that organizational structure, employee empowerment for frontline decision making, multi-skilled, motivated and flexible workforce, management–employee cohesion, workforce cooperation/collaboration, goal specificity, loose boundaries among function and units, availability of adequate training for the workforce, delegation of tasks and decision making, less stricter rules and procedures, implementation of employee and patient's suggestion, flexible setups, enterprise-wide integration of learning, organizational commitment in terms of time and fund for agile implementation and training and adoption of IT technologies are some of the enablers of organization agility to name a few.

Translating these enablers to a healthcare context, we attempted to analyze how these enablers interact with each other in a healthcare setting. The aspect that caught our attention is to understand 'are these enablers influence agile performance independently or they are themselves interrelated?' A contextual interpretation indicated that they are not only related to agility of the organization but also related to each other. Further exploring the literature, we found evidence for this phenomenon as well.

Schollhammer (1971) analyzed the structure of multinational corporations and stated that the organizational structure in terms of centralization or decentralization of authority indicates the extent to which delegation of authority and accountability happens at the subsequent levels. Similarly, Angst et al. (2012) mentioned that different types of IT differentially affect hospital process. For instance, IT has a positive effect on objective patient health status, but adverse effects on interpersonal care processes which could be intrusive and interfering in the doctor–patient relationship. Morgan and Piercy (1998) explored the inter-functional relationships of a marketing-quality unit and found that this is associated with senior management quality leadership. These evidences strengthened our intuition that enablers such as organizational structure and IT technologies are related to other enablers such as degree of delegation of tasks and decision, communication inside the organization and relationship among the workforce and departments. This interrelatedness indicated a very complex relationship structure among the components of organization agility. Therefore, in the next step, we went on to explore: 'can this connection among enablers as well as between organization agility be seen quantitatively? Can the priority of these enablers in terms of the degree of influence on organization agility be found out? Which enabler/enablers take precedence over others and drive others? Which enabler/enablers depend on others?' These questions translated into the following research question.

> RQ: What is the relationship among the enablers of agile performance of a healthcare organization? How do they influence one another as well as the agile performance of the organization? Which enabler/enablers drive others and which enabler/enablers depend on others? Can the priority of each of these enablers be measured?

Answer to these questions would help us introspect where healthcare organizations are failing in the attempts to become agile and how failing to strengthen one enabler can lead to a chain of failure in other enablers and consequently affect agility of the organization as a whole. It would also help the healthcare organizations or management of the healthcare organizations to have a picture of what is more important to obtain an agile organization and therefore what needs substantial attention.

Literature Review on TISM Methodology

The TISM methodology adopted in the study is an extension of interpretive structural modelling (ISM) developed by Warfield (1974). ISM is a computer-assisted modelling approach and is capable of incorporating three modelling languages: words, graphics and mathematics. ISM serves as a methodology to address complex issues and models the qualitative or subjective elements measured on ordinal scales (Janes, 1988). Attri et al. (2013) found that ISM transforms an obscure and complex problem to a structured, well-defined problem and gives the interpreter a realistic picture of the variables involved in the phenomenon along with their impact on the decision object. Vignesh and Suresh (2016) applied ISM approach for analyzing lean practices in supermarket. However, ISM has its own limitations. First, it can't provide a correct interpretation of how the directed links operate. Second, it does not offer any explanation related to transitive links and causality of the linkage between building blocks of the ISM (Sushil 2012). Addressing these limitations, Sushil (2012) proposed TISM which explicitly captures the causal thinking behind the interrelationship during data collection. Since its discovery, TISM has been applied in many studies across fields. Dubey et al. (2015) applied TISM to analyze the association among enablers of sustainable manufacturing. Jayalakshmi and Pramod (2015) analyzed the interrelationship among enablers of wireless control system using TISM. Shibin et al. (2016) used TISM to develop frameworks on enablers and barriers of flexible green supply chain management. Yadav and Sushil (2014) developed a model for strategic factors related to performance management of Indian Telecom Service using TISM. Mahajan et al. (2016) used TISM to analyze the interrelations among challenges of management education in India. Agarwal and Vrat (2015) modeled the attributes that enable human body to achieve organizational excellence, whereas Yadav and Barve (2016) modeled the challenges of humanitarian supply chains using TISM. Khare (2014) used TISM to assess various elements of flowing stream strategy in telecom sector, and Dubey and Ali (2014) analyzed the relationship among various constructs of flexible manufacturing systems using TISM.

Since this study intends to model the enablers of organization agility in a healthcare setting, TISM was chosen as the method to accomplish the objective. TISM takes into account the contextual relationship of each enabler with all the other enablers and delineates which enablers drive or

influence other enablers and which enablers depend on others. This depiction helps the researcher/manager to interpret which enablers are crucial in terms of having greater power to influence and which enablers are the subordinates and get influenced by others. Furthermore, TISM helps to rank those enables based on the severity of impact and provides a clear indication on where to emphasize (Sushil 2017). The outcomes of the analysis also help the researcher/manager to estimate the impact of their strategic decision on the enablers and guide them to formulate appropriate strategizes toward enhancing agile capability of the healthcare organization.

Identification of Enablers that Impact Agility in Health Care

Identification of enablers that impact agility in healthcare was accomplished in three steps: first, an exhaustive list of enablers was created from the literature review. Second, the enablers that refer to similar contextual meaning were eliminated to avoid redundancy. Third, five experts from five different healthcare organizations in and around south India were approached to validate the above list. Table 3 captures the list of enablers which was presented before the experts for validation. The experts chosen for this validation include three administrative officers and two senior physicians who have immense expertise on how to enhance the performance of the healthcare organization. The decision for considering five experts was taken following the studies by Jayalakshmi and Pramod (2015) and Yadav and Sushil (2014). We asked the experts to validate the list of enablers prepared from literature review and add or delete enablers which they find important or unimportant. After combining the opinions, we eventually narrowed them down to 10 enablers which were unanimously agreed upon by all experts. In addition, the experts suggested small fine tuning to the terminologies to add a greater precision and clarity to the context. Table 4 captures the final set of enablers shortlisted for analysis along with a brief explanation of each one of them.

Methodology

Following the identification and validation of the enablers of organization agility, we prepared a questionnaire that compared each enabler against another by asking the following questions for each pair.

Factor A influences Factor B (Yes/No)
OR
Factor B influences Factor A (Yes/No)

The questionnaire was circulated among the healthcare professionals, and a total of 30 responses were received. The respondents of the survey include administrative officers, physicians, nurses, and other frontline employees of healthcare organizations. Table 17 in 'Appendix' provides the distribution of respondents involved in both identification and comparison of enablers based on designation. In

Table 3 Agile capabilities of an organization as identified in the literature

Sl. no.	Enabler	Reference
1	Organizational structure	Sherehiy et al. (2007), Krishnamurthy and Yauch (2007) and Aravind Raj et al. (2013)
2	Employee empowerment for frontline decision making	Gehani (1995) and Sherehiy et al. (2007)
3	Multi-skilled, motivated and flexible workforce	Christopher (2000) and Kitzmiller et al.(2006)
4	Management–employee cohesion	Vinodh and Devadasan (2011)
5	Workforce cooperation/collaboration	Sherehiy et al. (2007)
6	Loose boundaries among function and units	Sherehiy et al. (2007)
7	Availability of adequate training for the workforce	Yusuf et al. (1999), Sherehiy et al. (2007) and Aravind Raj et al. (2013)
8	Delegation of tasks and decision making	Sherehiy et al. (2007)
9	Less stricter rules and procedures	Sherehiy et al. (2007)
10	Implementation of employee and patient's suggestion	Vinodh and Devadasan (2011) and Vinodh et al. (2012)
11	Flexible setups	Vinodh et al.(2012)
12	Enterprise-wide integration of learning	Gehani (1995) and Kidd (1995)
13	Organizational commitment in terms of time and fund for agile implementation and training	Kitzmiller et al.(2006)
14	Adoption of IT Technologies	Vinodh et al. (2012) and Aravind Raj et al. (2013)

Table 4 Agile capabilities of an organization taken for the study

Sl. no.	Enabler	Explanation
1	Organizational structure (E1)	Refers to flat and horizontal organization structure which has fewer power differentials, less adherence to authority and control, decentralized knowledge and control influence
2	Multi-skilled, motivated and flexible workforce (E2)	Corresponds to availability of motivated workforce, with multiple skill set, expertise and knowledge which encourages cross-functional working. The workforce should be flexible and willing to execute the implementation of new strategy or technology
3	Management–employee cohesion (E3)	Indicates the cooperation among the management and employee and how proactively the management addresses employee issues
4	Workforce cooperation/collaboration (E4)	Corresponds to more informal and personal coordination among the workforce; both at frontline and management level
5	Loose boundaries among function and units (E5)	Indicates cooperation among multiple operating units within a healthcare organization (inter-departmental cooperation)
6	Availability of adequate training for the workforce (E6)	Refers to whether the workforce is consistently upgraded with multiple skills trainings
7	Implementation of employee and patient's suggestion (E7)	Corresponds to management's receptivity to implement the suggestions of employees and patients
8	Flexible setups (E8)	Corresponds to the flexible technical and operational setup that can be used across different units of a healthcare organization
9	Enterprise-wide integration of learning (E9)	Refers to integration of information/knowledge generated or used in different part of an organization or cross sections
10	Adoption of IT Technologies (E10)	Indicates how well a health organization is equipped with IT and multimedia technology

order to aggregate the responses of individual experts, mode was used as a method of compilation. For example, if the pooled response for a particular interrelationship is acknowledged as 'Yes' by the majority, then 'Yes' was considered as the aggregate response. Following this aggregation, TISM analysis was performed on the data to analyze the interaction among them. The analysis is primarily carried out in three phases, namely Phase I, Phase II and Phase III. Phase I consists of identification of enablers of organization agility. Phase II deals with analysis of the enablers using TISM, and Phase III covers the Cross-Impact Matrix Multiplication Applied to Classification (MICMAC) analysis of the results. The details of each of these phases are explained under the subheading Phase I, Phase II and Phase III, respectively. These phases and corresponding sub-phases are followed in a linear sequence and the output from one step goes as input into the subsequent step. The outcome of our data analysis at each step is also presented under the above subheading along with the mechanism followed. The flowchart shown in Fig. 1 summarizes the entire process of our data collection and analysis using TISM.

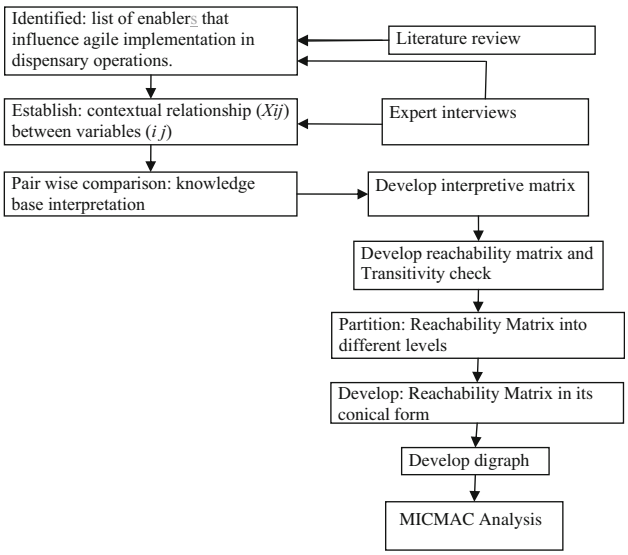

Fig. 1 Flow of TISM approach for agile capability assessment in dispensary

Phase I: Identification of Enablers that Impact Agile Performance of a Healthcare Organization

Identification of enablers that impact agile performance of a healthcare organization has been accomplished from literature review and expert validation. The details of this phase are outlined in Sect. 4.

Phase II: Analysis of the Enablers with TISM

Analysis of the enablers using TISM involves the following steps:

Establishing Contextual Relationship

A contextual relationship among the enablers is established by making a pair-wise comparison based on whether factor A influences factor B or vice versa.

Interpretation of Relationship

If the answer to the above question is 'Yes' for a pair of enablers, then the interpretation of in what way factor 'A' influences factor 'B' is captured. Technically, this step overcomes the limitation of ISM by explicitly recording the causal thinking behind the interrelationship between the enablers.

Interpretive Logic of Pair-Wise Comparison

Following the interpretation of relationship, a knowledge base is created for every pair-wise comparison where the answer is recorded in the form of 'Yes' (Y) or 'No' (N). The total number of pair-wise comparisons performed in this study is $10 \times 9 = 90$. Table 18 in 'Appendix' captures knowledge base of the study as well as the causal thinking of every contextual interaction.

Formation of Reachability Matrix and Transitivity Check

In order to form the reachability matrix, the 'Y' and 'N' in the above step are translated to '1' and '0,' respectively. Following this, a transitivity check is performed based on the transitivity rule. As per the transitivity rule, if criterion '*a*' is related to '*b*' and '*b*' is related to '*c,*' then '*a*' is related to '*c.*' This is called as first-level transitive connection. Similarly, the transitivity check can be extended to subsequent levels as well. An instance of second level transitive connection would be: if '*a*' is related to '*b,*' '*b*' is related to '*c,*' and '*c*' is related to '*d,*' then '*a*' is related to '*d.*' In this study, the transitivity check has been performed following Sushil (2016) which suggests a full transitivity check involving second- and third-level transitive connections. If two enablers were found to have transitive connection, then '***1***' is recorded in the respective cell. Table 5 represents the initial reachability matrix, and Table 6 represents the final reachability matrix of the study after the transitivity check. The transitive connections are highlighted as italic bold '***1'*** in the final reachability matrix.

Level Partition on Reachability Matrix

The final reachability matrix obtained in the previous step is partitioned into different levels based on the three sets: the reachability set, the antecedent set and the intersection set. The reachability set contains the criterion itself and the enablers that it may influence. The antecedent set contains the criterion itself and the enablers that may influence it. The set of enablers present in both reachability and antecedent set are called the intersection set. Once these three sets are obtained, the criterion for which the reachability and intersection sets match is designated as level I. In the next iteration, the criterion which has got a level is excluded from the analysis by removing it from the reachability set and antecedent set of all the other factors. In this way, the iteration and assignment of levels to the criteria continue till all the factors included under the analysis acquire a level. The working details of each of these iterations performed in this study are shown in Tables 7, 8, 9, 10, 11, 12 and 13.

Development of Digraph

Based on the above level partition obtained from each iteration, a digraph is developed. In the digraph, the enablers eliminated in iteration 1 (Table 7, Level I) occupy the top position and the enablers eliminated in iteration 7 (Table 13, Level VII) occupy the bottom most position. Similarly, other enablers occupy the respective levels in the digraph based on the sequence of level assignment. Following this, the enablers which now represent the nodes of the digraph are connected to each other as per the relationship obtained in the final reachability matrix. According to Janes (1988), the nodes of the digraph represent the objectives and the arrow connection represents the phrase 'would help to achieve.' From this, a well-defined textual inference is drawn from the pictorial representation of the digraph. However, unlike ISM, in this phase the transitive links established during transitivity check are examined for distinct interpretation and only those transitive links are retained whose interpretation is crucial (Yadav and Sushil 2014; Sushil 2012, 2016). The digraph and the TISM model of the study are illustrated in Figs. 2 and 3, respectively.

Interaction Matrix

Upon obtaining the digraph, an interaction matrix is developed by translating the direct and significant transitive links of the digraph to '1' and no connections to '0.' The binary form of the interaction matrix is presented in Table 14, and the textual form outlining the causal thinking behind direct and significant transitive links is presented in Table 15.

Phase III: MICMAC Analysis

The MICMAC analysis involves two steps: first, a MICMAC graph is developed, and second, a MICMAC rank is

Table 5 Reachability matrix

i	*j*									
	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10
E1	1	1	1	0	1	1	1	1	0	0
E2	0	1	0	1	1	1	0	1	1	1
E3	0	1	1	1	0	1	1	1	1	0
E4	0	0	0	1	1	0	0	1	1	1
E5	0	0	0	0	1	0	0	1	1	0
E6	0	0	0	0	0	1	0	0	0	1
E7	0	0	1	0	0	0	1	0	0	0
E8	0	0	0	0	0	0	0	1	1	0
E9	0	0	0	0	0	0	0	1	1	0
E10	0	0	0	1	1	0	0	1	1	1

Table 6 Reachability matrix with transitivity relations

i	*j*										
	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10	Driving power
E1	1	1	1	***1***	1	1	1	1	***1***	***1***	10
E2	0	1	0	1	1	1	0	1	1	1	7
E3	0	1	1	1	***1***	1	1	1	1	***1***	9
E4	0	0	0	1	1	0	0	1	1	1	5
E5	0	0	0	0	1	0	0	1	1	0	3
E6	0	0	0	***1***	***1***	1	0	***1***	***1***	1	6
E7	0	***1***	1	***1***	***1***	***1***	1	***1***	***1***	***1***	9
E8	0	0	0	0	0	0	0	1	1	0	2
E9	0	0	0	0	0	0	0	1	1	0	2
E10	0	0	0	1	1	0	0	1	1	1	5
Dependence	1	4	3	7	8	5	3	10	10	7	

Table 7 Iteration 1

Enablers	Reachability set	Antecedent set	Intersection set	Level
1	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	1	1	
2	2, 4, 5, 6, 8, 9, 10	1, 2, 3, 7	2	
3	2, 3, 4, 5, 6, 7, 8, 9, 10	1, 3, 7	3, 7	
4	4, 5, 8, 9, 10	1, 2, 3, 4, 6, 7, 10	4, 10	
5	5, 8, 9	1, 2, 3, 4, 5, 6, 7, 10	5	
6	4, 5, 6, 8, 9, 10	1, 2, 3, 6, 7	6	
7	2, 3, 4, 5, 6, 7, 8, 9, 10	1, 3, 7	3, 7	
8	8, 9	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	8, 9	I
9	8, 9	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	8, 9	I
10	4, 5, 8, 9, 10	1, 2, 3, 4, 6, 7, 10	4, 10	

Table 8 Iteration 2

Enablers	Reachability set	Antecedent set	Intersection set	Level
1	1, 2, 3, 4, 5, 6, 7, 10	1	1	
2	2, 4, 5, 6, 10	1, 2, 3, 7	2	
3	2, 3, 4, 5, 6, 7, 10	1, 3, 7	3, 7	
4	4, 5, 10	1, 2, 3, 4, 6, 7, 10	4, 10	
5	5	1, 2, 3, 4, 5, 6, 7, 10	5	II
6	4, 5, 6, 10	1, 2, 3, 6, 7	6	
7	2, 3, 4, 5, 6, 7, 10	1, 3, 7	3, 7	
10	4, 5, 10	1, 2, 3, 4, 6, 7, 10	4, 10	

Table 9 Iteration 3

Enablers	Reachability set	Antecedent set	Intersection set	Level
1	1, 2, 3, 4, 6, 7, 10	1	1	
2	2, 4, 6, 10	1, 2, 3, 7	2	
3	2, 3, 4, 6, 7, 10	1, 3, 7	3, 7	
4	4, 10	1, 2, 3, 4, 6, 7, 10	4, 10	III
6	4, 6, 10	1, 2, 3, 6, 7	6	
7	2, 3, 4, 6, 7, 10	1, 3, 7	3, 7	
10	4, 10	1, 2, 3, 4, 6, 7, 10	4, 10	III

Table 10 Iteration 4

Enablers	Reachability set	Antecedent set	Intersection set	Level
1	1, 2, 3, 6, 7	1	1	
2	2, 6	1, 2, 3, 7	2	
3	2, 3, 6, 7	1, 3, 7	3, 7	
6	6	1, 2, 3, 6, 7	6	IV
7	2, 3, 6, 7	1, 3, 7	3, 7	

Table 11 Iteration 5

Enablers	Reachability set	Antecedent set	Intersection set	Level
1	1, 2, 3, 7	1	1	
2	2	1, 2, 3, 7	2	V
3	2, 3, 7	1, 3, 7	3, 7	
7	2, 3, 7	1, 3, 7	3, 7	

obtained based on the driving power and dependence of the enablers. The driving power and dependence are obtained by adding the elements of corresponding row and column of the final reachability matrix, respectively. The MICMAC graph and rank combined together provide a classification of enablers based on their degree of influence.

a) Development of MICMAC graph:

The MICMAC graph is developed by classifying the enablers into four different categories: autonomous measures, dependent measures, linkage measures and independent measures. A brief outline of these measures is provided as follows.

Table 12 Iteration 6

Enablers	Reachability set	Antecedent set	Intersection set	Level
1	1, 3, 7	1	1	
3	3, 7	1, 3, 7	3, 7	VI
7	3, 7	1, 3, 7	3, 7	VI

Table 13 Iteration 7

Enablers	Reachability set	Antecedent set	Intersection set	Level
1	1	1	1	VII

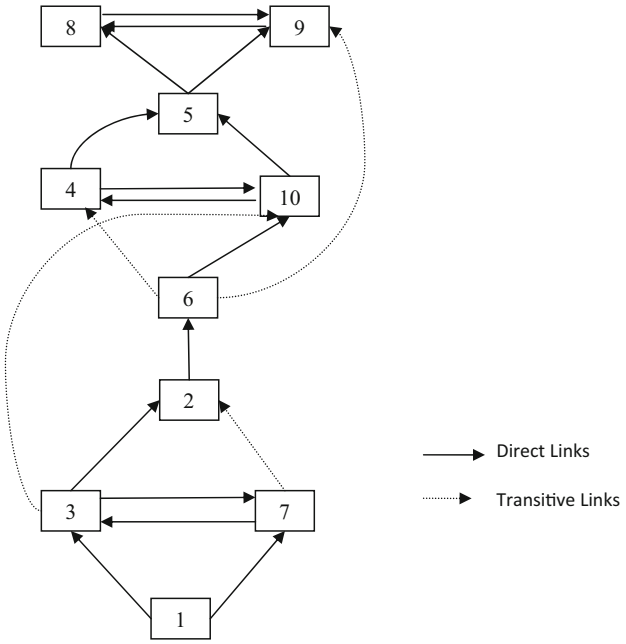

Fig. 2 Digraph with distinct transitive link

Autonomous measures: The enablers that have weak dependence as well as driving power are categorized as autonomous measures.
Dependent measures: Enablers with weak driving power but strong dependence are called as dependent measures.
Linkage measures: Enablers with both high driving power and dependence are classified as linkage measures.
Independent measures: The enablers that have strong driving power but weak dependence are considered as independent measures.

For this study, the MICMAC graph is presented in Fig. 4 in which the enablers appearing in cluster I, cluster II, cluster III and cluster IV are the autonomous enablers, dependent enablers, linkage enablers and independent enablers of the study, respectively.

Development of MICMAC Rank

The MICMAC rank is obtained by dividing the driving power of the enabler by its dependence. The first rank and the last rank are assigned to the highest and the lowest ratio, respectively. Venkatesh et al. (2015) used this indicator to measure the strength of occurrence of an event in supply chain management. In this study, this indicator represents the priority of the enablers in terms of their impact on the subject of interest which is agile performance of the healthcare organization. Table 16 represents the MICMAC rank of the study where Rank 1 corresponds to the most crucial enabler and Rank 7 corresponds to the least important enabler among all.

Results and Discussion

The requirement for need-based customized services in a competitive and dynamic healthcare industry has necessitated healthcare organization to become more agile and responsive. Many studies in literature such as Rahimnia and Moghadasian (2010), Aronsson et al. (2011) and Guven-Uslu et al. (2014) attest to the agility-related issues faced by the healthcare organization in current scenario. This study attempts to address those challenges by exploring the enablers of healthcare agility and analyses the interaction among them using TISM model. The analysis renders a hierarchy of the enablers which can help the healthcare managers to understand the phenomenon and recognize where the challenges lie and handle them effectively. The following crucial implications emerge out of the MICMAC analysis of the study:

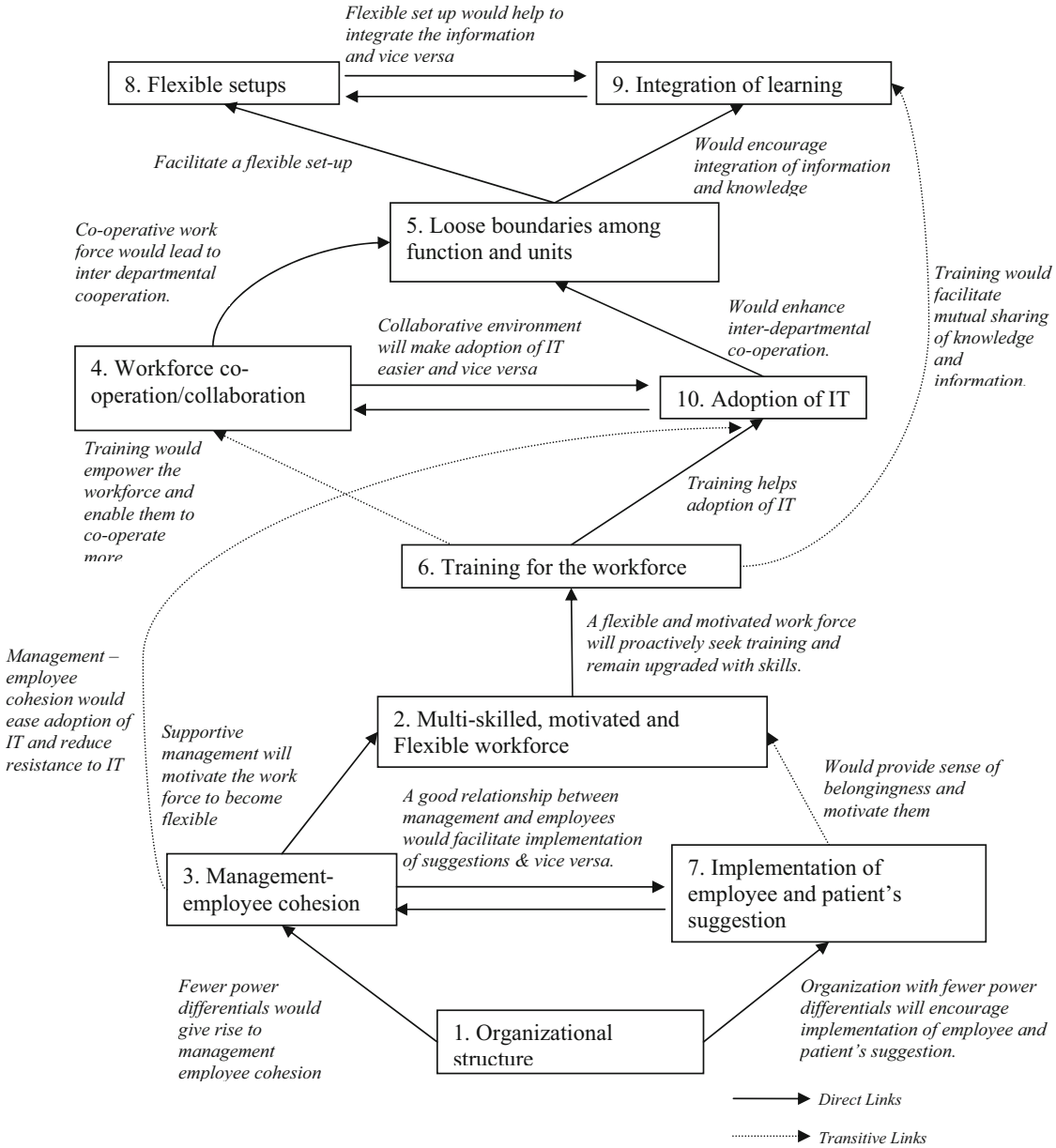

Fig. 3 TISM model

- Organizational structure (Enabler 1), motivated and flexible workforce (Enabler 2), management–employee cohesion (Enabler 3), availability of adequate training for the workforce (Enabler 6) and implementation of employee and patient's suggestion (Enabler 7) were found to be the independent enablers of the study which possess strong drive power and weak dependence. These enablers are considered as crucial for agile capability of the organization and are referred to as key enablers. Organizational structure being a key enabler reemphasizes the importance laid by Sherehiy et al. (2007) and Krishnamurthy and Yauch (2007) on less hierarchical and employee friendly organization for more agile performance. In addition, having an employee friendly organization and flexible workforce as key enablers can address the concerns raised by Olsson and Aronsson (2015) regarding extension of the use of a resource ahead of demand and as a response to demand.
- Workforce cooperation (Enabler 4), loose boundaries among function and units (Enabler 5), flexible setups (Enabler 8), enterprise-wide integration of learning (Enabler 9) and adoption of IT Technologies (Enabler 10) were found to be the dependent enablers which are

Table 14 Interaction matrix

i	*j*									
	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10
E1	1	1	1	0	1	1	1	1	0	0
E2	0	1	0	1	1	1	0	1	1	1
E3	0	1	1	1	0	1	1	1	1	***1***
E4	0	0	0	1	1	0	0	1	1	1
E5	0	0	0	0	1	0	0	1	1	0
E6	0	0	0	***1***	0	1	0	0	***1***	1
E7	0	***1***	1	0	0	0	1	0	0	0
E8	0	0	0	0	0	0	0	1	1	0
E9	0	0	0	0	0	0	0	1	1	0
E10	0	0	0	1	1	0	0	1	1	1

Italic and bold represents significant transitive links

highly dependent on other enablers and possess low driving power. As a result of this high dependence, a small change in any other enabler would influence these set of enablers. This finding further attests to Sherehiy et al. (2007), Vinodh et al.(2012) and Aravind Raj et al. (2013) which stress that cooperation among the work force and departments, integration of learning and adoption of IT technologies are essential with regard to agile capability of the organization. But at the same time these enablers rely on the organizational-, management- and leadership-related anchors. Apart from this, less formalities among functional units, flexible technical setups and integration of IT would also help resolve the issues discussed by Rahimnia and Moghadasian (2010) and Aronsson et al. (2011) regarding trauma centers and operating units.

- There were no linkage and autonomous enablers found in the study which reflects that no such enabler possesses both high driving power and dependence and exhibits a few but strong connections with the other enablers.
- Apart from this, the digraph of the study depicted in Fig. 2 provides insights into the hierarchy of the enablers and how they influence one another. From the digraph, it is found that organizational structure (Enabler 1) is the primary level influencer and is the most salient enabler among all. This further strengthens the findings of MICMAC analysis which determines organizational structure as the key enabler. A horizontal organizational structure with fewer power differentials would help achieve cooperation between management and employees (Enabler 3) and facilitate implementation of employees' suggestion (Enabler 7). These measures would in turn motivate the workforce to be flexible and be prepared to accept the challenges without resistance (Enabler 2). As the workforce becomes more flexible, the organization can consistently upgrade the skill sets of the workforce by providing training (Enabler 6). This would help the workforce to be willing to learn and imbibe new technology and strategy. As a result, the organization's propensity to adopt IT technology (Enabler 10) and the collaboration among employees (Enabler 4) would increase. Collaboration among employees at a lower level would give rise to loose boundaries among the functional units (Enabler 5) and help establish a flexible setup (Enabler 8) and learning environment (Enabler 9) within the healthcare organization.

In addition to MICMAC analysis and the digraph, the MICMAC rank of the enablers sheds light on the impact of the enablers on agile performance of the organization. As per the MICMAC rank, organizational structure was found to be the most crucial (Rank 1), and flexible setup was found to be the least crucial enabler of healthcare agility. This further adds evidence to the findings obtained in digraph and MICMAC analysis of the study.

Managerial Implications

The results suggest that management of a healthcare organization should pay special attention to organizational structure and attempt to maintain a horizontal and employee friendly organization. An employee friendly organization with less power differentials would empower the employees to have autonomy in decision making and foster employees' proactive involvement in discharging the duties. In addition, this would encourage them to put forth the suggestive measures to improve the service delivery

Table 15 Interpretive interaction matrix

	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10
E1	–	Flat organizational structure may motivate employees to give their best	Fewer power differentials would give rise to management–employee cohesion	–	Less adherence to authority enables the employees of one department to help the other department or disseminates relevant information without friction	Fewer power differential makes it easier to arrange a training program for workforce	Organization with fewer power differentials will encourage implementation of employee and patient's suggestion	Less adherence to authority will enable use of equipments across units	–	–
E2	–	–	–	The flexibility and willingness of employees leads to cooperation	The flexibility and willingness of employees may lead to increase in cooperation among departments	A flexible and motivated work force will proactively seek training and remain upgraded with skills	–	A flexible and willing work force can give rise to sharing of equipments and technical setups across departments	A flexible and willing work force can lead to an easy integration of knowledge	A flexible and willing work force can adopt IT technologies without struggle
E3	–	Supportive management will motivate the work force to become flexible	–	If management addresses the employee issues, they would be more willing to cooperate with each other	–	Management can address the employee need for upgrading the skill set	A cooperative management receives and implements employee suggestion	Management's receptivity to employee suggestion may lead to a flexible setup	Cooperation among management and employees may ease the integration of information or knowledge	***Management–employee cohesion would ease adoption of IT and reduce resistance to IT***
E4	–	–	–	–	Cooperative work force can lead to inter-departmental cooperation	–	–	Cooperative workforces can facilitate a flexible setup	Cooperative workforce can help integration of information and knowledge	A collaborative environment will make adoption of IT technology easier
E5	–	–	–	–	–	–	–	Inter-departmental cooperation can help develop a flexible setup	Inter-departmental cooperation encourages integration of information and knowledge	–

Table 15 continued

	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10
E6	–	–	–	***Training would empower the workforce and enable them to cooperate more***	–	–	–	–	***Training would facilitate mutual sharing of knowledge and information***	Training helps adoption of IT
E7	–	***Would provide sense of belongingness and motivate them***	Management's receptivity to employee suggestion may enhance cooperation between them	–	–	–	–	–	–	–
E8	–	–	–	–	–	–	–	–	Flexible setup would help integrate the information across the enterprise	–
E9	–	–	–	–	–	–	–	An Enterprise-wide integration of information or knowledge would help to design a flexible setup	–	–
E10	–	–	–	IT technologies would help the employees to collaborate and coordinate among themselves	Would enhance inter-departmental cooperation	–	–	IT technologies may help establish a flexible technical and operational setup	IT technologies may help integration of information or knowledge across the departments	–

Texts in italic and bold represent significant transitive links

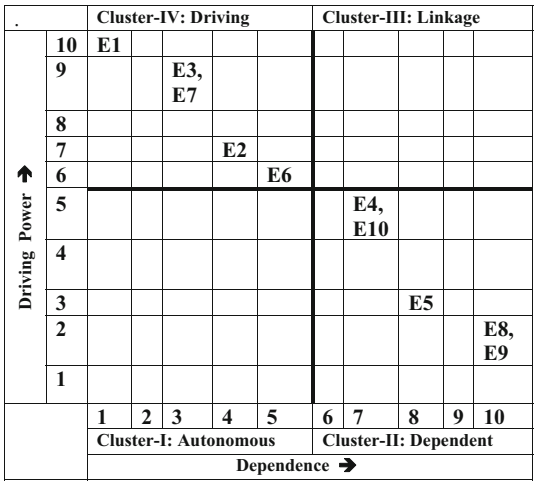

Fig. 4 Clusters of enablers that influence agile performance of a healthcare unit

Table 16 MICMAC analysis rank for enablers of organization agility of a healthcare organization

Enabler code	Description of the enabler	Rank
E1	Organizational structure	1
E3	Management–employee cohesion	2
E7	Implementation of employee and patient's suggestion	2
E2	Multi-skilled, motivated and flexible workforce	3
E6	Availability of adequate training for the workforce	4
E4	Workforce cooperation/collaboration	5
E10	Adoption of IT Technologies	5
E5	Loose boundaries among function and units	6
E8	Flexible setups	7
E9	Enterprise-wide integration of learning	7

and perform the required actions without adhering to stricter procedures or rules. Apart from this, the management should also ensure availability of adequate training for the workforce and implementation of employee and patient suggestions to improve the agile performance of the organization. By ensuring these aspects, management would motivate the workforce and bring in a sense of belongingness to its employees. It is also essential for the management to have flexible technical setups and IT systems to facilitate a quick and immediate reaction to emergency cases. A careful attention to all these aspects would enable a healthcare organization to become more agile and responsive.

Conclusions

In conclusion, this study suggests that agile concepts can address the unpredictable service demand faced by healthcare organizations and can enable them to meet the requirement for need-based and customized services. Healthcare units such as trauma centers and surgery departments inevitably need rooms for flexibility as the treatment process varies from patient to patient. Such needs compel healthcare organizations to become more agile and versatile. In this context, exploration of the agility-related factors and analysis of their interaction become imperative. This study is an attempt to shed light on those aspects and highlights the implication of interrelationship among agility-related enablers. The study underlines that having a less authoritative and employee friendly organization is extremely crucial for agile performance of a healthcare organization. Apart from this, a flexible workforce, training availability and implementation of employee and patient's suggestions foster the agile capability of the organization. However, an exhaustive exploration of the panorama is still undercover as the aspects alter based on geographical location, nature of competition and other market forces. Future studies can address these concerns and help this model evolve by appending other enablers and testing it in different healthcare settings. In addition, future research can validate the findings by applying structural equation modelling. Apart from this, the current study does not investigate the individual enablers in depth. As a result, various other dimensions such as cause and effect of these individual enablers remain unexplored. Future research may venture into these lines of research and contribute deeper insights into the literature.

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Appendix

See Tables 17 and 18.

Table 17 Profile of respondents for TISM

Designation	Number of respondents
Medical Superintendent	1
Deputy Medical Superintendent	2
Doctor—Emergency Medicine	1
Doctors—ENT	2
Doctor—Internal Medicine	1
Doctors—Pediatric Genetics	2
Doctor—Obstetrics and Gynecology	1
Doctors—Speech Pathology and Audiology	3
Doctor—Integrated Medicine	1
Doctors—Geriatrics	3
Doctors—General Pediatrics	2
Doctors—Dermatology	3
Doctor—Anesthesiology and Critical Care Medicine	1
Infection Control Nurses	2
Registered Nurses	2
Clinical nurse specialist	1
Nurse Educator	1
Diabetes champion	2
Training Champion	2
Wound Care Nurse	2

Table 18 Interpretive logic-knowledge base

Sl. no.	Element nos.	Paired comparison of enablers	Y/N	In what way an enabler will influence/enhance/alter other enabler? Concise justification
1	E1–E2	Organizational structure will influence or enhance multi-skilled, motivated and flexible workforce	Y	Flat organizational structure may motivate employees to give their best
2	E2–E1	Multi-skilled, motivated and flexible workforce will influence or enhance organizational structure	N	
3	E1–E3	Organizational structure will influence or enhance management–employee cohesion	Y	Fewer power differentials would give rise to management–employee cohesion
4	E3–E1	Management–employee cohesion will influence or enhance organizational structure	N	
5	E1–E4	Organizational structure will influence or enhance workforce cooperation/collaboration	N	
6	E4–E1	Workforce cooperation/collaboration will influence or enhance organizational structure	N	
7	E1–E5	Organizational structure will influence or enhance loose boundaries among function and units	Y	Less adherence to authority may enable the employees of one department to help the other department or disseminate relevant information without friction
8	E5–E1	Loose boundaries among function and units will influence or enhance organizational structure	N	
9	E1–E6	Organizational structure will influence or enhance availability of adequate training for the workforce	Y	Fewer power differential makes it easier to arrange a training program for workforce
10	E6–E1	Availability of adequate training for the workforce will influence or enhance organizational structure	N	
11	E1–E7	Organizational structure will influence or enhance implementation of employee and patient's suggestion	Y	Organization with fewer power differentials will encourage implementation of employee and patient's suggestion
12	E7–E1	Implementation of employee and patient's suggestion will influence or enhance organizational structure	N	
13	E1–E8	Organizational structure will influence or enhance flexible setups	Y	Less adherence to authority will enable use of equipments across units
14	E8–E1	Flexible setups will influence or enhance organizational structure	N	

Table 18 continued

Sl. no.	Element nos.	Paired comparison of enablers	Y/N	In what way an enabler will influence/enhance/alter other enabler? Concise justification
15	E1–E9	Organizational structure will influence or enhance enterprise-wide integration of learning	N	
16	E9–E1	Enterprise-wide integration of learning will influence or enhance organizational structure	N	
17	E1–E10	Organizational structure will influence or enhance adoption of IT technologies	N	
18	E10–E1	Adoption of IT technologies will influence or enhance organizational structure	N	
19	E2–E3	Multi-skilled, motivated and flexible workforce will influence or enhance management–employee cohesion	N	
20	E3–E2	Management–employee cohesion will influence or enhance multi-skilled, motivated and flexible workforce	Y	Supportive management will motivate the work force to become flexible
21	E2–E4	Multi-skilled, motivated and flexible workforce will influence or enhance workforce cooperation/collaboration	Y	The flexibility and willingness of employees lead to cooperation
22	E4–E2	Workforce cooperation/collaboration will influence or enhance multi-skilled, motivated and flexible workforce	N	
23	E2–E5	Multi-skilled, motivated and flexible workforce will influence or enhance loose boundaries among function and units	Y	The flexibility and willingness of employees may lead to increase in cooperation among departments
24	E5–E2	Loose boundaries among function and units will influence or enhance multi-skilled, motivated and flexible workforce	N	

Table 18 continued

Sl. no.	Element nos.	Paired comparison of enablers	Y/N	In what way an enabler will influence/enhance/alter other enabler? Concise justification
25	E2–E6	Multi-skilled, motivated and flexible workforce will influence or enhance availability of adequate training for the workforce	Y	A flexible and motivated work force will proactively seek training and remain upgraded with skills
26	E6–E2	Availability of adequate training for the workforce will influence or enhance multi-skilled, motivated and flexible workforce	N	
27	E2–E7	Multi-skilled, motivated and flexible workforce will influence or enhance implementation of employee and patient's suggestion	N	
28	E7–E2	Implementation of employee and patient's suggestion will influence or enhance multi-skilled, motivated and flexible workforce	N	
29	E2–E8	Multi-skilled, motivated and flexible workforce will influence or enhance flexible setups	Y	A flexible and willing work force can give rise to sharing of equipments and technical setups across departments
30	E8–E2	Flexible setups will influence or enhance multi-skilled, motivated and flexible workforce	N	
31	E2–E9	Multi-skilled, motivated and flexible workforce will influence or enhance enterprise-wide integration of learning	Y	A flexible and willing work force can lead to an easy integration of knowledge
32	E9–E2	Enterprise-wide integration of learning will influence or enhance multi-skilled, motivated and flexible workforce	N	
33	E2–E10	Multi-skilled, motivated and flexible workforce will influence or enhance adoption of IT technologies	Y	A flexible and willing work force can adopt IT technologies without struggle

Table 18 continued

Sl. no.	Element nos.	Paired comparison of enablers	Y/N	In what way an enabler will influence/enhance/alter other enabler? Concise justification
34	E10–E2	Adoption of IT technologies will influence or enhance multi-skilled, motivated and flexible workforce	N	
35	E3–E4	Management–employee cohesion will influence or enhance workforce cooperation/collaboration	Y	If management addresses the employee issues, they would be more willing to cooperate with each other
36	E4–E3	Workforce cooperation/collaboration will influence or enhance management–employee cohesion	N	
37	E3–E5	Management–employee cohesion will influence or enhance loose boundaries among function and units	N	
38	E5–E3	Loose boundaries among function and units will influence or enhance management–employee cohesion	N	
39	E3–E6	Management–employee cohesion will influence or enhance availability of adequate training for the workforce	Y	Management can address the employee need for upgrading the skill set
40	E6–E3	Availability of adequate training for the workforce will influence or enhance management–employee cohesion	N	
41	E3–E7	Management–employee cohesion will influence or enhance implementation of employee and patient's suggestion	Y	A cooperative management receives and implements employee suggestion
42	E7–E3	Implementation of employee and patient's suggestion will influence or enhance management–employee cohesion	Y	Management's receptivity to employee suggestion may enhance cooperation between them

Table 18 continued

Sl. no.	Element nos.	Paired comparison of enablers	Y/N	In what way an enabler will influence/enhance/alter other enabler? Concise justification
43	E3–E8	Management–employee cohesion will influence or enhance flexible setups	Y	Management's receptivity to employee suggestion may lead to a flexible setup
44	E8–E3	Flexible setups will influence or enhance management–employee cohesion	N	
45	E3–E9	Management–employee cohesion will influence or enhance enterprise-wide integration of learning	Y	Cooperation among management and employees may ease the integration of information or knowledge
46	E9–E3	Enterprise-wide integration of learning will influence or enhance management–employee cohesion	N	
47	E3–E10	Management–employee cohesion will influence or enhance adoption of IT technologies	N	
48	E10–E3	Adoption of IT technologies will influence or enhance management–employee cohesion	N	
49	E4–E5	Workforce cooperation/collaboration will influence or enhance loose boundaries among function and units	Y	Cooperative work force can lead to inter-departmental cooperation
50	E5–E4	Loose boundaries among function and units will influence or enhance workforce cooperation/collaboration	N	
51	E4–E6	Workforce cooperation/collaboration will influence or enhance availability of adequate training for the workforce	N	
52	E6–E4	Availability of adequate training for the workforce will influence or enhance workforce cooperation/collaboration	N	

Table 18 continued

Sl. no.	Element nos.	Paired comparison of enablers	Y/N	In what way an enabler will influence/enhance/alter other enabler? Concise justification
53	E4–E7	Workforce cooperation/collaboration will influence or enhance implementation of employee and patient's suggestion	N	
54	E7–E4	Implementation of employee and patient's suggestion will influence or enhance workforce cooperation/collaboration	N	
55	E4–E8	Workforce cooperation/collaboration will influence or enhance flexible setups	Y	Cooperative workforces can facilitate a flexible setup
56	E8–E4	Flexible setups will influence or enhance workforce cooperation/collaboration	N	
57	E4–E9	Workforce cooperation/collaboration will influence or enhance enterprise-wide integration of learning	Y	Cooperative workforce can help integration of information and knowledge
58	E9–E4	Enterprise-wide integration of learning will influence or enhance workforce cooperation/collaboration	N	
59	E4–E10	Workforce cooperation/collaboration will influence or enhance adoption of IT technologies	Y	A collaborative environment will make adoption of IT technology easier
60	E10–E4	Adoption of IT technologies will influence or enhance workforce cooperation/collaboration	Y	IT technologies would help the employees to collaborate and coordinate among themselves
61	E5–E6	Loose boundaries among function and units will influence or enhance availability of adequate training for the workforce	N	
62	E6–E5	Availability of adequate training for the workforce will influence or enhance loose boundaries among function and units	N	

Table 18 continued

Sl. no.	Element nos.	Paired comparison of enablers	Y/N	In what way an enabler will influence/enhance/alter other enabler? Concise justification
63	E5–E7	Loose boundaries among function and units will influence or enhance implementation of employee and patient's suggestion	N	
64	E7–E5	Implementation of employee and patient's suggestion will influence or enhance loose boundaries among function and units	N	
65	E5–E8	Loose boundaries among function and units will influence or enhance flexible setups	Y	Inter-departmental cooperation can help develop a flexible setup
66	E8–E5	Flexible setups will influence or enhance loose boundaries among function and units	N	
67	E5–E9	Loose boundaries among function and units will influence or enhance enterprise-wide integration of learning	Y	Inter-departmental cooperation facilitates integration of information and knowledge
68	E9–E5	Enterprise-wide integration of learning will influence or enhance loose boundaries among function and units	N	
69	E5–E10	Loose boundaries among function and units will influence or enhance adoption of IT technologies	N	
70	E10–E5	Adoption of IT technologies will influence or enhance loose boundaries among function and units	Y	IT technology can help improve inter-departmental cooperation
71	E6–E7	Availability of adequate training for the workforce will influence or enhance implementation of employee and patient's suggestion	N	
72	E7–E6	Implementation of employee and patient's suggestion will influence or enhance availability of adequate training for the workforce	N	

Table 18 continued

Sl. no.	Element nos.	Paired comparison of enablers	Y/N	In what way an enabler will influence/enhance/alter other enabler? Concise justification
73	E6–E8	Availability of adequate training for the workforce will influence or enhance flexible setups	N	
74	E8–E6	Flexible setups will influence or enhance availability of adequate training for the workforce	N	
75	E6–E9	Availability of adequate training for the workforce will influence or enhance enterprise-wide integration of learning	N	
76	E9–E6	Enterprise-wide integration of learning will influence or enhance availability of adequate training for the workforce	N	
77	E6–E10	Availability of adequate training for the workforce will influence or enhance adoption of IT technologies	Y	Training helps adoption of IT
78	E10–E6	Adoption of IT technologies will influence or enhance availability of adequate training for the workforce	N	
79	E7–E8	Implementation of employee and patient's suggestion will influence or enhance flexible setups	N	
80	E8–E7	Flexible setups will influence or enhance implementation of employee and patient's suggestion	N	
81	E7–E9	Implementation of employee and patient's suggestion will influence or enhance enterprise-wide integration of learning	N	
82	E9–E7	Enterprise-wide integration of learning will influence or enhance implementation of employee and patient's suggestion	N	
83	E7–E10	Implementation of employee and patient's suggestion will influence or enhance adoption of IT technologies	N	
84	E10–E7	Adoption of IT technologies will influence or enhance implementation of employee and patient's suggestion	N	
85	E8–E9	Flexible setups will influence or enhance enterprise-wide integration of learning	Y	Flexible setup would help integrate the information across the enterprise
86	E9–E8	Enterprise-wide integration of learning will influence or enhance flexible setups	Y	An enterprise-wide integration of information or knowledge would help to design a flexible setup
87	E8–E10	Flexible setups will influence or enhance adoption of IT technologies	N	
88	E10–E8	Adoption of IT technologies will influence or enhance flexible setups	Y	IT technologies may help establish a flexible technical and operational setup
89	E9–E10	Enterprise-wide integration of learning will influence or enhance adoption of IT technologies	N	
90	E10–E9	Adoption of IT technologies will influence or enhance enterprise-wide integration of learning	Y	IT technologies may help integration of information or knowledge across the departments

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Key Question

1. What is the relationship among the enablers of agile performance of a healthcare organization?

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