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Original Article

Metrics to Catch on Innovation Culture in Hospital: A Scoping Review

Asnany[1,2,*], M. Alimin Maidin[3,4], Syahrir A. Pasinringi[3,4], Anwar Mallongi[4]

ABSTRACT

Objective: This scoping review aimed to map measurement instruments of innovation culture in hospital. **Introduction:** A culture of innovation can reveal the strengths and opportunities of hospitals in driving strategic innovation and creating an organizational culture; however, suitable measurement instruments for depicting innovation culture are still being discussed. **Inclusion criteria:** This review considered studies that reviewed the measurement of organizational innovation culture, specifically in a hospital setting. **Methods:** This review adopted the JBI methodology for scoping review. Search strategies used PCC elements, and the terms "Metric OR Measure OR Questionnaire" AND "Culture of Innovation OR Innovation Culture" AND "Hospital OR Healthcare" were used as the main keywords, limited by quantitative research types in English. The data was extracted from qualified articles, compiled in a spreadsheet, and then imported into Microsoft Word to be combined into a table containing a grid synthesis and a summary of the main concepts. **Results:** Eight articles published from 2015 to 2022 were eligible for review. The mapping results obtained five metrics that depicted the innovation culture in the hospital. Groups of various dimensions and the measurement results also varied, including innovation tendency, value, climate, flexibility, and focus on being characteristic of innovation. Resource, process, role and involvement of health workers, technology support, and leadership were components of innovation. Reflexivity, behavior, and teamwork are essential to achieving a successful culture of innovation in the hospital. **Conclusions:** The measurement of innovation culture in hospitals consists of three main keys, namely the characteristics of innovation, the components of innovation, and teamwork: innovation in action.
Key words: Innovation Culture in Hospital, Metrics, Team Work.

Asnany[1,2,*], M. Alimin Maidin[3,4], Syahrir A. Pasinringi[3,4], Anwar Mallongi[4]

[1]Doctoral Student of Public Health, Hasanuddin University, INDONESIA.

[2]Sector of Medical and Health of The Regional Police of South Sulawesi, INDONESIA.

[3]Department of Hospital Administration Management, Faculty of Public Health, Hasanuddin University, INDONESIA.

[4]Departement of Environmental Health, Faculty of Public Health, Hasanuddin University, INDONESIA.

Correspondence

Asnany

Doctoral Student of Public Health, Hasanuddin University, INDONESIA; Sector of Medical and Health of The Regional Police of South Sulawesi, INDONESIA.

E-mail: azharasnany@gmail.com

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INTRODUCTION

Innovation culture plays an essential role in shaping an innovative environment and encouraging the implementation of creative ideas to improve the quality and delivery of health services. Innovation culture can be defined as an open system approach that emphasizes the interaction, the number of values, behaviors, climate, resources, processes, and success of organizations that contribute to the ability to innovate in the form of products and services in response to environmental demands.[1-3]

A hospital culture that values and supports innovation can encourage innovative behaviors, which in turn have the potential to drive change and improve health. Therefore, implementing an innovation culture is vital to provide the necessary resources for hospitals to continue innovating.[4,5]

Several studies have synthesized the variety of innovation cultures in organizations and described the characteristics of organizational culture that support innovation.[6-8] Mak *et al.* (2021)[8] conducted a systematic review of the measurement of innovation culture in organizations and found 27 studies with several constructive versions of "innovation culture" using 26 different instruments. Ten studies used a single instrument without adaptation, seven studies modified existing instruments, two studies developed "homegrown" instruments, and eight studies combined a mixture of adaptations between homegrowns and instruments without modification. Six instruments were used more than once to measure the "innovation culture." Some instruments combined eight items related to the "support for innovation" domain. However, most of the instruments reviewed were adapted from the management and economics disciplines. There were also several instruments developed in health care settings with limited reviews so that the evaluation and measurement of the innovation culture in the hospital was still a hot topic of discussion.

A preliminary search through PROSPERO, MEDLINE, and the Cochrane Database was conducted; however, no scoping or similar systematic reviews were identified as current or ongoing related to the topic.

Review question(s)

What instruments can be used in measuring the culture of innovation in hospitals?

What dimensions can make up the metrics of innovation culture in hospitals?

Inclusion criteria

Problem: This review considered studies that review the organizational innovation culture.

Concept: This review considered studies that included instruments for measuring organizational innovation culture.

Context: This review included specific settings in the hospital.

Types of sources: This review considered studies that focused on quantitative studies, especially studies with cross-sectional designs.

METHODS

The writing of this scoping review followed the *Joanna Briggs Institute* (JBI) approach.[9] It was in line with the checklist items for reporting *Preferred*

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Reporting Items for Systematic Reviews and Meta-Analyses for Scoping Reviews (PRISMA-ScR).[10] The draft protocol was revised after receiving feedback from the research team.

Search strategy

The search strategy aimed to find published articles in journals. The search was conducted on three databases, including PubMed, Science Direct, and Wiley Library, to identify articles on the topic. The search strategy used PCC elements and the terms "Metric OR Measure OR Questionnaire" AND "culture of innovation OR Innovation culture" AND "Hospital OR Healthcare." The search strategy was limited by the design of quantitative studies and studies published in English.

Study/Source of evidence selection

Following the search, all citations were collected and uploaded to Mendeley desktop, and duplicated articles were removed. The titles and abstracts screening were undertaken based on inclusion criteria by two independent reviewers. The relevant titles and abstracts deemed appropriate for inclusion were retrieved in full text, and details of its citations were imported into the JBI System for Integrated Management, Assessment, and Review.[11] Full-text articles that did not meet the inclusion criteria were excluded, and the reasons for their exclusion were presented in Figure 1.

Data extraction

The data was extracted from eligible articles by two independent reviewers using a data extraction instrument developed by the reviewers (see Appendix II). The extracted data included specific details about the characteristics of the study, the instruments, dimensions, and subdimensions used. Any disagreement that arose among reviewers was resolved through discussion.

Data analysis and presentation

The data was compiled in a spreadsheet and imported into Microsoft Word 2019 (Microsoft Corporation, Redmond, WA) to be put together into a table containing a summary of the study characteristics, consisting of the author, year and article title, design, data analysis, setting, and participant. The review results were summarized in the table, which included the metric used, dimensions, and subdimensions of the measurement of innovation culture in the hospital.

RESULTS

Study inclusion

After entering keywords according to PCC, 4331 articles were identified from three databases. The initial filter was undertaken on duplicate articles, and 2420 articles were removed, while the remaining 2271 articles were then screened. After reading the titles and abstracts, 55 articles met the inclusion criteria, and 18 articles were eligible after full-text review. Of those eligible articles, ten were excluded since they did not contain metrics for assessing the innovation culture, leaving eight articles that were eventually reviewed (Figure 1).

Characteristics of included studies

This review included eight articles published from 2015 to 2022. All used a quantitative methodology, specifically cross-sectional design. All studies were in a hospital setting, and most were conducted in the Americas. Most studies involved health workers, including nurses,

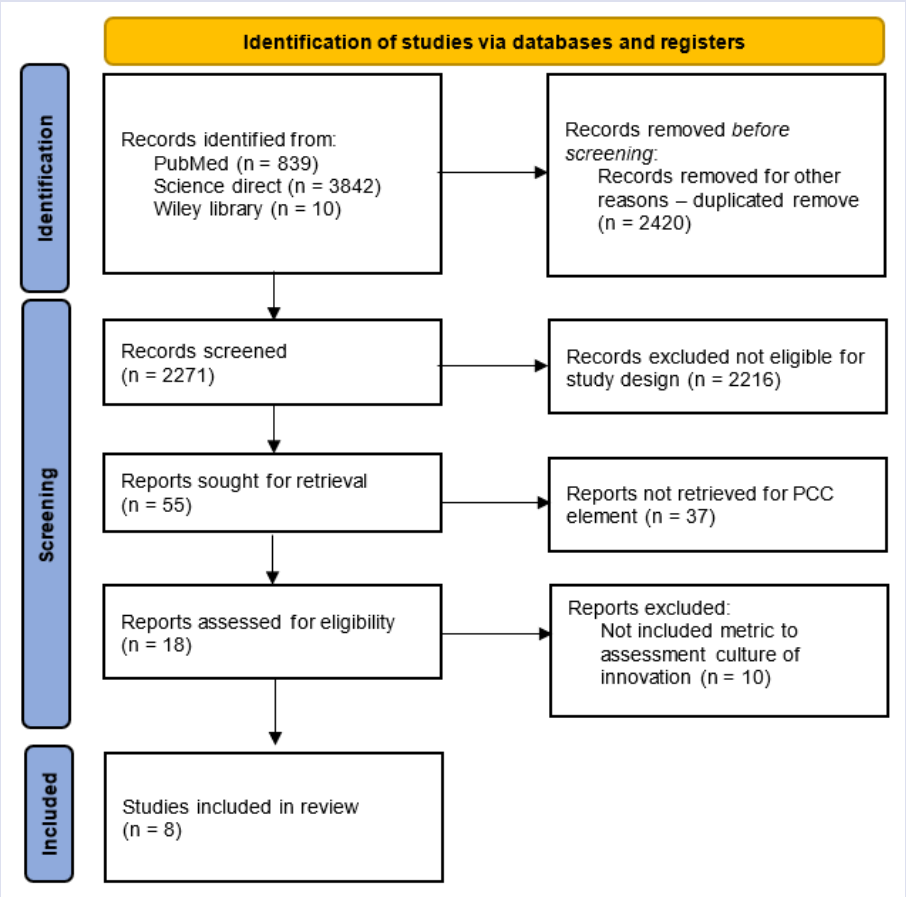

Figure 1: Search results and study selection and inclusion process.

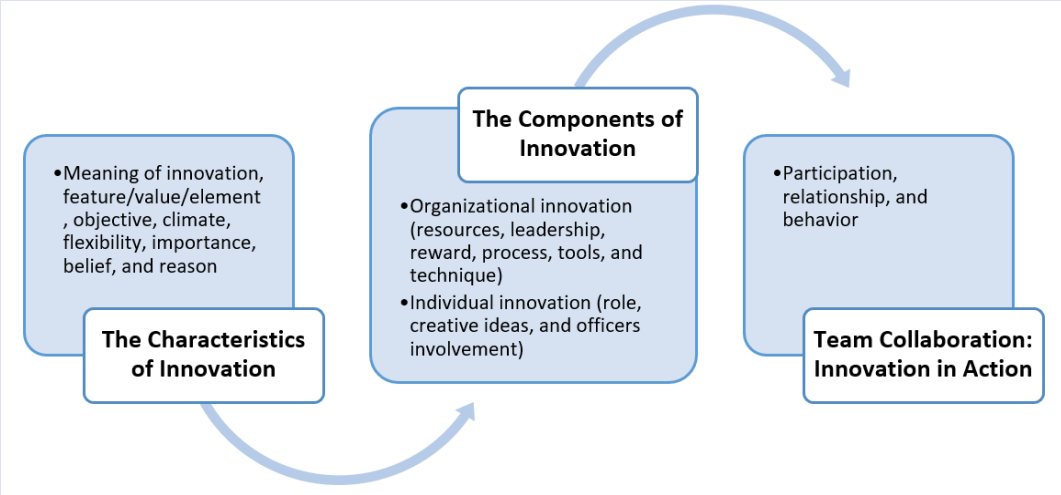

Figure 2: The main keys in the innovation culture metric in hospital.

The dimensions of the instrument often use different terms, but the meaning remains the same.

Table 1: Characteristics of the included studies.

No	Author, years & Title	Design	Data Analysis	Setting	Participant
1	Eynde A, Cornejo-Canamares M, Diaz-Garcia I, Munoz E. (2015). Measuring Innovation Culture: Development and Validation of a Multidimensional Questionnaire	Cross-sectional	Structural Equation Model (SEM)	Three Spanish organizations (a public research organization, a public university, and a private healthcare company)	645 workers
2	Kim SJ, Park M. (2015). Leadership, Knowledge Sharing, and Creativity.	Cross-sectional	SEM	Six general hospitals (>300 beds) in South Korea	347 nurses
3	Phung VH, Essam N, Asghar Z, Spaight A, Siriwardena AN. (2016). Exploration of contextual factors in a successful quality improvement collaborative in English ambulance services: a cross-sectional survey.	Cross-sectional	Multiple regression	Hospital in England (United Kingdom)	2743 paramedics and 11 ambulances services
4	Danks S, Rao J, Allen JM. (2017). Measuring culture of innovation: A validation study of the innovation quotient instrument (part one & two).	Cross-sectional	*Factor analysis* and SEM	12 industry companies include health care and social services in 13 countries, namely Spain, Mexico, Chile, Germany, Colombia, Scotland, United States, United Kingdom, Panamá, Saudi Arabia, El Salvador, Belgium dan Portugal	19781 workers
5	Nazir S, Qun W, Hui L, Shafi A. (2018). Influence of social exchange relationships on affective commitment and innovative behavior: Role of perceived organizational support.	Cross-sectional	SEM	Public sector hospital in China	325 full time nurses
6	Sönmez B, Yildırım A. (2018). The mediating role of autonomy in the effect of pro-innovation climate and supervisor supportiveness on innovative behavior of nurses.	Cross-sectional	Linear regression	Public university hospitals in Turkey	332 nurses
7	Nowak R. (2019). Responding to key exogenous changes: The joint effect of network heterogeneity and culture of innovation.	Cross-sectional	Stepwise multivariate regression	119 hospitals in the United States	500 health workers
8	Rashid A, Nawaz S, Zaman U. (2021). Examining the effect of inclusive climate on public health official's creative performance: Mediating role of innovation climate.	Cross-sectional	SEM	Public hospital in Pakistan	331 public healthcare officials

Table 2: Mapping of innovative cultural instruments in hospital based on study source and its use.

Instrument	Study							
	(Eynde et al., 2015)^	(Kim & Park, 2015)*	(Nazir et al., 2018)*	(Phung et al., 2016)^	(Danks et al., 2017b)^	(Sönmez & Yıldırım, 2018)*	(Nowak, 2019)*	(Rashid et al., 2021)*
Radiography of Innovation Culture-Multidimensional Questionnaire (RIC-MQ)	A							
Innovative Behaviors		NA	A					
Culture of Innovation				NA				
Innovation Quotient survey					A			
Climate for Innovation						NA	A	A
Number of questions items	16 items	19 items	11 items	7 items	37 items	28 items	15 items	7 items
Number of dimensions that make up the instrument	3	2	4	7	5	2	1	1
Number of subdimensions	16	7	-	-	17	6	-	5

Note: ^ = single study; * = multiple studies; NA = Instrument without adaptation; A = Adapted/modified.

Table 3: Mapping of the dimensions that make up the instrument of innovation culture in hospital.

Dimension	Instrument of innovation culture in hospital				
	RIC-MQ	Innovative Behaviors	Culture of Innovation	Innovation Quotient survey	Climate for Innovation
General	√				
Organizational innovation	√	√			
Individual innovation	√	√			
Behavior		√		√	√
Climate				√	√
Risk			√		
Resources			√	√	+
Sharing of knowledge			√	+	
Target			√		+
Tools and technique			√		+
Rewards			√		+
Relationship			√	+	
Success				√	
Value		√		√	
Belief	+	√			
Impact		√			

Note: √ = Dimension that make up the instrument; + = subdimension

paramedics, and ambulance officers. The characteristics of the included studies are shown in Table 1.

Review findings

Table 2 showed that of eight studies, there were five metrics used in measuring the innovation culture in hospital, derived from a single study (RIC-MQ Questionnaire, culture of innovation, and innovation quotient survey) and multiple studies (innovative behaviors questionnaire and climate for innovation questionnaire). Four adapted instruments from previous questionnaires have been modified according to research requirements, including the RIC-MQ questionnaire, the innovative behaviors questionnaire, the innovation quotient survey questionnaire, and the climate for innovation questionnaire. The number of question items was very diverse among the studies, although the questionnaire used was the same. This was because the questionnaire was modified; hence, the number of question items was not similar to the innovation behavior questionnaire used by Kim & Park (2015),[12] who used 19 questions, while Nazir *et al.* (2018)[13] merely used 11 questions, as well as the climate for innovation questionnaire. The instrument with the greatest number of questions was the innovation quotient survey questionnaire, which was 37 items.

All questionnaires were compiled by dimensions with varying numbers, a maximum of seven dimensions, and a minimum of one dimension. Of the eight studies, five described the subdimensions that underlay the formation of questions used to assess the innovation culture in hospitals. The most subdimensions were in the innovation quotient survey questionnaire by Danks *et al.* (2017),[14] which was 17 subdimensions.

Further mapping was carried out on the dimensions that made up the instrument because several dimensions were found similar and intersecting. There were even dimensions that were subdimensions of other instruments, such as "belief," which was the dimension of the innovative behaviors questionnaire and became a subdimension on the RIC-MQ questionnaire. Most dimensions in the culture of innovation questionnaire were subdimensions of other questionnaires. The results are depicted in Table 3.

The eight articles were extracted from the dimensions and subdimensions of the innovation culture measurement instruments and then grouped according to the roadmap of innovation in the health environment,[15,16] which consisted of three main keys as presented in Figure 2.

DISCUSSION

This scoping review identified the metrics used to assess the innovation culture in hospital. Eight studies have tried to measure it through various constructs (dimensions and subdimensions), emphasizing that the culture of innovation is unique. However, gaps were found when mapping the dimensions of the innovation culture instrument. For example, some studies measured constructs as dimensions, but others grouped them as subdimensions. There were also several different terms, but they had the same meaning. Apart from that, the cultural dimensions of innovation included organizational, individual, and behavioral innovation. If it was classified further, three main keys could be made in measuring the innovation culture as follows:

Characteristics of the innovation: Eyden *et al.* (2015)[17] suggested that characteristics were needed to measure innovation culture that generally consisted of the meaning of innovation, feature/value/element, objective, climate, flexibility, importance, belief factor, and reason. Sönmez & Yıldırım (2018)[18] included innovation climate as a characteristic of innovation.

Innovation component: Phung *et al.* (2016)[19] concluded the importance of components in innovation: macro systems (organizational innovation), including resources, leadership, reward, processes, tools, and technique. In addition, it required a microsystem (individual innovation), including the role and involvement of officers. Danks *et al.* (2017b)[14] referred to resources as a component of dimension. Sönmez & Yıldırım (2018)[18] suggested the importance of process, technique, and creative ideas that were components of innovation.

Teamwork: A well-functioning team would move forward and shape a culture of innovation.[15] Rashid *et al.* (2021)[20] emphasized participation to achieve a shared vision of innovation. Relationships and behaviors were needed to cultivate innovation.[12,14,21]

This review was limited to studies with cross-sectional design so that it provided a static view at one point in measurement, and instrument mapping was carried out without further studying the measurement results of the instrument. It is suggested that further research can undertake more specific work examining the result criteria of the instruments that have been reviewed.

CONCLUSIONS

The measurement of innovation culture in hospitals consists of three main keys: innovation characteristics, innovation components, and teamwork.

IMPLICATIONS FOR RESEARCH

Several dimensions intersect with each other in measuring the innovation culture in the hospital, and the measurement result criteria have not been clearly outlined. Researchers are then expected to be able to conduct factor analysis to confirm the construct and content as well as the appropriate result criteria in measuring the innovation culture in hospitals.

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AUTHOR CONTRIBUTIONS

Designing the analysis: Asnany, M.Alimin Maidin, Syahrir A. Pasinringi; Contributing or collecting the data: M.Alimin Maidin, Syahrir A. Pasinringi; Interpretation of data: Asnany, M.Alimin Maidin; Drafting the manuscript: Asnany, Anwar Mallongi; Revising the manuscript critically for important intellectual content: Asnany

CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

REFERENCES

1. Danks S, Rao J, Allen JM. Measuring culture of innovation: A validation study of the innovation quotient instrument (part 2). Perform Improv Q. 2017;30(1):29-53.
2. Rao J, Danks S. Measuring culture of innovation: from assessment to action. In Handbook of Research Methods for Organisational Culture. Edward Elgar Publishing; 2022.
3. Rao J, Weintraub JR. How innovative is your company's culture? MIT. 2013;54(3).
4. Ghosh-Jerath S, Downs S, Singh A, Paramanik S, Goldberg G, Fanzo J. Innovative matrix for applying a food systems approach for developing interventions to address nutrient deficiencies in indigenous communities in India: a study protocol. BMC Public Health. 2019;19(1):944.
5. Muhyi HA, Raharja SJ. The Analysis of Organization Cultural Values of Local Government Company (Study in the Local Water Company of Bogor Regency). Rev Bus Econom Res. 2017;6(2):343-9.
6. Ali M, Park K. The mediating role of an innovative culture in the relationship between absorptive capacity and technical and non-technical innovation. J Bus Res. 2016;69(5):1669-75.
7. Hogan SJ, Coote LV. Organizational culture, innovation, and performance: A test of Schein' s model. J Bus Res. 2014;67(8):1609-21.
8. Mak S, Fenwick K, Myers B, Shekelle P, Begashaw M, Severin J, et al. Creating a Culture of Innovation in Healthcare Settings: A Systematic Review. 2021.
9. Peters M, Godfrey, McInerney, Munn, Tricco, Khalil. Scoping Reviews (2020 version). In Aromataris & Munn (Eds.), JBI Manual for Evidence Synthesis. JBI. 2020.
10. McGowan J, Straus S, Moher D, Langlois EV, O'Brien KK, Horsley T, et al. Reporting scoping reviews—PRISMA ScR extension. J Clin Epidemiol. 2020;123:177-9.
11. Munn Z, Aromataris E, Tufanaru C, Stern C, Porritt K, Farrow J, et al. The development of software to support multiple systematic review types: the Joanna Briggs Institute System for the Unified Management, Assessment and Review of Information (JBI SUMARI). JBI Evid Implement. 2019;17(1):36-43.
12. Kim SJ, Park M. Leadership, Knowledge Sharing, and Creativity. J Nurs Admin. 2015;45(12):615-21.
13. Nazir S, Qun W, Hui L, Shafi A. Influence of social exchange relationships on affective commitment and innovative behavior: Role of perceived organizational support. Sustainability. 2018;10(12):4418.
14. Danks S, Rao J, Allen JM. Measuring culture of innovation: A validation study of the innovation quotient instrument (part one). Perform Improv Q. 2017;29(4):427-54.
15. Sensmeier J. Cultivating a culture of innovation. Nurs Manage. 2019;50(11):6-12.
16. van der Veer J. The contribution of design in cultivating a culture of innovation. Retrieved from militaryepistemology. com. http://militaryepistemology.com. 2018.
17. Eynde A, Cornejo-Canamares M, Diaz-Garcia I, Munoz E. Measuring Innovation Culture: Development and Validation of a Multidimensional Questionnaire. Adv Res. 2015;4(2):122-41.

18. Sönmez B, Yıldırım A. The mediating role of autonomy in the effect of pro-innovation climate and supervisor supportiveness on innovative behavior of nurses. Eur J Innov Manage. 2018.

19. Phung V, Essam N, Asghar Z, Spaight A, Siriwardena AN. Exploration of contextual factors in a successful quality improvement collaborative in English ambulance services: cross-sectional survey. J Eval Clin Pract. 2016;22(1):77-85.

20. Rashid A, Nawaz S, Zaman U. Examining the effect of inclusive climate on public health official's creative performance: Mediating role of innovation climate. J Public Affairs. 2021;21(3):e2273.

21. Nowak R. Responding to key exogenous changes: The joint effect of network heterogeneity and culture of innovation. Int J Innov Manage. 2019;23(4):1950030.

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