

1 AHP method for selecting the best strategy to Enhance Safety Culture
2 A Case study at “XYZ” Company in Qatar

3 By: Cece Hadian)¹; Kholil)² and Syahfirin Abdullah)³

4 ¹Student Magister Program of Occupational, Health, Safety, and Environmental
5 Post graduate program of Sahid University Jakarta.

6 ^{2,3}Lecture at post graduate program of Sahid University

7 Author correspondence: email:cecehadian@gmail.com

8 **ABSTRACT**

9 Lack of safety culture awareness in the ambulance services affects not only locally but
10 internationally in different countries, including at "XYZ" a company in Qatar. Many
11 studies mentioned about risks and hazards associated with ambulance services that result
12 from illnesses, accidents, or property damaged because of a lack of safety culture. The
13 results of the safety culture survey in ambulance service of XYZ Company were showing
14 less of commitment and involvement of ambulance personnel to safety 52.6% and less
15 motivation 57.9%. It supports by the achievement of key performance index of
16 ambulance services that was 85 % – 96 % from the target. This paper discussed a
17 strategy to improve safety culture in ambulance services. The authors conducted a
18 research study utilizing the AHP method to select the best approach by following the real
19 condition. This study compares the essential factors in improving safety culture based
20 on eight criteria and three strategies safety climate which the result shows that (a) The
21 commitment of senior management with a value of 0.247 or (247%), and (b) Operational
22 approach strategy with a value of 0.386 or (38.6%), with CR of 0.03 are among the top
23 priorities needed in the operational of ambulance services to run optimally.

24 **Keywords: Safety Culture, Ambulance Service, AHP**

25 **Introduction**

26 Indicators of a good safety culture in an organization can result from various factors like
27 as good safety commitment from top management and employees, compliance with
28 policies and regulations, quality services and professionalism or the existence of a safety
29 system in the organization but most of the people will see from the number of accidents
30 and illnesses that occur in the organization (Strank, 2007). Safety concerns in ambulance
31 services are mandatory, failure to do, it will be led the incident and accident into the
32 ambulance personnel and patients (Sanders, 2018).

33 Commonly, factors are causing failure to provide high quality and excellent safety
34 performance in ambulance services such as physical and psychological condition,
35 professionalism, motivation and competence, work environment, weather, coworkers,
36 policy and finance problem. Pattersen, Weaver, & Hostler, (2015) states, in addition to
37 physical risks, EMS personnel also experience psychological risks. Many EMS
38 personnel violate in written regulations, failed on procedures, stress, felt insomnia and
39 exhausted and have no commitment to the profession (Wankhade, Jones, 2015).
40 Uncontrolled and unpredictable environmental conditions, lack of supervision, limited
41 information and uncertainties that often linked as factors that contribute to increased
42 safety risks for patients in EMS services (Price, Bendall, Patterson, & Middleton. 2013).

43 According the data NHTSA agency period of 1999-2011, the number of accidents or
44 collisions related to ambulance every year is around 4500 cases, 34% resulted in injuries
45 and 33 people died. 4% were ambulance drivers dead, 21% were ambulance passengers,
46 63% were passengers from other vehicles and 12% were pedestrians (NHTSA, 2012).In
47 Western Turkey, "The most accident happens in ambulance service was motor vehicle
48 accident (MVA) 31.9%, needle-stick injuries 16.0% (Yilmaz, Serinken, Dal, Yaylaci, &
49 Serpil, 2016).In Taiwan had been 1,627,217 traffic accidents during the study period,

50 715 involved the ambulance within 8 fatality and 1844 injured patients. (Lin, 2018). My
51 impression to those incident and accident, due to the lack of the safety culture in
52 ambulance service, it was the high-risk incident and accident and harmful to ambulance
53 personal and patient.

54 Similarly, it also happened in the ambulance service at XYZ Company. In the 2013-2018
55 period, there were 4833 emergency calls, Two thousand six hundred fifty-six calls
56 (55.5%) were related to patient management, and 45 % non-related. One hundred
57 seventeen cases (4.4%) were traffic accidents, 424 (16.0%) cases of trauma or injury,
58 2098 cases (79.0%) were medical, and 17 cases (0.6%) were dead on arrival (EMS
59 yearly report XYZ Company, 2018).

60 Based on data from occupational health (OH) clinic period of 2016 - 2018, there were 3
61 cases of ambulance personnel suffered low back pain and spinal cord injury due to faulty
62 in lifting, 1 case of small head injury and 1 case of heat exhaustion. Presentation by Al-
63 Jaidah, (2018) mentioned, "Number of sick leave during 2017 was high. OH recorded,
64 1.55% (544 days) of health workers including ambulance personnel submitted sick
65 letters".

66 On annual report 2018 of safety performance reported, participate of providing incident
67 or accident says in the health department of XYZ Company, especially ambulance
68 services, was deficient. It was 16 reports during the 2013-2018 period ref. 90% are
69 related to patient management, and 10% similar to safety issues; unexpected events
70 (KTD) and near misses (KNC).

71 The National Patient Safety Agency, (2011) in Wankhade & Jones, (2015) mentions
72 complex problems in the provision of ambulance services and related processes, as risk
73 factors for quality service failures. The risk and hazard in ambulance service are difficult
74 to avoid because of the environment condition and the nature of work itself, but it can be
75 reduced or minimized as little as possible by efforts to enhance occupational health and
76 safety system with increasing promoting strategy through the development of a safety
77 culture in the work environment.

78 Based on the description above, the author is interested in researching the strategy to
79 enhance safety culture at the ambulance service of the XYZ Company in Qatar. The
80 primary purpose of this research is to analyze existing problems, formulate priority
81 strategies and build up a model for strengthening the safety culture in ambulance services
82 at XYZ Company. Building a safety culture in ambulance services or organizations is
83 fundamental. A positive safety culture influenced by organizational performance and
84 safety management performance.

85 **Literature Review**

86 In the United States of America or most Europe countries, ambulance services were
87 called Emergency Medical Services - EMS (Platt, Stoy, & Lejeune, 2011, p.2). EMS is
88 an ambulance service system in terms of emergency services integrated in terms of
89 facilities, professional personnel and management systems that are standardized both
90 nationally and internationally (p.5). Principally, EMS practitioners have some
91 responsibility as well as another health practitioner in the hospital to provide established
92 high-quality health services to the patient but more focus on pre-hospital management
93 before the patient sends to the hospital (p.6).

94 To maintain and improve the care of patients, systematic documentation and periodic
95 audits, or other processes to ensure the quality of care, need to be incorporated, "Quality
96 management systems that are simple, are continuous, and allow for rapid changes in the
97 system need to be implemented" (Jones, 2015) in (Wankhade & Jones, 2015). The safety
98 and quality management in the ambulance became a priority and essential because a lack

99 of supervision in safety will be led to an accident, loss of property damage, social
100 problem and protection for the personnel and patient. The Berwick Report (DH 2013) in
101 Pattersen, Weaver, & Hostler, (2015) explained, what steps to be required to improve
102 patient safety: "Identifying that incorrect organizational priority, systems, environmental
103 factors, and culture were contributory factors in failing to learn and in failing to protect
104 patients from harm". The management of quality risks within ambulance services
105 presents significant challenges due to the unique environment they operate within (Brice,
106 Studnek, Bigham, Martin, Gustalow, Hawkins, & Morrison, (2012). In this view, we
107 should eliminate the risk factors and enhancing the safety culture in the ambulance to
108 maintain the services and protect all parties involved in ambulance services, including
109 personnel and patient.

110 What is the safety culture means and how's to enhance safety culture? Confederation of
111 British Industry (CBI, 1991) defines "culture" is the way we do things around here".
112 Stranks, (2007, p.354) described as "a state of manners, taste and intellectual
113 development of mind, tastes, etc. by education and training." The Department of Mine,
114 Industry Regulation and Safety of Western Australia defined "the safety and health
115 culture of an organization is a reflection of the values, attitudes, perceptions,
116 competencies, and behaviors of the people working there (WHSQ, 2013). It reflects the
117 organization's commitment to, and prioritization of, safety and health as well as the
118 effectiveness of the organization's safety management system (p.359). The elements of a
119 safety and health culture organized into three categories: a) Organizational. It includes
120 policies, procedures, and systems that relate to safety and health. b) Psychological,
121 involving individual perceptions, attitudes, and values. c) Behavioral, what people do,
122 health, and safety behaviors (Cooper,2001). King (2013) Identified two distinct while
123 developing a safety culture within the organization: a) A transformation of systems,
124 leadership, and organizational culture. b) The administration created the conditions in
125 which high standards of care are delivered consistently, setting clear goals and standards
126 for improving quality and patient safety, and providing the tools for staff to address these
127 goals within available resources.

128 In building a safety management system in adhering to a high quality in the ambulance
129 service based on the enhancement of safety culture within the organization, there is some
130 indicator that needs to follow. The cultural symbols utilized in many aspects of activities
131 found within the organizations (Stranks, 2007, p.354). It is how to measures specific
132 features of a particular culture of the people or group of the people when they are doing
133 communication, transaction, or other business (Cooper, 2001). Stranks, (2007, p.355) On
134 human factors and behavior, safety said: "cultural indicators linked with Key
135 Performance Indicators (KPI) and Success Criteria (Acceptance Criteria)." Within an
136 organization, cultural indicators include a) Degree of loyalty and commitment displayed
137 by all levels of the workforce. b) Presence of shared goals with specific signs. c).
138 Policies and procedures. d) Evidence of fair and effective management systems. e)
139 Investment in people (Training, frequent information) f) Investment in Technology. g)
140 Compliance with a legal requirement. Personal integrity at all levels. h) System for
141 communication both within and in our organization. i) A well-written mission statement.
142 And j) A publicized reward structure that rewards high levels of performance. The
143 organization operational and safety performance will influence those those indicators. The
144 indicator shows, the critical thing of build up a system and human resources as well to
145 get a positive culture in the workplace and it is the best way to have greatest impact on
146 the reduction of accident and ill health (p.355). In the meantime, in the context of
147 ambulance operational, the commitment from executive or top management are very
148 significant because it is related to vision and mission, value, financing, and build up a
149 system (Wankahade & Jones, 2015).

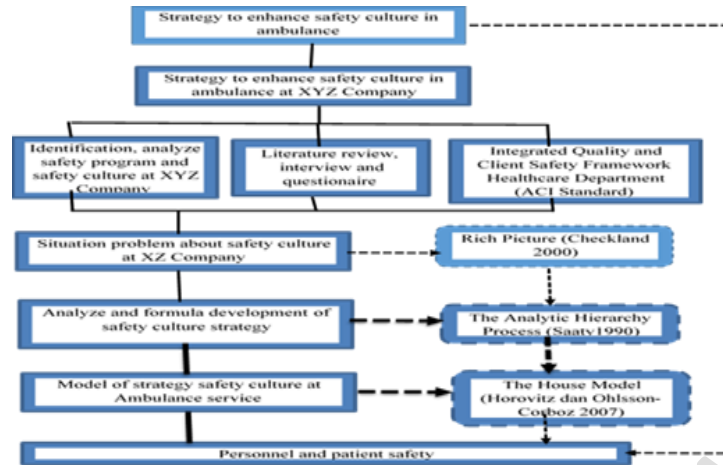


Figure 1.1: Theoretical framework of strategy to enhance safety culture at ambulance service in XYZ Company Qatar

150

151 Methods

152 This type of research is conceptual research, which is research related to an idea or
 153 theory that might be applied, with a system approach. The theoretical research that the
 154 researcher did was a concept, design, or strategy to improve safety culture at the
 155 ambulance service of XYZ Company in Qatar. The study conducted from March 2019-
 156 up to July 2019 at XYZ Company.

157 Descriptive analysis is used to analyze data by describing the data collected without the
 158 intention to create a generally applicable conclusion — the systematical data found by
 159 interview results, observation, documentation, and survey. Descriptive analysis was used
 160 to describe problems, risk factors regarding safety culture at ambulance services of XYZ
 161 Company. After the study results well explained, the problematic situation described
 162 with Rich Picture.

163 In this research, the author compiles primary and secondary data. Primary data collected
 164 with the observation method, in-depth interview with the expert, who directly concerns
 165 in enhance of safety culture in the ambulance services. In this research, choosing the
 166 experts are used non-probability method and to collect data are used purposive sampling
 167 technique. The primary data is used to obtain the information, assessment quality,
 168 objective, and measurement of formulation strategies for enhancing safety in the
 169 ambulance services of XYZ Company. The rest, secondary data taken from internal data
 170 of XYZ Company, statistic, and yearly report, books, relevant websites, thesis, and the
 171 related journals.

172 Data analysis methods used in this research were descriptive analysis, utilization of
 173 questionnaire safety culture as tools analysis with SPSS25, Soft System Methodology
 174 based Rich Picture (Checkland, 1999), AHP (Saaty & Vargas, 2012) in (Kholil, 2018),
 175 and The House Model (Horovitz & Ohlson, 2007). By using AHP, the best choice
 176 according to the objective condition determined (Kholil, Susanti, & Soechayadi, 2016).
 177 The judgment from experts were analyzed and arranged appropriately by Expert Choice
 178 2.0 software (Expert Choice, 2004) and presented with the house model. In this research,
 179 five experts were involved. The expert for this research was two ambulance practitioners
 180 at XYZ Company, one direct supervisor from management, one from business, health
 181 and quality section (BHQ) as an auditor and one academician including practicing in
 182 occupational and health and safety. The AHP process seen in Figure 1.2.

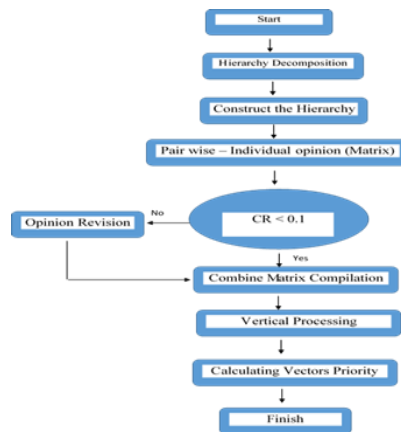


Figure 1.2: AHP Process

183

184 **Results and Discussion**

185 ***Brief view of OH&S program and safety culture at ambulance service in XYZ***
 186 ***Company Qatar***

187 The XYZ Company is engaged in oil and gas. As a state-owned company with
 188 international tenure, the viability of a safety management system in the company
 189 mandates and must be in operation ref. One standard that must be met by the company is
 190 to provide a plan and emergency response system to deal with emergency conditions and
 191 situations ref. Ambulance service is one component in the emergency response system
 192 ref. The ambulance service at XYZ Company operates 24 hours, 7/28 with a fleet of 4
 193 units with a total of 39 personnel from several different countries. Operationally, the
 194 ambulance service provides emergency services for all employees in the industrial area,
 195 neither for XYZ employees itself nor contractors and subcontractors.

196 Officially, the company have been received ISO 9001-2015 and ACI "Diamond" Level
 197 (Accreditation Canada International) for Quality services, but not yet synchronized with
 198 implementation at ambulance services.

199 Table 1.1: ACI – Accreditation Canadian International Program.

Category	Goal
Safety Culture	Building a culture of safety in the company
Communication	Improve communication and coordination in services and service providers and service recipients
Medicines Dispensing	Make sure you use drugs at risk
Work Environment	Establish a safe place and work environment in providing services
Infection Control	Decreases and minimizes the risk of disease due to service to service personnel
Risk Analysis	Identify risks to clients and employees

200 Source: ACI manual book 2018 XYZ Company.

201 Management's commitment to safety seen in the form of the BHQ division (Business,
 202 Healthcare, and Quality). "The BHQ team is responsible for the direction and
 203 implementation of the management functions of compliance with procedures, service
 204 quality, health risks in the work environment of the company clinic and ambulance". The
 205 focus and responsibilities are "on improving quality, effective health risk management
 206 and compliance with national health regulations to improve the health values of XYZ

207 companies and employees following health terms and standards, good service and cost-
208 effectiveness."

209 OH&S's Company strategies and objectives are as follows:

- 210 a. Improve the performance of the health system and service delivery (ensuring the
- 211 reach of health services that are accessible and sustainable according to the needs of
- 212 XYZ company employees and work partners and other stakeholders).
- 213 b. Safety, quality and client satisfaction (providing integrated, safe, high-quality health
- 214 services to improve the physical and mental health and well-being of clients).
- 215 c. Occupational health services and collaborative support (providing world-class
- 216 occupational health services for XYZ company employees and collaborative support
- 217 to internal and external stakeholders.)
- 218 d. Professional development (ensuring and maintaining a competent workforce through
- 219 the development of sustainable professionalism).
- 220 e. Efficient business processes and financial systems with integrity (ensuring financial
- 221 integrity through the implementation of efficient business processes).

222 **Data Findings and Analysis**

223 *Analysis or description of the problem situation in the XYZ company ambulance*
224 *service.*

225 In general, the Safety system and program in the XYZ Company are excellent, but the
226 implementation in the field still needs to be improved. Based on the result of the safety
227 culture survey, it showed in table 1.2:

228 Table 1.2: Descriptive Analysis Result
229 Safety culture at Ambulance Services in XYZ Company Qatar

Criteria	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference	
				Lower	Upper
Management Commitment	9.4474	1.13179	.18360	9.0754	9.8194
Communication	9.0526	1.48774	.24134	8.5636	9.5416
Employee Involvement	8.5000	1.42847	.23173	8.0305	8.9695
Training & Information	9.3947	1.15172	.18683	9.0162	9.7733
Motivation	8.3158	1.71015	.27742	7.7537	8.8779
Comply with Policy & Procedure	8.8947	1.87140	.30358	8.2796	9.5099
Learning Organization	9.2105	1.29777	.21053	8.7840	9.6371

230 Resource: Extracted from SPSS25.

231 Based on table 1.2 above, the highest value is a management commitment criterion with
232 an average score of 9.44 while the lowest cost is a motivation criterion with an average
233 rating of 8.31.

234 Table 1.3: Frequency Analysis Result
235 Safety culture at Ambulance Services in XYZ Company Qatar

Criteria	Value	Frequency	Percent	Valid Percent	Cumulative Percent
Management Commitment	No	11	28.9	28.9	28.9
	Yes	27	71.1	71.1	100.0
Communication	No	15	39.5	39.5	39.5

	Yes	23	60.5	60.5	100.0
Employee Involvement	No	18	47.4	47.4	47.4
	Yes	20	52.6	52.6	100.0
Training & Information	No	11	28.9	28.9	28.9
	Yes	27	71.1	71.1	100.0
Motivation	No	16	42.1	42.1	42.1
	Yes	22	57.9	57.9	100.0
Comply with Policy & Procedure	No	10	26.3	26.3	26.3
	Yes	28	73.7	73.7	100.0
Learning Organization	No	14	36.8	36.8	36.8
	Yes	24	63.2	63.2	100.0

236 Resource: Extracted from SPSS25

237 Based on the table 1.3 above, comply with policy and procedure have the highest rating
 238 with a value of 73.7%, while employee involvement was the lowest value with a value of
 239 52.6%.

240 This is supported by internal data which is the key to the work performance of the
 241 ambulance unit (KPI). In this case, it can be seen with unsatisfactory achievements from
 242 the patient handling report of 94% during 2018. Even though reporting on services to
 243 patients is fundamental as the legality of all actions that have been done. Likewise, the
 244 value of the reporting index of pain scale and response time were 96%.

245 **Rich Picture (RP)**

246 In this stage, identify the problem as a problematic situation known from the culture of
 247 the safety of ambulance services at the XYZ Company. Problematic situations aim to
 248 explain clearly about issues in the real world. The process at this stage is essential
 249 because it is related to the decisions of experts. After the results of the analysis
 250 concluded, the next process illustrated by drawing for explaining the situation in the real
 251 world. See, Figure 1.3 as below:



Figure 1.3: Rich Picture of Situation Problem at Ambulance service of XYZ Company

252

253 **Formulation of Safety Culture Improvement Strategies at Ambulance Services at**
 254 **Qatar XYZ Company.**

255 According to Expert's judgment towards 8 criteria's and 3 strategies proposed in the
 256 effort to enhance safety culture at ambulance service in XYZ company, there were 3
 257 main factors that get individual attention, namely: commitment of senior management is
 258 the most critical factor with a value of 0.247 (24.7%), followed by employee
 259 commitment and involvement with a value of 0.181 (18.8%) and compliance with
 260 regulations and existing procedures with a value of 0.140 (14%). The Expert's argued:
 261 "Commitments with a clear vision and mission from management and a good system
 262 improvement on OH&S will spur organizations and employees to always comply with
 263 OH&S." The synthesized result is seen in Figure 1.4.

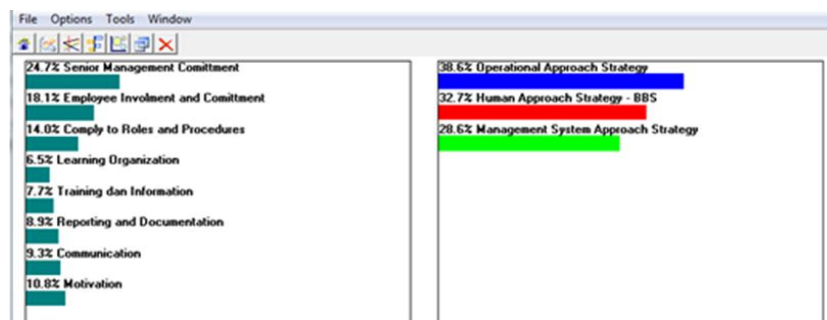


Figure 1.4: Strategy and factors to enhance safety culture at ambulance services at XYZ Company in Qatar. Sources: Extracted from Expert Choice 2000.

264

265 The result of this research is in line with previous research from Price, 2013; Pattersen,
 266 Weaver, & Hostler. (2015) & Ernawati, Arini, & Haryono, (2017). They mentioned,
 267 "The risk factors that causing various hazards in the ambulance service environment, it
 268 came both internally and externally such as destitute of the systems, no organizational
 269 commitment, lousy culture, inadequate safety facilities and infrastructure. It is also
 270 because of procedures that do not meet standards, stress, lack of knowledge, training and
 271 motivation, conditions of work and weather climate". This study supported by Atack &
 272 Maher, (2010) on Perception of EMS personnel and health workers on safety issues in
 273 the pre-hospital service, they suggested, more active participation of EMS personnel to
 274 improve skills, clinical decision making and the necessity for changes in the regulations
 275 and health systems in the regions and the government, in the effort to enhance the safety
 276 of the patient.

277 Anyhow, the essential strategy based on the expert's judgment was operational approach
 278 strategy with a value of 0.386 (38.6%). The following strategy was the human approach.
 279 In this approach strategy, the expert binds the second priority with a value of 0.327
 280 (32.7%). While the latter approach is a management system approach with a value of
 281 0.286 (28.6%). Overall this assessment has a level of inconsistency or CR 0.03 so that
 282 the judgement and opinions of experts was logic and can be accepted. See, Figure 1.5.

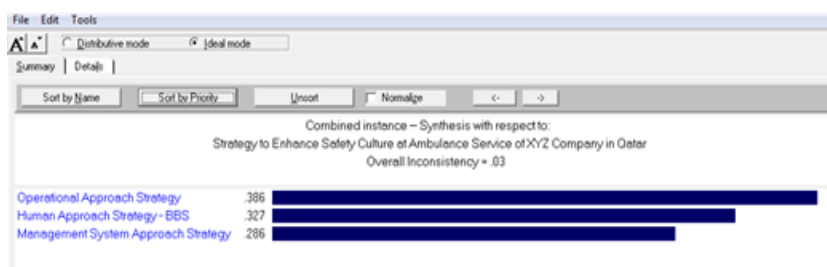


Figure 1.5: Priority of Safety Culture Improvement strategies in ambulance services at Qatar XYZ Company. Source: Extract from Expert Choice 2000

283

284 Based on the expert's judgment, who was prioritizing operational strategies was the most
285 important with a value of 0.386 (38.6%) is very appropriate. It is because of the XYZ
286 Company already has an excellent safety management system, but the implementation in
287 the field still needs to be improved. In this case, it was evident from the KPI index that
288 does not meet the target and safety culture results. The determination of safety values is
289 not limited to paper, but it needs explicit work. For this reason, a strategy for improving
290 safety culture with operational approaches can be carried out in the following ways
291 (Ramli, 2013):

- 292 a. How to work safely.
- 293 b. Management changes
- 294 c. Safe operation
- 295 d. *Process safety management*

296 The second strategy should be developed is a human approach strategy with a priority
297 value of 0.327 (32.7%). The approach to insane, or better known as behavior-based
298 safety (BBS), is a fundamental alternative strategy. This strategy requires hard work to
299 run it. Behavior change cannot be done in a short time but requires clear steps and
300 programs with the support of top management. They argue that; "*Safety culture will run*
301 *effectively and successfully if there is motivation and have positive attitudes and*
302 *behaviors, so they will tend to do positive things too.*" Thus, all existing regulations and
303 systems will be easy to run.

304 The last strategy is the approach strategy of the system with a value of 0.286 (28.6%). In
305 this approach focuses on building an OH&S management system within the organization
306 to improve the program and safety culture. Reasonable policies and procedures support
307 the success of safety in the operation of ambulances or other activities — this approach
308 made by creating a system of documentation, control of documents, and data. At the
309 same time, building work plans in ambulances, targets, and excellent communication
310 between personnel. The Expert's mentioned: "*A safe way of working by analyzing the*
311 *surrounding risks and following the procedures in the ambulance service, will provide a*
312 *sense of security in working.*"

313 Studied by Jones (2005) in Wankhade & Jones, (2015) states, "Quality management
314 systems that are simple, are continuous, and allow for rapid changes in the system need
315 to be implemented". To maintain and improve service, systematic documentation,
316 routine training, and continuous audits need to be promoted.

317 It is also supported by Pirrallo, Khan, & Kuhn, (2005) "The development of policies and
318 protocols related to operational safety directly impacts the safety of the patient". ". Those
319 all the steps will improve the system and quality management in the operation of the
320 ambulance.

321 According to Wankhade & Jones, (2015) in ethnographic studies in the UK about
322 cultural elements in ambulances, identifying three different occupational subcultures
323 using the Schein (1996) typology: Elements of safety and health culture can be organized
324 into three categories: a). Organization. This includes policies, procedures, and systems
325 related to safety, and health. b). Psychological, which involves individual perceptions,
326 attitudes and values. c). Behavior, people's behavior, health, and safety behavior.

327 Meanwhile, in the context of ambulance operations, commitment from executives or top
328 management is very significant because it is related to the vision and mission, values,
329 financing, and system building. If you do not have a clear commitment, the results will
330 not be achieved. So, with this, expert judgment can be summed up simply in an AHP
331 hierarchy like figure 1.6 and in-house model like figure 1.7.



Figure 1.6: AHP Hierarchy Results of Strategy to Enhance Safety Culture at Ambulance Service of XYZ Company in Qatar.

332



Figure 1.7: The House Model of Strategy to Enhance Safety Culture at Ambulance Service of XYZ Company in Qatar

333

334

Conclusion

335

Provide a high quality of ambulance services with the medical organization, and the safety aspect is one most crucial component while delivering care. Enhancing safety culture within an organization is one program to improve safety performance. According to the discussion and expert's judgement with AHP method regarding of strategies to improve safety culture in ambulance services at XYZ Qatar, the researcher can answer the research formulation as follows: (1). To enhance the safety culture of ambulance services in XYZ companies, the operational approach strategy is the most important strategy to implement and develop. (2). In terms of implementing this strategy, the commitment factor of senior management is the most important thing in an effort to improve safety culture in ambulance services in Qatar XYZ Company. (3). The House Model method is a model or presentation of a strategy to improve safety culture in the ambulance service with a mission on the safety of ambulance personnel and patient. The three main factors become pillars in building a strategy to improve safety culture in ambulance services, namely commitment from management and employees, compliance with regulations and motivation. These pillars upheld through operational approach safety programs through safe work, changes to management by making regulations and work standards, synergized with approaches to employees by changing behavior and perceptions and providing motivation with the support of a sound system approach about safety through a safety management system that continues to develop with the ongoing audit.

354

355 **Competing Interests Disclaimer:**

356 Authors have declared that no competing interests exist. The products used for this
357 research are commonly and predominantly use products in our area of research and
358 country. There is absolutely no conflict of interest between the authors and producers of
359 the products because we do not intend to use these products as an avenue for any
360 litigation but for the advancement of knowledge. Also, the research was not funded by
361 the producing company rather it was funded by personal efforts of the authors.

362 **Recommendation**

363 The development of safety culture in ambulance services will improve the quality of
364 services that prioritizes the safety of personnel and patients. Safety concerns from all
365 level management and effective approach will be improve quality service. Further
366 research needs to be done in an effort to develop a safety culture in ambulance services
367 and the development of safety programs that are directly related to the safety of
368 ambulance personnel and patients in particular.

369 **References**

- 370 Al Jaidah, M. A. (2018, 2 21). *Presentation "Managing Sickness Absence in The*
371 *Workplace"*. Doha, Qatar: XYZ Company.
- 372 Atack, L., & Maher, J. (2010). Persepsi personel EMS dan tenaga kesehatan tentang
373 masalah-masalah keselamatan pasien di pelayanan prehospital. *Prehospital*
374 *Emergency Care*, 14(1), 95-102.
375 doi:<https://doi.org/10.3109/10903120903349887>.
- 376 Brice, J., Studnek, J., Bigham, B., Martin, G. C., Gustalow, C., Hawkins, E., &
377 Morrison, L. (2012). EMS Provider and Patient Safety during Response and
378 Transport: Proceedings of an Ambulance Safety Conference. *Prehospital*
379 *Emergency Care*, 16(1), 3-19. doi:10.3109/10903127.2011.626106.
- 380 CBI. (1991). *Developing a Safety Culture*. London. Retrieved 7 3, 2018
- 381 Checkland, P. (1999). *Systems Thinking, Systems Practice*. Wiley. doi:1. ISBN 0-471-
382 98606-2
- 383 Cooper, D. (2001). *Improving Safety Culture*. London, UK: John Wiley & Sons Ltd.
- 384 Ernawati, D., Arini, D., & Haryono, H. M. (2017). *Analisis faktor yang berhubungan*
385 *dengan insiden keselamatan pasien(di unit ambulans gawat darurat rumah sakit*
386 *umum Haji Surabaya*. Surabaya: Sekola Tinggi Ilmu Kesehatan Hang Tuah
387 Surabaya.
- 388 Expert Choice. (2004). *Quick Start Guide and Tutorials Copyright 2000-2004* .
389 Arlington, VA, USA: Expert Choice, Inc.
- 390 Horovitz, J., & Ohlson, C. A. (2007). *A Dream With Deadline: Turning Strategy Into*
391 *Action*. . . Great Britain (GB): Pearson Education.
- 392 Kholil. (2018). *Pendekatan Holistik dan Model Dinamik: Untuk Masalah yang Komplek*.
393 (1st ed.). Jakarta, Yayasan Komunikasi Pasca Tiga belas Sahid Sudirman Center
394 11th Floor Suite A. Jl. Jenderal Sudirman Kav.86. Jakarta., INA: Indigo Media.
395 doi:ISBN 978 602 52218 1 1.
- 396 Kholil, Susanti, S. L., & Soecahyadi. (2016). Potential leading resource in Padang
397 Panjang city. The development of regional economic based on Soft System
398 Methodology(SSM). *Journal of Scientific research and reports*, 9(7), 1-8.
- 399 King, F. (2013). *Patient-centred leadership: Rediscovering our purpose*. London: The
400 King's Fund. Retrieved 08 17, 2018
- 401 Lin, C. e. (2018). Ambulance Traffic Accident in Taiwan. *Journal of the Formosan*
402 *Medical Association*, 117,283-29. Retrieved 03 30, 2018, from [www.jfma-](http://www.jfma-online.com)
403 [online.com](http://www.jfma-online.com)

- 404 NHTSA. (2012). *When Ambulance Crash"EMS Provider and Patient Safety"*.
405 Department of Transportation, National Highway Traffic Safety Administration.
406 Washington DC: US Department of Transportation. Retrieved 03 28, 2018, from
407 National Highway Traffic Safety Administration:
408 <https://www.ems.gov/pdf/NHTSAOEMSAmbulanceInfographic/>
- 409 Pattersen, D. P., Weaver, M. D., & Hostler, D. (2015). Occupational injury prevention
410 and management. *Emergency Medical Services*, 217-221. Retrieved 08 28, 2018
- 411 Pirrallo, C. A., Khan, C. A., Evelyn, & Kuhn, R. (2005). Characteristics of fatal
412 ambulance crashes in the united state. *Pre Hospital Emergency Care*, 5(3), 261-
413 269. Retrieved 7 10, 2018
- 414 Platt, E. T., Stoy, W. A., & Lejeune, D. A. (2011). *Mosby's EMT-B Textbook* (2nd
415 Edition ed.). 11830 West line Industrial City Drive St. Louis, Missouri. St:
416 Elsevier Mosby.
- 417 Price, R., Bendall, JC, Patterson, JA, & Middleton, P.M, (2013). Treating the clock and
418 not the patient: Ambulance response times and risk. *Quality and Safety Health*
419 *Care*, 15,27-30.
- 420 Ramli, S. (2013). . *Smart Safety: Panduan Penerapan K3 yang Efektif*. Jl. Rawagirang
421 No.8 Kawasan Industri Pulogadung. Jakarta.: PT Dian Rakyat. doi:ISBN 978
422 979 078 403 1.
- 423 Saaty, T., & Vargas, L. (2012). *Model, Methods, Concepts & Applications of the AHP*.
424 *International Series in Operations Research & Management Science*. New York:
425 Springer: Science & Business Media.
- 426 Stranks, J. (2007). *Human Factors and Behavioral Safety. Health and Safety Culture* (1st
427 Edition ed.). Burlington, Linacre House, Jordan Hill, Oxford OX2 8DP 30
428 Corporate Drive, Suite 400, UK: Elsevier.
- 429 Sanders, M. J. (2018). *Paramedic Tekstbook* (5th edition ed.). Udbury, United States.
430 doi:ISBN:1284147827.
- 431 Wankhade, P., & Jones, K. M. (2015). *Ambulance Services :Leadership and*
432 *Management Perspective* (1st Edition ed.). Bolton: Springer International
433 Publishing AG Switzerland. doi:DOI 10.1007/978-3-319-18642-9
- 434 WHSQ. (2013). Understanding safety culture: A Practical Guide to Safety Leadership:
435 Implementing A Construction Safety. Queensland: The State of Queensland
436 (Department of Justice and Attorney-General).
- 437 Yilmaz, A., Serinken, M., Dal, O., & Yaylaci, S. (2016). Work-related Injuries Among
438 Emergency Medical Technicians in Western Turkey. *Prehospital and Disaster*
439 *Medicine*, 31(5), 505-508. doi:<https://doi.org/10.1017/S1049023X16000741>.

UNDER PEER REVIEW