Government regulation and organizational effectiveness in the health-care supply chain

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Abstract

Purpose – In the context of the debate on ensuring health-care efficiency, this study aims to identify and prioritize factors and subfactors that influence organizational effectiveness (OE) in the health-care supply chain.

Design/methodology/approach – For the purpose of this qualitative study, triangulation was applied to identify, explore and systematically analyze the OE-related practices used by diverse stakeholders along the health-care supply chain. Sixty-two OE practices were thus identified. Subsequently, these were grouped in six different nodes before the analytical hierarchical process (AHP) was used to identify the weightings of specific practices (and related factors) and their impact on OE.

Findings – The findings suggest that external factors associated with government regulation, including government directives and branding, are the most critical factors that influence OE-related practices, while cost-related factors are the least important.

Originality/value – The originality of this study derives from the introduction of system theory supported by a modified supplier-input-process-output-customer (SIPOC) framework. Two important factors – government regulation and branding – have been introduced to the existing SIPOC chart as a valuable process structure for the health-care chain.

Keywords Organizational effectiveness, SIPOC, Government regulation, Health-care supply chain

Paper type Research paper

Introduction

Over the past two decades, the health-care sector has been under constant pressure to simultaneously reduce cost and improve both operational service quality and patient satisfaction (Hung *et al.*, 2021; de Vries and Huijsman, 2011). In this context, attention has been paid to the health-care supply chain: an issue that has become critical during the COVID-19 pandemic (Spieske *et al.*, 2022; Senna *et al.*, 2021). The thrust of the challenge that the health-care sector faces represents a triple bottom line of balancing better health, improved care and lower cost. In response to this challenge, several studies (Hussain *et al.*, 2020; Abdolazimi *et al.*,

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2021) have examined health-care management from the perspective of operations management. Similarly, the need to balance health treatment outcomes and cost/resource management have been examined in various studies (Shah *et al.*, 2008) focusing, in particular, on the performance outcomes of health-care operation and management. Increasingly, it is also argued in the literature that more insight from public policy is needed if the problems and challenges that the health-care sector encounters are to be navigated (Dixit and Sambasivan, 2018; Pitt *et al.*, 2018; Kopalle and Lehmann, 2021). This paper locates itself in this context by examining organizational effectiveness (OE) in the health-care supply chain and by seeking ways to improve efficiency in the health-care domain.

OE has emerged as a relevant concept in health-care organizations because of the need to evaluate the extent to which the goals and objectives of health-care organizations are met (Sein Myint *et al.*, 2021; Gu and Itoh, 2016). The relevance of OE to health-care operations is evident in the number of studies that have examined diverse aspects of health-care operations through the lens of OE. For instance, AlJaberi *et al.* (2018) focused on operations management, while other researchers focused on patient satisfaction (Badri *et al.*, 2009), management (Jabnoun *et al.*, 2005) and the role of motivation and job satisfaction in predicting work performance (Suliman and Al-Sabri, 2009). Other health-care aspects viewed from the perspective of OE include studies on leadership and organizational performance (Al-Abrrow, 2014), service quality (Phan *et al.*, 2019; Ciasullo *et al.*, 2018) and sustainable organizational performance (Alhamadi and Hussain, 2019). However, in the otherwise rich literature, there has been a tendency to focus on just one tier of the health-care supply chain. Hence, more research is needed that would examine OE across the health-care supply chain (Aman and Seuring, 2021; Almutairi *et al.*, 2020). This paper seeks to do just that. To this end, by placing the analysis in the context of United Arab Emirates (UAE), a significant hub in health-care service provision (Zainal and Salloum, 2021; Bodolica and Spraggon, 2021; Rees *et al.*, 2021), the OE-related practices used by diverse stakeholders along the health-care supply chain are identified and examined in terms of their impact on OE.

This study adopts systems theory, as it allows highlighting the salience of resources to achieve the desired performance in terms of inputs, the acquisition of resources and processes (Yuchtman and Seashore, 1967). Systems theory highlights the connectivity of a group of independent, but interrelated components, to comprise a unified whole. Viewed in this way, the health-care chain may be conceptualized as consisting of suppliers, input, process, output and the customer (SIPOC). Two additional factors are added to this classic view, i.e. government regulation and branding. Both factors, as shall be argued here, are consequential for OE in health care. Against this backdrop, the question that needs to be addressed is to what extent and how each of the so identified factors influences overall OE in the health-care sector. To address this question, the paper is structured as follows. First, the literature review is introduced. Here systems theory and SIPOC are used to identify and categorize factors influencing OE in the health-care sector. Then the research methodology, using the AHP technique, is outlined. In the next section, the findings are elaborated. Discussion and conclusions follow.

Literature review

OE, as a concept, has attracted interest in the extant literature. Previous studies have sought to understand the nature of OE and how it can be measured. One school of thought believes that OE should focus more on factors related to human performance and supplier performance relative to effectiveness measures and indicators (Ali and Anwar, 2021; Bhardwaj and Ketokivi, 2021). Other studies, such as those by Ageron *et al.* (2012) and Alhamadi and Hussain (2019), have sought to define factors that can be considered to

measure OE. These include: cycle time, productivity, waste reduction, regulatory compliance, community involvement and operational performance. Another school of thought has suggested an identification of the areas of ineffectiveness to benefit the organization by using weakness as a roadmap to increasing effectiveness (Pedraza, 2014).

Systems theory emphasizes the resources required to achieve the desired performance in terms of inputs, the acquisition of resources and processes (Yuchtman and Seashore, 1967). Open system approaches present system theory in terms of factors such as inputs, processes and outputs that define performance because organizations are man-made systems that dynamically interact with their environments, customers, competitors, suppliers and governments (Johnson *et al.*, 1964). The benefit of systems theory is that it allows for the assessment of progress toward the goal of long-term survival and the interdependency of organizational activities (Robbins, 1983). The applicability of systems theory to this study is based on the need to examine the entire health-care chain from resources input to feedback on performance outcomes. Thus, the theory enables building a comprehensive model for identification, categorization and prioritization of health-care supply chain effectiveness.

Organizations interact dynamically with external entities, and health-care organizations compete with each other for the same patients. Therefore, in considering the OE of the health-care supply chain and how it is influenced by external stakeholders, this study emphasizes the importance of government regulation and, from a different perspective, branding. Government regulation, in the form of laws, technical standards and regulations etc., is important because it creates a rule-based environment, which health-care organizations must adhere to. These rules impact the effectiveness of the supply chain (Hussain *et al.*, 2010). Substantial research exists that details the mechanisms and scope of the government (regulation) impact on health-care, health-care service provisions and the overall efficiency of the health-care sector (Dobrzykowski, 2019; Chen *et al.*, 2020; Sorato *et al.*, 2020). Similarly, branding is important in the health-care sector as it influences the ability to attract health-care professionals and patients and innovation capacity (Polese *et al.*, 2018; Troisi *et al.*, 2021), and, consequently, impact the effectiveness of health-care organizations. Research on branding in the health-care sector flourishes (Gapp and Merrilees, 2006; Berry and Martin, 2019; Khosravizadeh *et al.*, 2021).

While studies such as by Beckhard (1969) have used systems theory only to measure systems, in this paper systems theory is used to examine performance effectiveness. Furthermore, this study has included the consideration of government regulation on the one hand and branding on the other, as means of expanding systems theory. It is also important to identify a suitable tool to model or map the elements of systems theory for the health-care chain. Consequently, SIPOC is adopted for use in this study. Therefore, while systems theory presents a strategic perspective applicable to OE, SIPOC is a commonly used tool for process mapping to implement the strategy (Al-Amor and Hussain, 2019). Because the focus of this study is to cover the entire health-care supply chain, the strategic perspective of systems theory and the process mapping of SIPOC are both used to underpin it.

Figure 1 shows the SIPOC framework with measurement dimensions for OE in the health-care chain. For suppliers, three measurements are introduced: quality standards, cost effectiveness and time. Input includes three measurements: strategic priorities, learning and development, and internal and external communication. Within process, which includes the stages from booking an appointment to leaving the hospital, there are four measurements: efficiency, effectiveness, benchmarking and social test. Output includes five measurements: individual performance, operation efficiency, innovation, environmental friendliness and community responsiveness. Customer includes three measurements: patient satisfaction, patient choice and quality assurance.

Research methodology and materials

Data was collected in two phases from health-care experts working for highly regarded hospitals in the UAE. The first phase (the exploratory stage) focused on identifying OE factors in the health-care chain based on the perceptions and experiences of health-care professionals. During this stage, survey questions were developed and sent to managers and senior executives in Abu Dhabi Healthcare Services (SEHA) from various departments including human resources, operations, supply chain, patients' affairs, public relations/excellence/marketing and CEO office/government support. Survey methodology was largely used to explore phenomena operations and supply chain management contexts, being one of the most reliable and robust adopted research strategies in the field (Forza, 2002; Malhotra and Grover, 1998). A total of 210 professionals working in these departments were identified as potential respondents, and, out of these, 90 were randomly shortlisted, briefed and contacted by emails and phones calls. Fifty-nine potential respondents agreed to participate. The questionnaire was emailed to them, and a reminder was sent after two weeks. After four weeks, 44 answers were received, but three of them were discarded because of incomplete information. Thus, 41 responses were received and were used for the first stage of the research.

The OE factors identified by the survey respondents were further validated by experts from both academia and industry. A total of 10 professors from the fields of operations management, health-care management and organizational performance, from three leading universities in the country were contacted and briefed about the research project. Similarly, 12 experts (senior managers/directors) from various departments of health-care organizations were involved in the validation of the results of the exploratory phase. Based on the feedback of these 22 experts, some of the previously identified OE techniques were removed or regrouped.

Phase 1: identification and classification of OE factors

A total of 62 OE factors in health care were identified and categorized. The factors were classified into six primary categories, which were based on the SIPOC nodes identified (see Table 1). It can be seen that 15 are related to suppliers, 14 to the health-care process, 12 to employees, eight to patients, seven to branding, and six to government directives. A further subclassification of two of the categories was also recommended by the experts. First, OE factors for the supplier node were clustered under the headings of Operational/Business strategies (AA) and Certifications and Accreditation (AB), with the relevant OE factors listed within each cluster. Second, OE factors for the process node were clustered under the headings of Lean Waste (BA) and Green Environment.

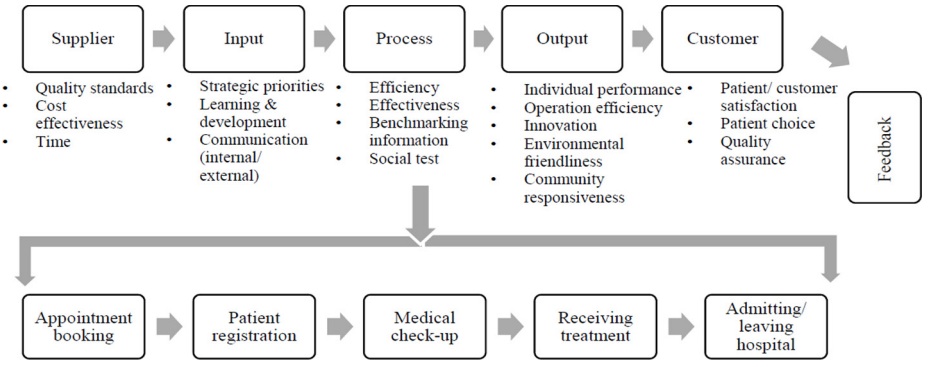

Figure 1.
SIPOC framework

Suppliers	Process	Employees	Patients	Government directives	Branding
AA. Operational/ business strategies	BA. Lean waste	C. HR practices	D1. Patients' experience	G1. Mystery shoppers' feedback	H1. Employer of choice
AA1. Six Sigma	BA1. Inventory	C1. Competency framework	D2. Cost effectiveness	G2. Employment of Emirati	H2. Interaction, engagement, and participation
AA2. Lean enterprise	BA2. Transportation	C2. Employee productivity	D3. Patient rights	G3. Scholarships	H3. Sustainable practices
AA3. Total Quality Management					
AA4. Financial health	BA3. Over-processing	C3. Capabilities assessments	D4. Social sustainability	G4. Budget support	H4. Patient choice
AA5. Operational performance metrics	BA4. Waiting time	C4. Job descriptions	D5. Readmissions	G5. Laws and regulations	H5. Competitive advantage
AA6. Business process and practices	BA5. Overproduction	C5. Performance appraisals	D6. Mortality rate	G6. Partnerships/ management contracts with international hospitals	H6. Accreditations and awards
AA7. Enabling behaviors or cultural factors	BA6. Defects	C6. Innovation and creativity	D7. Communication		H7. *Estidama* [1], safety, smoking
AA8. Risk factors	BA7. Motion	C7. Flexibility and advancement	D8. Medical errors		
AB. Certifications and accreditation	BB. Green environment	C8. Fairness and equity			
AB1. ISO	BB1. Reuse	C9. Organizational culture			
AB2. EHSMS	BB2. Recycling	C10. Management support			
AB3. JCIA	BB3. OSHAD (Abu Dhabi Occupational Safety and Health)	C11. Research and education			
AB4. OSHAD	BB4. EHSMS certification				
AB5. SKEA	BB5. Information sharing and technology				
AB6. JAWDA					

Table 1.
Classification of OE factors

Phase 2: development of analytical hierarchical process model

The second phase of the study focused on the prioritization of OE factors using the analytical hierarchical process (AHP) model. During Phase 2, 75 respondents were randomly selected from 210 potential respondents identified earlier.

They were contacted and briefed about this phase, and 40 respondents agreed to participate. Of these, 34 completed the AHP questionnaire, and three were discarded because of missing information. Thus, 31 respondents participated in this phase, and 62 factors and subfactors were explored and identified. The assessment and quantification of these factors involved a significant amount of complexity. Thus, these factors were broken down into factors (criteria) and subfactors (subcriteria) for measuring OE across the health-care chain. A hierarchical structure was developed, as shown in Figure 2, and AHP methods were applied to this end. The AHP method is most appropriate at this stage to make the complex decisions to prioritize the nodes and subfactors.

AHP is a methodology for complex systems that allows the interpretation of both qualitative and quantitative aspects of decision-making (Saaty and Sagir, 2009). AHP establishes pairwise comparisons at each level of the hierarchy to derive priority scales using experts' feedback. AHP methodology is commonly used in similar studies, and it has been used by many researchers to identify and rank critical parameters in various sectors (Chung and Lee, 2009; AlJaberi *et al.*, 2018). In addition, it has the advantage of combining qualitative and quantitative data (Korpela *et al.*, 2001; Kurttila *et al.*, 2000) As a result, it fits the needs of this analysis. For further details about the steps of AHP and analysis, the reader is referred to the work of Al-Amor and Hussain (2019) and Alhamadi and Hussain (2019).

AHP results and findings

Main factor findings

Figure 3 presents the findings of the pairwise comparisons of the main criteria by calculating the consistency index and the consistency ratio. The geometric means of the

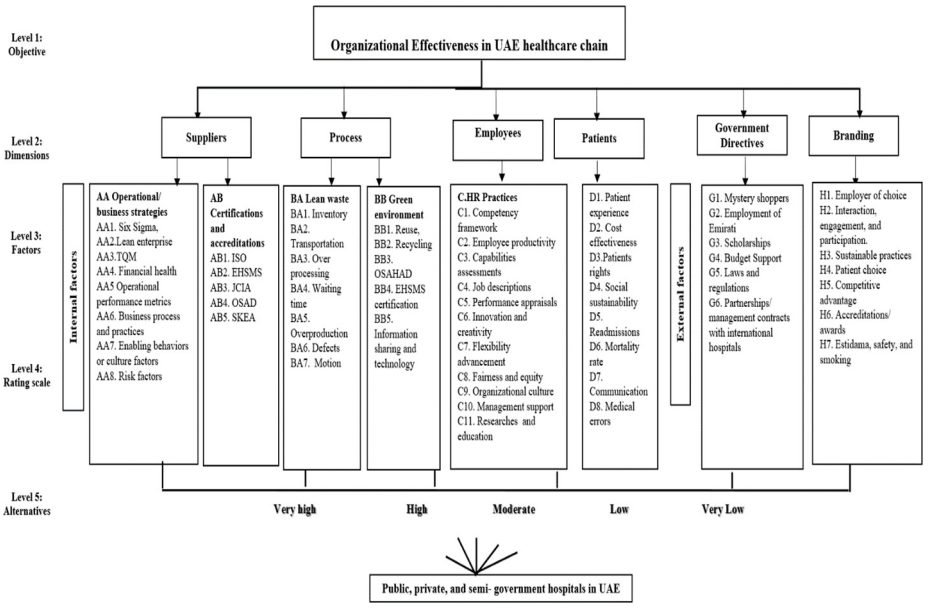

Figure 2.
Holistic model (AHP framework)

pairwise comparisons of the main criteria were determined using the six criteria – supplier, process, employees, patients, government directives and branding. The data shows that patients is the highest factor, with a priority vector of 31%, followed by government directives (30%), branding (16%) and employees (14%). The two least important factors are suppliers (6%) and process (3%).

- Suppliers subfactor findings

As Figure 4 shows, the supplier factor has 10 subfactors: operational business strategies, lean enterprise, Six Sigma, total quality management (TQM), financial health, operational performance, business process and practices, enabling behaviors or cultural factors, risk factors and certifications and accreditations. Certifications and accreditations include several types defined in stage one, specifically, ISO, JCIA, SKEA, JAWDA, EHSMS and OSHAD. Risk factor has the highest priority vector of 28%, followed by certification and accreditations (26%), operational performance (10%), business process and practices (9%) and enabling behaviors or cultural factors (9%). Financial health has a priority vector of 6%, followed by TQM at 5%. The lowest priority vectors are for Six Sigma (3%), operational business strategies (2%) and lean enterprise (2%).

- Process subfactor findings

Within the process factor, 10 subfactors were identified: lean waste, inventory, transportation, over-processing, waiting time, overproduction, defects, motion, the green environment (i.e. reuse and recycling), EHSMS certification and OSHAD. Figure 5 shows that the highest priority vector is that of green environment, with a value of 20%, followed by EHSMS and OSHAD at 19%, motion at 17% and defects at 13%. Waiting time has a priority vector of 8%, followed by overproduction at 7%. Three criteria – inventory, transportation and overprocessing – have priority vectors of 4%. The lowest priority vector is that for lean waste at 3%.

- Patient subfactor findings

Figure 6 presents the geometric means of the patient subfactors. Eight subfactors are identified: patient experience, cost effectiveness, patients' rights, social sustainability, readmissions, mortality rate, communication and medical errors. The highest priority factors are medical errors, communications and patients' rights with priority weightings of 26%, 25% and 21%, respectively, followed by mortality rate and social sustainability, with priority weightings of 11% and 6%, respectively. The lowest priority vector is patient experience, with a priority weighting of 3%. Cost effectiveness and readmission both have priority vectors of 4%.

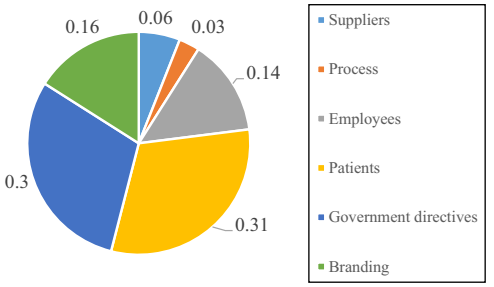

Figure 3.
Relative weightings of six main criteria [CR value: 0.07 < 0.10 (consistent)]

- Employee subfactor findings

With regard to employee subfactor pairwise comparisons, 10 subfactors are identified: HR practices, competency framework, employee productivity, capabilities assessments, job description, performance appraisals, innovation and creativity, flexibility and advancement, fairness and equity and organizational culture. Figure 7 shows that the highest priority vector is that of fairness and equity, with a weighting of 26%. Flexibility and advancement, innovation and creativity, and capabilities assessment have the next highest weightings of 15%, 14% and 10%, respectively. Both HR practices and job descriptions have priority vectors with weightings of 4%. Competency framework and performance appraisals have priority vectors with weightings of 2% and 6%, respectively.

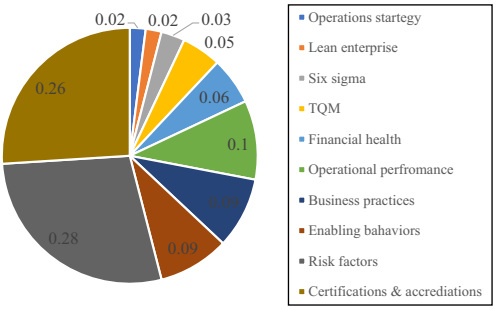

Figure 4.
Relative weightings of suppliers subfactors [CR value: 0.08 < 0.10 (consistent)]

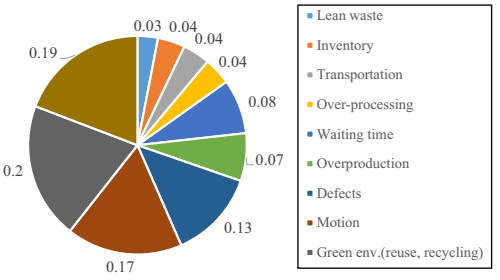

Figure 5.
Relative weightings of process subfactors [CR value: 0.09 < 0.10 (consistent)]

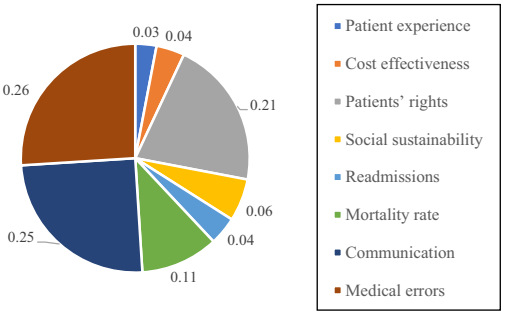

Figure 6.
Relative weightings of patient subfactors [CR value: 0.09 < 0.10 (consistent)]

- Branding subfactor findings

Branding was identified as one of the most important factors for OE in the entire health-care chain and has seven subfactors: employer of choice; interaction, engagement and participation; sustainable practices; patient choice; competitive advantage; accreditations and awards; and Estidama, safety and smoking. Figure 8 shows that the highest priority vector is assigned to the patient choice subfactor, with 34%, followed by employer of choice (20%); Estidama, safety and smoking (15%); sustainable practices (13%); and interaction, engagement and participation (9%). Accreditations and awards have a 5% priority vector weighting, and competitive advantage has a 4% weighting, making it the least important subfactor.

- Government directives subfactor findings

Figure 9 shows the results for government directives, one of the most important factors for OE in the health-care chain. It has six subfactors: mystery shoppers' feedback, employment of Emirati, scholarships, budget support, laws and regulations and partnerships/management contracts with international health-care providers. The most important subfactor is laws and regulations, with a priority vector of 42%, followed by employment of Emirati (22%) and partnerships with international hospitals (18%). After that, mystery shoppers' feedback has a priority vector of 6%, followed by budget support with a priority vector of 5%.

Conclusion

This study set out to measure OE across the health-care chain using systems theory coupled with a SIPOC and AHP matrix. This study provides new and exciting insights

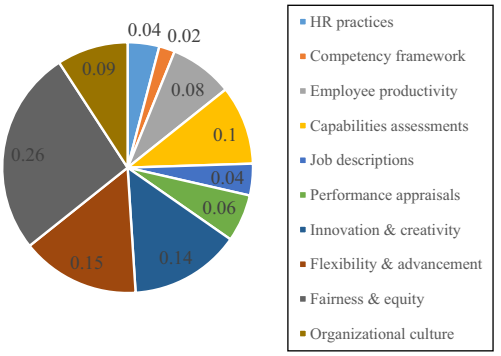

Figure 7.
Relative weightings of employee subfactors [CR value: 0.09 < 0.10 (consistent)]

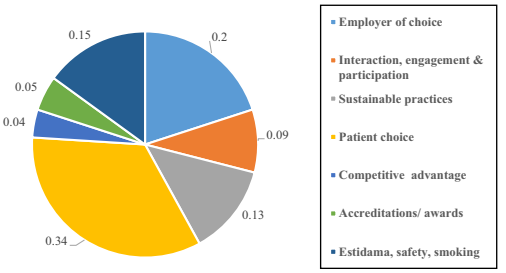

Figure 8.
Relative weightings of branding subfactors [CR value: 0.08 < 0.10 (consistent)]

into the measurement of overall effectiveness in the health-care supply chain based on the industry stakeholders' perceptions. The study identified six main factors and 62 subfactors. The overall results show that, of the six main factors, patients, government directives and branding are the most important. In contrast, employees, suppliers and process are the least important. This ranking is important for at least two reasons. First, from a health-care supply chain point of view, government directives and branding have not been significantly considered as critical influencers of performance success and competitive advantage. Particularly, government directives and branding relate heavily to external stakeholders as opposed to internal operations. Second, many studies in the operations management field have tended to focus more on the benefits and importance of getting processes and suppliers right to improve process efficiency (Hussain and Al-Amor, 2018). While there is little doubt that getting process and suppliers issues right provides advantages, this study finds, that when considering overall effectiveness in the health-care supply chain, these two factors are the least important of the six studied.

In addition, across suppliers and process factors, accreditation and awards were very prominently ranked (Böhme *et al.*, 2016). The study also found that organizations placed important emphasis on avoiding risk and errors where patients are concerned, although, surprisingly, patient experience was not seen as particularly important. The importance of avoidance of errors and effective communication has been identified in some previous studies (AlMustafa *et al.*, 2018) and is reiterated by this study. Surprisingly, patient experience and readmission rates were the least ranked subfactors within the patients' dimension. This is at odds with other studies that have emphasized the importance of patient experience and a low readmission rate (Esimai, 2005). This may suggest that UAE health-care organizations have either not understood the importance of patient experience to perception or that their focus is more effective treatment and avoidance of risk as opposed to patient experience and readmission rate. The issue of increasing risk in health-care supply chains was identified by Elliot and Catto-Smith (2014), and this suggests that it is an important issue for health-care organizations to understand and manage. The study also found that significant importance is given to perception of potential employees and the treatment of employees across many dimensions, including fairness, flexibility, advancement and creativity. These are important findings, as previous studies have not strongly emphasized the importance of so many subfactors that relate to employees (Khan *et al.*, 2018). However, in contrast to many previous studies, this study found a very low emphasis on cost effectiveness and activities that minimize process waste in health-care operations.

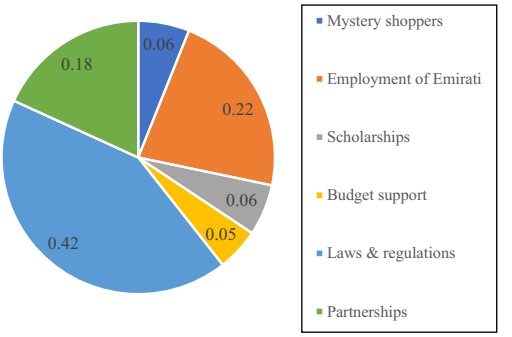

Figure 9.
Relative weightings of government directives subfactors [CR value: 0.08 < 0.10 (consistent)]

Research implications

Academically, this study has expanded systems theory by adding other nodes that were confirmed to be important (i.e. government directives and branding) and proposed a structured approach, which was missing for measuring OE across the entire health-care chain. In addition, the study has identified, to date, the most comprehensive list of subfactors that impact on OE in the health-care chain. From a practitioner perspective, this research can help decision-makers review and amend the health-care policies in the UAE to improve patient satisfaction and quality. In particular, it emphasizes the importance attached to external perception and the need for health-care organizations to ensure that multiple stakeholders including patients, suppliers, potential employees and government regulators all have a positive image of the organizations. The study also suggests that while the cost pressures that relate to health-care organizations have been widely identified in several studies, they are still not placing a high emphasis on process efficiency or competitive advantage. However, in a sector in which the talent of employees is a key issue, they must continue to place emphasis on projecting a positive image to attract talent and on good management practices to retain it.

Limitations and new research avenues

Inasmuch as this study adds to our understanding of certain aspects of the functioning of the health-care supply chain, it also opens new avenues of research. At the most local level, as the sample for this study was taken only from SEHA, other bodies could be included in the exploration to enhance the analysis. Further, considering the recent establishment of the Ministry of Artificial Intelligence in the UAE, it would be interesting to include this factor in the analysis of OE. At the regional and international levels, it would be interesting to engage in comparative examination of (approaches to) health-care effectiveness in other developed countries or, more specifically, in the Gulf region. In this context, future studies could focus on comparisons of health-care providers (private, public, other) in other countries to identify which type of hospital is the best for patient choice in terms of safety and quality. Some of these topics are currently explored by the undersigned.

Note

1. Estidama is the sustainability standard and rating matrix and integral component of Abu Dhabi Vision 2030. It aims to create an adaptive and flexible sustainability framework that will not only improve the quality of life but will also encompass the panning, designing, construction and operation of sustainable development in Abu Dhabi.

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Further reading

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