HOSPITAL LOCATION SELECTION TARGETING INDONESIAN NHI PATIENTS FOR A SUSTAINABLE BUSINESS

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Abstract

Finding an optimal location is a strategic decision, and an error of location judgment causes problems in the process and directly affects cost and profitability. Currently, Indonesian National Health Insurance (BPJS) program has high coverage growth in Indonesia; however, building hospitals targeting BPJS patients have faced some challenges and may lead to an unprofitable business. Therefore, location selection is a crucial aspect of a hospital's operation, highly relates to profitability, and impacts business performance. Moreover, being profitable is not enough for businesses to survive in the long run; they have to be sustainable. The purpose of this study is to develop a reference for a location selection for healthcare management when building hospitals targeting BPJS patients. This paper utilizes the EGSEE framework for a sustainable business to evaluate comprehensive hospital location selection sub-factors. The study employs a systematic literature review and a modified Delphi method to examine the experts' judgment. Finally, the Analytic Hierarchy Process is applied to develop the evaluation method.

Keywords: BPJS, hospital location selection, JKN, national health insurance, sustainable business

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INTRODUCTION

Good health and well-being is among the United Nations' sustainable development goals. Realizing universal health coverage (UHC) is essential to determine good health and well-being. However, UHC continues to be a challenge for nations worldwide. According to WHO and the World Bank [1], more than half of the global population doesn't have access to necessary health care.

Indonesia's response to provide universal health coverage was establishing National Health Insurance (NHI) for all residents in 2014. The deployment of NHI has intensified competition in the local healthcare industry. Consumer health awareness and demand for medical services are increasing, therefore encouraging new hospital establishments. However, running hospitals is a sophisticated work. Hospital is considered a business since it produces something in exchange for payment to obtain profit.

Successful businesses are those with profitable business models. Nevertheless, being profitable is not enough for businesses to survive in the long run, they have to be sustainable. Businesses are said to be sustainable when not only profitability is achieved, but can also deliver enduring performance that adds value to shareholders [2]. Therefore, hospitals must also be sustainable as businesses.

Both sustainable hospital businesses along with NHI jointly create a sustainable national healthcare ecosystem. Citizens of a country can have necessary health services without economic difficulties. Accordingly, good health and well-being can be attained, and to great extent assisting people to maximize capabilities for fulfilling their goals [1]. This is crucial to United Nations' sustainable development goals as other aspects such as economic growth will also automatically be accomplished.

According to the agglomeration literature [3], the business location would impact the performance of a company. Locating an excellent location is a tactical choice and an error of judgment causes issues with the procedure and straightforwardly affects cost and profitability [4]. In such circumstances, it is of priority concern to select the optimal location of hospitals to be built. Studies in the past have attempted to find the best hospital location by using traditional mathematical or statistical approaches and linear programming was used in its early stage to address location-selection-related problems [5]. When deciding where to choose a location, business groups also consider how finding the appropriate location during the decision-making process could potentially impact the company's performance [6].

Taken into account high healthcare services demand and still low supply side, this research is intended to establish an assessment method to evaluate the best business location for hospitals. This work will get into details on location selection factors influencing the sustainability of hospital businesses targeting BPJS patients. Consequently, hospital management can utilize this work to enable hospitals to adopt strategies to enhance their capabilities running business aiming at BPJS patients. This research will utilize modified Delphi method and the analytic hierarchy process (AHP). The result of this research is in the hope to help hospital management serving as guidelines for hospital location selection targeting BPJS patients.

LITERATURE STUDY

Periodically, United Nations (UN) will set development goals with the intention to be followed globally as prioritized common goals [7]. UN established the development goals by first investigating current problems to be tackled and share them globally to engage everyone in finding the solutions for a better future. In 2000, the UN had set Millennium Development Goals (MDG) to be achieved in the future. Among them are: Reducing child mortality; improving maternal health; combating HIV/AIDS, malaria, and other diseases. Three out of eight MDG are strongly related to the healthcare ecosystem. Subsequently, in 2015 UN intervened and set another development goals as the new shared goals for everyone to pursue by the label of Sustainable Development Goals (SDG). The goals for a better and more sustainable future consist of seventeen points, including good health and well-being. One of the newly established SDG is also directly associated with the healthcare ecosystem, which suggests the UN has put big attention on the healthcare sector, with two of the main drivers are healthcare facilities and National Health Insurance.

A. Hospitals as Healthcare Facilities

According to WHO, hospitals as healthcare facilities are crucial to providing UHC to comply with the population health needs. Morgan, Mays, & Holland [8] also supported the idea of hospitals are population needs. Moreover, as one of the most critical infrastructures, demand for hospitals is proportional to population, that is a surge in population will urge demand for hospitals [4].

Conventionally, the description of a hospital is an establishment for unhealthy individuals that seek refuge to get treatments and attention from medical professionals [9]. However, the modern function of hospitals is much more than that. Nowadays, a hospital is considered a complete set of healthcare providers. Each set is called a department as an administrative body, and within or between departments there exist functional entities named units. For example, the cardiovascular medicine department utilizes the catheterization laboratory (cathlab) unit to treat its patient, yet the department of neuroscience can treat its patient using the cathlab unit as well. Some of the most well-known hospital departments are: Accident & Emergency (A&E) department; Ear, Nose, & Throat (ENT) department; radiology department; oncology department; pharmacy department; and many more. Furthermore, generally known hospital units are: Different types of Intensive Care Units (ICUs) such as Neonatal Intensive Care Unit (NICU), Pediatric Intensive Care Unit (PICU), Coronary Care & Cardiothoracic Unit (CCU/CTU), etc.; medical records unit; Computed Tomography (CT) scan unit; blood bank unit; Operating Theatre (OT) unit; and the rest.

Hospital also offers various kinds of treatment to patients from disease prevention, rehabilitation, health curative services, and health palliative services depending on its size. Those are almost every function of healthcare facilities. This further reflects the importance of a hospital in communities because of its comprehensiveness. Nonetheless, hospital management should take note that studies showed primary care provider is sufficient to increase the quality of life [10] and even reducing hospital admissions [11, 12]. This infers that demand for hospitals might be lower with the presence of primary care providers.

B. National Health Insurance (NHI)

Besides healthcare facilities, medical care such as health insurance is usually associated with health. Levy & Meltzer [13] found an interesting association from observing hundreds of literature which concludes people with insurance have a higher quality of health. Despite that, the researchers pointed out there is no causal interconnection between health insurance on the quality of health in the same study. However, a further observational study involving several papers suggested that for susceptible low-paid subpopulations, health insurance enhances health by promoting particular health measures [14].

Levy & Meltzer [14] also justified the presence of health insurance increases the total spending of healthcare consumption because of more medical treatments. Even though Fisher [15] argued the more medical practice is not always good and the conservative one is better that indicates the rise of healthcare consumption doesn't consistently mean health quality is getting better clinically, health service facilities are benefited since more expenditure goes to them. This would significantly have direct effects on hospitals' profitability as major health service facilities. Hospitals can then reinvest the funds to provide even more advanced services and facilities.

In addition, it is important to understand the contribution of health insurance to UHC. Studies showed the broader the health coverage, the more positive the impacts on health [16, 17]. NHI plays an integral role as wide areas are covered and citizens are mandated to participate. Taiwan is a good example of having NHI would increase hospital competitions and consequently provide better care/incentives to patients [18].

Indonesia launched BPJS in 2014 as the nation's NHI. Considering health expenses as a major barrier to accessing healthcare [19], BPJS is expected to ease Indonesian citizens accessing healthcare. Not to mention the Indonesian government supports the premium payment of the low-income to further facilitate access to healthcare. For the future, the government is targeting to obtain coverage of at least 95%.

C. *Business Sustainability*

Sustainability is a topic for finding the right move to bring us forward in terms of shaping the future [20]. The term sustainability mainly talks about the development that not only for the present but the future [21]. Accordingly, in a business context, sustainability implies the ability to perform exceptionally both in the short and the long run [22, 23]. Even more, Griffiths [20] suggests a sustainable business must be developed to last indefinitely.

The history of sustainability dated back to the early twentieth century, when the conservation movement was perceived as sustainability [24]. Subsequently, the environmental movement became popular in the 1960s and early 1970s [24]. At the same time during 1953, Howard Bowen issued a book highlighting the significance of moral values in a company's actions for the community and the relevance of ethics to stakeholders through the concept of Corporate Social Responsibility (CSR) [25]. Then in 1970 CSR became well-known as corporate or business sustainability [26]. In 1979, Carroll contributed by creating a famous CSR framework centered on four attributes of business performance: economic, legal, ethical, and discretionary (philanthropic) [27]. Not until 1994, the definition of business sustainability started to transform with the introduction of the concept of Triple Bottom Line (TBL) by John Elkington [26]. Elkington's [28] interpretation of business sustainability is about the advancement of economic growth, environmental condition, and social justice all at the same time. Nonetheless, TBL has constraints of being too diverse, difficult to measure, and portrayed as disengaged performance elements instead of the outcome of an integrated method [26]. In the early 2000s, the modern definition of business sustainability called Environmental, Social, and Governance (ESG) concepts emerged as the outcome of numerous ideas [26].

The development of sustainability also urged global standardization for its measurement, therefore organizations developing worldwide sustainability guidelines began to emerge. Including in 1997, The Global Reporting Initiative (GRI) was founded and had issued "Sustainability Reporting Guidelines" several times since its first publication in 2000 [2]. Not to mention the Securities and Exchange Commission (SEC) published guidance in February 2010 that mandates publicly traded entities to disclose reports related to climate change as part of sustainability reporting [29]. Additionally, The International Integrated Reporting Committee (IIRC) was established in 2010 to promote a consolidated reporting framework by concentrating on the interaction among all elements of business sustainability [2]. Finally, in November 2010 The International Organization for Standardization (ISO) established ISO 26000 which contributes to the development of the most comprehensive sustainability performance indicator yet since it takes into account Multiple Bottom Line (MBL) of five sustainability dimensions also known as EGSEE [2]. EGSEE refers to Economic, Governance, Social, Ethical, and Environmental.

A.A. *EGSEE as Five Dimensions of Sustainability*

The success of firm value creation is determined by the combination of all EGSEE dimensions [23]. Brockett & Rezaee [2] explained aspects of sustainability performance using EGSEE framework as follows,

    a. Economic: Organizations can only succeed and deliver long-term results if they remain profitable and add value to shareholders. profitability is maintained through economic performance and was reported in financial statements.
    b. Governance: Compliance with all applicable laws, rules, regulations, and standards.
    c. Social: Concern for the society wherein a business exists. empowering a business to take actions giving benefit to society by raising positive effects and lowering negative effects.
    d. Ethical: Moral principles to determine right or wrong. regulations and ethics are different, something that is ethical might not be addressed in the regulation and vice versa.
    e. Environment: Environmental quality and its effort to prepare for future generations.

D. Location Theory

Burdurlu & Ejder [30] described the importance of a business location as a proper spot to do its operation such as basic material supply, stockpile, fabrication, and delivery for economic purposes. Appropriate location selection can allow businesses to cut expenses and maximize earnings, as well as improving the capabilities for prospective growth [6]. This is also true in the healthcare field.

Early research into location theory concentrated on factory location selection by considering transportation expenses [6]. Although early research considered quantitative factors such as cost and distance, the issue now includes qualitative factors, making it far more complex [4].

Kobu [31] suggests considering four fundamental aspects for industrial location, (1) the business's priorities must be investigated carefully and without bias, (2) the investigations must be done in a systematic manner, using a variety of reliable resources, (3) location selection process must be carried out bit by bit with no phase being blended, (4) experts and organizations must contribute in the process.

Different goals can be determined depending on the characteristics of the issue for location selection [4]. According to Farahani, SteadieSeifi, & Asgari [32], examples of common goals are, (1) reducing the overall expense of the setup, (2) reducing the maximum distance from new facilities, (3) reducing fixed costs, (4) reducing the annual average cost of activities, (5) operation optimizing, (6) reducing the average travel time/distance, (7) reducing the amount of location, (8) optimizing reaction. In addition to these issues, ecological and social priorities focused on energy costs, land use and building costs, traffic, sound pollution, standard of living, emissions, the fossil fuel crisis, and tourist activities have recently become influential. Accordingly, determining a way to calculate these parameters is amongst the most significant challenges in solving the issues [32]. In this study, the location selection goal is to establish a sustainable business by utilizing EGSEE framework. The use of EGSEE framework is also to make measurements more convenient since there exist guidelines for sustainability performance reporting using five dimensions of EGSEE [2].

RESEARCH METHODOLOGY

A. Systematic Literature Review

The role of a literature review is vital to academic work. It resolves critical questions by learning the subject based on previous works, deeply explores existing works on a particular subject, and provides a conceptual foundation for future study [34]. Fink [35] highlights the characteristics of a literature review should be systematic, explicit, comprehensive, and reproducible. Such a review can be produced using a structured literature review with the help of instructions like Fink's [35] book. Rousseau, Manning, & Denyer [36] also support the idea of the structured literature review by calling it a systematic literature review. According to Rousseau, Manning, & Denyer [36], systematic indicates extensive collection, clear evaluation, and can picture the perception of entire works related to a particular topic.

B. Modified Delphi Method

Delphi has three main characteristics that set it apart from other group interaction techniques like the Nominal Group Technique [37]. They have to be maintained during all the process, the three features are,

    a. anonymous panel communication and answer,
    b. several rounds of data accumulation with review under the supervision of researchers,
    c. deliver panel answers using statistical reports.

According to Murry & Hammons [37], Delphi started with the panel selection consists of experts in a particular field. After experts are selected, the first round of the questionnaire is given. When the first-round questionnaires are submitted, the researchers observe, evaluate, and assemble the panel's responses. If consensus is not made in the panel's answer, the next questionnaire round is needed. The researchers then give an additional questionnaire to the panel that includes feedback about the prior round and ask to consider, modify, and comment on their opinion. The round continues until consensus is created, and eventually, the Delphi technique is finished.

The difference between traditional Delphi and modified Delphi is in the first-round questionnaire [37]. The first-round questionnaire of traditional Delphi comprises of unsystematic questions, while in modified Delphi systematic questions have been established to reduce time and cost and enable experts to concentrate on the problems right away [37].

The workflow of the modified Delphi comprises several stages,

    (1) initial questionnaire,
    (2) panel selection,
    (3) invitations to panelists,
    (4) previous questionnaire analysis for the next round questionnaire,
    (5) next round questionnaire,
    (6) consensus/stability,
    (7) conclusion.

C. AHP Method

Decision-making and its assessment had existed for a long time and are an integral aspect of management science [32]. A complex analysis for decision-making consists of multiple goals or factors to be taken into account before determining any decision [32]. Researchers usually resolve the decision-making issue using a multi-objective decision-making (MODM) method or a multi-attribute decision-making (MADM) method [32]. The combination of MODM and MADM methods is multi-criteria decision-making (MCDM) methods [32].

Various types of MCDM methods can be used for hospital location analysis. For the record, simple additive weighted [38], geographic information system (GIS) [39, 40, 41, 42], belief rule-based inference [43], vise kriterijumska optimizacija i kompromisno resenje (VIKOR) [44], additive ratio assessment with gray values (ARAS-G) [45], extended elimination and choice expressing reality (ELECTRE) [46, 38], evidential reasoning (ER) [47], grey relational analysis (GRA) [48], primitive cognitive network process (P-CNP) [49], TOPSIS [38], analytic hierarchy process (AHP) [6], analytic network process (ANP) [50] have been used for hospital location selection problems.

Not only using stand-alone MCDM methods, but scholars also have attempted to utilize integrations of MCDM methods for hospital location selection problems. Several examples are (1) using AHP and GIS [51, 52, 53, 54, 55], (2) combining criteria importance through intercriteria correlation (CRITIC) with TOPSIS, evaluation based on distance from average solution (EDAS), and combinative distance-based assessment (CODAS) [56], (3) using CRITIC and combined compromise solution (CoCoSo) [57], (4) using ANP and TOPSIS [58, 59], (5) using belief-desire-intention (BDI) and GIS [60], (6) using GRA and AHP [4], (7) using a kind of multi-criteria decision analysis (MCDA) and GIS [61].

Although there are many options out there, this research will utilize stand-alone AHP. Besides widely used for hospital location selection researches [62, 38, 63, 6, 64, 65, 66, 67], AHP have the following features as well,

a. one of the most comprehensive for evaluating multiple criteria [62, 38],
b. a solid and versatile method for quantitative and qualitative analysis [68, 38],
c. simple and easy to use [63],
d. availability of consistency test for minimizing errors [63].

AHP also can be used with its fuzzy extension [69, 70]. AHP and its fuzzy extension are not used against each other [71]. When the users are sure with the data, the AHP can be utilized, alternatively, fuzzy AHP is more favorable [71]. In this research, the subject of the research are experts who know the theory, practice, and the nature of the selected topic, therefore their justification for the opinions is strong [72]. Consequently, AHP is preferred since according to Helmer & Rescher [73], experts are capable to make precise predictions in the long run. Eventually, the information given by the experts is credible and can be considered certain.

AHP breaks down a complex multi-criteria decision issue into a hierarchy [74]. The method employs prioritization and consistency tests of the collected data for measurement [6]. AHP can combine all decision-makers assessments into an ultimate judgment without the need to draw out any part on the parameters [6].

The process of the AHP consists of multiple steps,
(1) establish a hierarchical structure,
(2) data collection using a nine-point scale,
(3) utilizing paired comparisons as ratios,
(4) consistency tests,
(5) establishing local and global weights.

RESULT

A. Preliminary Factors and Sub-Factors

Papers selected from the systematic literature review are analyzed one at a time along with extracting hospital location criteria highlighted by each paper and were labeled under sub-factors. The evaluation of 41 papers contributed to the establishment of 21 sub-factors. The twenty-one sub-factors are (1) investment cost, (2) operating cost, (3) competition, (4) supply chain, (5) regulations, (6) urban planning, (7) policymakers attitude, (8) tax/incentives, (9) population, (10) demography, (11) distance to the target area, (12) social inconvenience, (13) land specifications, (14) organization strategy, (15) safety & security, (16) area size, (17) pollution, (18) network infrastructure, (19) public transport, (20) main road, (21) climate.

B. Determining Factors and Sub-Factors for Hospital Targeting Indonesian NHI Patients

Using the modified Delphi method, questionnaires are used to obtain the experts' opinions. The members of the panel comprise 11 experts from the hospital industry of various hospitals. The details of the experts can be seen in Table IV.I.

Table 1.
Members of the Panel

Name	Position	Experience in Hospital Industry
Expert 1	Hospital Manager	15 years
Expert 2	President Director	26 years
Expert 3	President Director	16 years
Expert 4	Strategic Team Director	10 years
Expert 5	Commissioner	36 years
Expert 6	Internal Auditor	13 years
Expert 7	Finance Director	20 years
Expert 8	Project Director	3 years
Expert 9	Medical Specialist	15 years
Expert 10	Medical Specialist	4 years
Expert 11	Vice President	20 years

Two rounds of questionnaire were conducted. The first stage of the questionnaire is to question which sub-factors among the preliminary sub-factors are considered for selecting hospital locations targeting BPJS patients. The description of each sub-factor is defined in Table IV.II.

Table 2.
Sub-Factors Description

Investment cost	The amount of money needed to start a business.
Operating cost	The expenses needed to keep a business operates.

Competition	Organizations offering similar services that one's gain is the other's loss.
Supply chain	Quality and quantity of a network between a company and its suppliers to produce and distribute a specific product to the final buyer.
Regulations	Rules to comply.
Urban planning	Current and future developments of the region by the government.
Policymakers attitude	Government's attitude towards the medical industry.
Tax/incentives	A compulsory financial charge or some other type of levy imposed on a taxpayer by a governmental organization or financial support (funds) from government and independent organizations
Population	Hospital is a key factor of good health & well-being, therefore people need hospitals.
Demography	Statistical study of populations.
Distance to the Target Area	Physical access to medical centers as patient convenience in obtaining medical treatment.
Social inconvenience	The opinion from people living nearby about the hospital establishment.
Land specifications	The specifications of the land for hospital establishment.
Safety & security	The aspect of being secure against unintended threats and protection against deliberate threats for hospitals.
Organization strategy	Compliance with the management vision, mission, and values.
Area Size	The size of the land for hospital establishment.
Pollution	Contamination of harmful materials in the environment.
Network infrastructure	The availability of utilities for hospital operation.
Public transport	Enable patients & hospital staffs to visit the hospital with ease.
Main road	Enable delivery to be made quick and efficient.
Climate	The long-term average of weather affecting the hospital construction & its operation.

The experts were asked to respond to each sub-factor by giving a score out of the four-point scale, namely *(1) strongly disagree, (2) moderately disagree, (3) moderately agree, and (4) strongly agree*. Additionally, experts were also asked whether the categorization into the EGSEE framework is relevant or not. If any disagreement persists, experts are suggested to give arguments and recommendations.

Using the 70 percent APMO cut-off rate, twelve sub-factors are eliminated and considered irrelevant for hospital location selection targeting BPJS patients. The remaining nine subfactors are presented in Figure . Furthermore, several experts argued to put one of the chosen sub-factors into a different factor category, particularly area size was moved from the environment category to the economic category.

The second stage questionnaire is conducted to further confirm the result of the first stage questionnaire. The experts were asked for confirmation on each chosen sub-factor and its categorization using a four-point scale. Through the questionnaire, a consensus is reached when at least 70 percent agreement by the members of the panel is achieved.

The response rate for the second stage questionnaire was 100% and a consensus was reached with the nine sub-factors and their category classification obtained more than 70 percent vote of the panel members. The result as well as the final hierarchical structure of factors and sub-factors influencing hospital location selection targeting BPJS patients can be shown in Figure IV.II.

C. AHP Process

Experts as the members of the panel in the previous stage were also the respondents for the AHP Process. Experts were asked to rate the importance of each sub-factors through pair-wise comparison using a nine-point scale, namely (1) equal importance, (3) moderate importance of one over another, (5) essential or strong importance, (7) very strong importance, and (9) extreme importance. A total of thirty-six pair-wise comparisons are presented to be evaluated. The response rate of the respondents is 90.91% (10 out of 11 experts).

Figure 1.
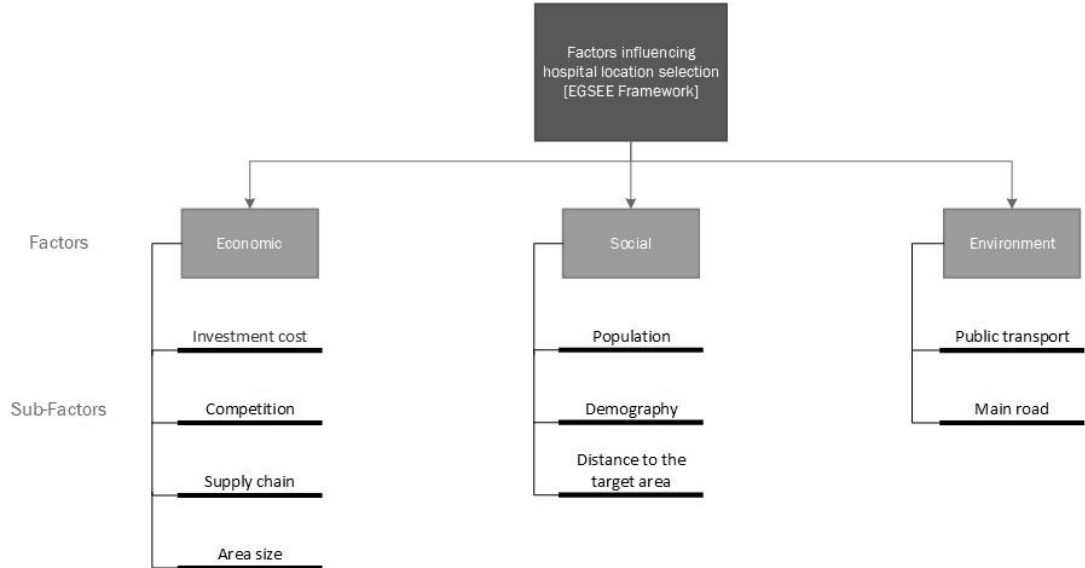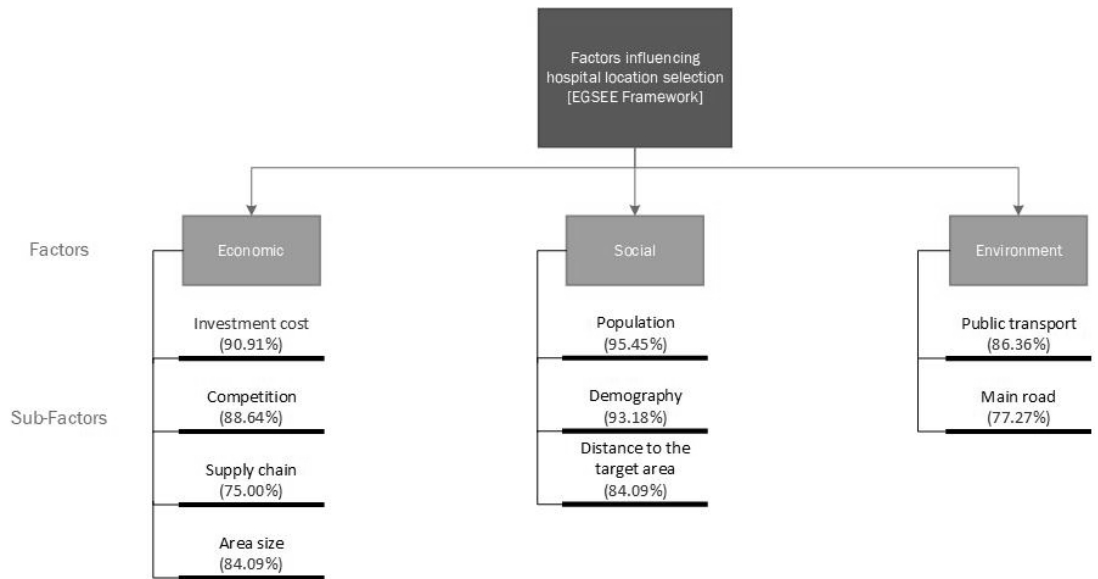Result from the
First Stage
Questionnaire

Figure 2.
Result from the
Second Stage
Questionnaire

Each response of the experts was evaluated to test its consistency before aggregating them. If any of the results is found to be not consistent (CR > 1), further examination on the specific result is necessary, and if needed, a reassessment by the particular expert. The calculation of the consistency test based on the questionnaire result can be seen in **Error! Reference source not found.**.

Since the consistency ratios of all respondents are below 0.1, no further examination is needed and therefore can proceed to aggregate the results. The pair-wise comparisons are aggregated using geometric mean and a further consistency test for the aggregated pair-wise comparison is computed. The detail of the aggregate pair-wise comparison matrix for the sub-factors is displayed in **Error! Reference source not found.**. Since the consistency ratio of the aggregate pair-wise comparison is below 0.1, hence it is consistent and can be used for the next stage

To compute the criteria weights, the normalized pair-wise comparison matrix has to be established first. A normalized pair-wise comparison matrix can be solved using the aggregate pair-wise comparison matrix by applying AHP formula. The result of the calculation is shown in Table IV.V. Finally, criteria weight can be found by taking the arithmetic average of each row on the normalized pair-wise comparison matrix for each criterion/sub-factors. Each sub-factor weight can be seen in Table V.I.

Name	λ_{max}	Consistency Index (CI)	Consistency Ratio (CR ≤ 0.1) RI = 1.45
Expert 1	9.004969	0.000621115	0.000428355
Expert 2	9.028165951	0.003520744	0.002428099
Expert 3	9.276488333	0.034561042	0.023835201
Expert 4	9.309106409	0.038638301	0.026647104
Expert 5	9.269133426	0.033641678	0.023201157
Expert 6	9.156805219	0.019600652	0.013517691
Expert 7	9.037310029	0.004663754	0.003216382
Expert 8	9.131707578	0.016463447	0.011354102
Expert 9	9	0	0
Expert 10	9.004626722	0.00057834	0.000398855

Table 3. Respondents Consistency Test

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1)	1	1.7504	2.1663	0.664	1.0537	1.2904	1.3741	1.1822	1.6438
(2)	0.5713	1	1.2821	0.4152	0.664	0.8762	0.9124	0.7538	1.0414
(3)	0.4616	0.78	1	0.3321	0.5531	0.5653	0.6497	0.5781	0.749
(4)	1.506	2.4082	3.0109	1	1.5337	1.8131	2.2206	1.6438	2.2855
(5)	0.949	1.506	1.808	0.652	1	1.0718	1.2311	1	1.3741
(6)	0.775	1.1413	1.7689	0.5515	0.933	1	1.1044	0.9779	1.3057

Table 4 Aggregate Pair-Wise Comparison Matrix

DISCUSSION

Based on the result in Table V.I, population has the highest priority when considering hospital location for BPJS. Followed by investment cost, demography, public transport, distance to target area, area size, main road, competition, and supply chain. In terms of the factor categorization, social factor has the highest priority with a total weight of 42%, followed by economic factor (38%), and environment factor (20%).

This implies hospitals that targeting BPJS patients can build a sustainable business even when hospitals concern much about social factor. Hospital can focus on the area where population is large, dense, with the demography such that people in the environment are BPJS holder, moreover the distance to the target market is also fundamental when considering social aspect of hospital location selection.

CONCLUSION AND RECOMMENDATIONS

BPJS and Hospital are major contributors to UHC. Through this research, the main factor that contributes to hospital sustainable business is the social factor. This explains even if hospital management is becoming social that they build a hospital where BPJS patients have no access to the facility before, the hospital business will also follow to be sustainable.

Also from this research, besides hospital targeting BPJS patients have a sustainable business, by being social, hospitals also contribute to increase the welfare of people living near the facility.

AMBR

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1)	0.1343	0.1462	0.1385	0.1299	0.1273	0.1386	0.1301	0.1347	0.1395
(2)	0.0767	0.0836	0.082	0.0812	0.0802	0.0941	0.0864	0.0859	0.0884
(3)	0.062	0.0652	0.0639	0.065	0.0668	0.0607	0.0615	0.0658	0.0636
(4)	0.2023	0.2012	0.1925	0.1956	0.1853	0.1947	0.2103	0.1872	0.194
(5)	0.1275	0.1258	0.1156	0.1276	0.1208	0.1151	0.1166	0.1139	0.1166
(6)	0.1041	0.0954	0.1131	0.1079	0.1127	0.1074	0.1046	0.1114	0.1108
(7)	0.0978	0.0916	0.0984	0.0881	0.0981	0.0972	0.0947	0.0958	0.0964
(8)	0.1136	0.1108	0.1106	0.119	0.1208	0.1098	0.1125	0.1139	0.1057
(9)	0.0817	0.0802	0.0854	0.0856	0.0879	0.0823	0.0834	0.0914	0.0849

Table 5.
Normalized Pair-Wise Comparison Matrix

Table 6.
Sub-Factors Global Weight

No.	Sub-Factors	Global Weight
(1)	Investment cost	0.135462714
(2)	Competition	0.084275372
(3)	Supply chain	0.063839298
(4)	Population	0.195905083
(5)	Demography	0.119943914
(6)	Distance to the target area	0.107484975
(7)	Area size	0.095343699
(8)	Public transport	0.112988047
(9)	Main road	0.084756899

The result also opens a room for further research, whether BPJS and hospital targeting BPJS patients create a causal loop, since if hospital become more common and reach more people (being social), people that haven't joined BPJS program before will be attracted to join the program since more coverage of hospital serving BPJS patients.

REFERENCES

[1] WHO and . The World Bank, Tracking Universal Health Coverage: 2017 Global Monitoring Report, 2017, p. 88.

[2] A. M. Brockett and Z. Rezaee, Corporate sustainability : Integrating performance and reporting, Wiley, 2012.

[3] S. J. Appold, "Agglomeration, Interorganizational Networks, and Competitive Performance in the U.S. Metalworking Sector," Economic Geography, vol. 71, p. 27, 1 1995.

[4] H. Şen and M. F. Demiral, "Hospital Location Selection with Grey System Theory," European Journal of Economics and Business Studies, vol. 5, p. 66, 8 2016.

[5] G. T. Ross and R. M. Soland, "A multicriteria approach to the location of public facilities," European Journal of Operational Research, vol. 4, p. 307–321, 5 1980.

[6] C.-R. Wu, C.-T. Lin and H.-C. Chen, "Optimal selection of location for Taiwanese hospitals to ensure a competitive advantage by using the analytic hierarchy process and sensitivity analysis," Building and Environment, vol. 42, p. 1431–1444, 3 2007.

[7] J. D. Sachs, "From Millennium Development Goals to Sustainable Development Goals," The Lancet, vol. 379, p. 2206–2211, 6 2012.

[8] M. Morgan, N. Mays and W. W. Holland, "Can hospital use be a measure of need for health care?," Journal of Epidemiology & Community Health, vol. 41, p. 269–274, 12 1987.

[9] T. F. Main, "The hospital as a therapeutic institution," Bulletin of the Menninger Clinic, vol. 10, p. 66, 1946.

[10] S. J. M. van Hoof, M. E. A. L. Kroese, M. D. Spreeuwenberg, A. M. J. Elissen, R. J. Meerlo, M. M. H. Hanraets and D. Ruwaard, "Substitution of hospital care with primary care: defining the conditions of Primary Care Plus," International Journal of Integrated Care, vol. 16, 2016.

[11] S. V. Katikireddi, G. Cezard, R. S. Bhopal, L. Williams, A. Douglas, A. Millard, M. Steiner, D. Buchanan, A. Sheikh and L. Gruer, "Assessment of health care, hospital admissions, and mortality by ethnicity: population-based cohort study of health-system performance in Scotland," The Lancet Public Health, vol. 3, p. e226–e236, 5 2018.

[12] G. Fiorentini, E. Iezzi, M. L. Bruni and C. Ugolini, "Incentives in primary care and their impact on potentially avoidable hospital admissions," The European Journal of Health Economics, vol. 12, p. 297–309, 2011.

[13] H. Levy and D. Meltzer, "What do we really know about whether health insurance affects health," Health policy and the uninsured, p. 179–204, 2004.

[14] H. Levy and D. Meltzer, "The Impact of Health Insurance on Health," Annual Review of Public Health, vol. 29, p. 399–409, 4 2008.

[15] E. S. Fisher, "Medical care-is more always better?," New England Journal of Medicine, vol. 349, p. 1665–1667, 2003.

[16] S. C. Coleman and A. Kellerman, "Hidden Costs, Value Lost: Uninsurance in America," Washington, DC: Institute of Medicine, 2003.

[17] W. Miller, E. R. Vigdor and W. G. Manning, "Covering The Uninsured: What Is It Worth?," Health Affairs, vol. 23, p. W4–157–W4–167, 1 2004.

[20] T.-M. Cheng, "Taiwan's New National Health Insurance Program: Genesis And Experience So Far," Health Affairs, vol. 22, p. 61–76, 5 2003.

[19] W. "The World Health Report. Health Systems Financing: The Path to Universal Coverage. Geneva: WHO; 2010," Contract No.: WHO Report ISBN, vol. 978, p. 4, 2018.

[20] A. Griffiths, Sustainability: The corporate challenge of the 21st century, Allen & Unwin, 2000.

[21] "World Commission on Environment and Development: Our common future," 1987.

[22] P. Bansal and M. R. DesJardine, "Business sustainability: It is about time," Strategic Organization, vol. 12, p. 70–78, 2 2014.

[23] Z. Rezaee, "Business sustainability research: A theoretical and integrated perspective," Journal of Accounting Literature, vol. 36, p. 48–64, 6 2016.

[24] C. V. Kidd, "The evolution of sustainability," Journal of Agricultural and Environmental Ethics, vol. 5, p. 1–26, 3 1992.

[25] H. R. Bowen, Social responsibilities of the businessman, New York: Harper & Brothers, 1953.

[26] P. Taticchi and M. Demartini, "A Modern Definition of Corporate Sustainability," in Corporate Sustainability in Practice, Springer International Publishing, 2020, p. 65–74.

[27] A. B. Carroll, "A three-dimensional conceptual model of corporate performance," Academy of management review, vol. 4, p. 497–505, 1979.

[28] J. Elkington, "Partnerships from cannibals with forks: The triple bottom line of 21st-century," Environmental Quality Management, vol. 8, no. 1, pp. 37-51, 1998.

[29] Securities and Exchange Commission, "Commission guidance regarding disclosure related to climate change," 2010.

[30] E. Burdurlu and E. Ejder, "Location Choice for Furniture Industry Firms by using Analytic Hierarchy Process (AHP) Method," Gazi University Journal of Science, vol. 16, no. 2, pp. 369-373, 2003.

[31] B. Kobu, Üretim Yönetimi, Genişletilmiş ve Güncellenmiş 16, İstanbul: Beta Basım Yayım Dağıtım A.Ş., 2013.

[32] R. Z. Farahani, M. SteadieSeifi and N. Asgari, "Multiple criteria facility location problems: A survey," Applied Mathematical Modelling, vol. 34, p. 1689–1709, 7 2010.

[33] G.-S. Liang and M.-J. J. Wang, "A fuzzy multi-criteria decision-making method for facility site selection," The International Journal of Production Research, vol. 29, p. 2313–2330, 1991.

[34] C. Okoli and K. Schabram, "A Guide to Conducting a Systematic Literature Review of Information Systems Research," SSRN Electronic Journal, 2010.

[35] A. Fink, Conducting research literature reviews : from the internet to paper, Thousand, Oaks: SAGE, 2014.

[36] D. M. Rousseau, J. Manning and D. Denyer, "Evidence in Management and Organizational Science: Assembling the Field\textquotesingles Full Weight of Scientific Knowledge through Syntheses," SSRN Electronic Journal, 2008.

[37] J. W. Murry and J. O. Hammons, "Delphi: A Versatile Methodology for Conducting Qualitative Research," The Review of Higher Education, vol. 18, p. 423–436, 1995.

[38] M. Khaksefidi and M. Miri, "Hospital Location in the Southern Fars Province by Using Multi Criteria Decision Making Techniques," European Online Journal of Natural and Social Sciences: Proceedings, vol. 4, p. pp–638, 2016.

[39] C. A. R. Assad, "Building GIS framework based on multi criteria analysis for hospital site selection in developing countries," International Journal of Computer Techniques, vol. 6, p. 1–6, 2019.

[40] N. Sharmin and M. N. Neema, "A GIS-based multi-criteria analysis to site appropriate locations of hospitals in Dhaka City," Hospital, vol. 8, p. 0–37, 2013.

[41] J. I. Kim, D. M. Senaratna, J. Ruza, C. Kam and S. Ng, "Feasibility study on an evidence-based decision-support system for hospital site selection for an aging population," Sustainability, vol. 7, p. 2730–2744, 2015.

[42] F. Rahimi, A. Goli and R. Rezaee, "Hospital location-allocation in Shiraz using Geographical Information System (GIS)," Shiraz E-Medical Journal, vol. 18, 7 2017.

[43] M. M. Islam, T. Mahmud and M. S. Hossain, "Belief-rule-based intelligent decision system to select hospital location," Indonesian Journal of Electrical Engineering and Computer Science, vol. 1, p. 607–618, 2016.

[44] Y. Çelikbilek, "Group Decision Making for Hospital Location Selection Using VIKOR under Fuzzy Environment," İstanbul Gelişim Üniversitesi Sağlık Bilimleri Dergisi, p. 435–450, 2018.

[45] S. Halil, "Hospital location selection with ARAS-G," The Eurasia Proceedings of Science Technology Engineering and Mathematics, p. 359–365, 2017.

[46] P. Kumar, R. K. Singh and P. Sinha, "Optimal site selection for a hospital using a fuzzy extended ELECTRE approach," Journal of Management Analytics, vol. 3, p. 115–135, 4 2016.

[47] T. Mahmud, J. Sikder and S. Tripura, "Knowledge-based Decision Support System to Select Hospital Location," IOSR Journal of Computer Engineering, vol. 20, no. 3, pp. 39-47, 2018.

[49] K. K. F. Yuen, "Using the primitive cognitive network process for location analysis: comparisons with the analytic hierarchy process," Journal of Applied Operational Research, vol. 4, p. 194–202, 2012.

[50] S. Önüt, U. R. Tuzkaya and B. Kemer, "An analytical network process approach to the choice of hospital location," Journal of Engineering and Natural Sciences, vol. 25, p. 367–379, 2008.

[51] A. Soltani, R. B. Inaloo, M. Rezaei, F. Shaer and M. A. Riyabi, "Spatial analysis and urban land use planning emphasising hospital site selection: a case study of Isfahan city," Bulletin of Geography. Socio-economic Series, vol. 43, p. 71–89, 2019.

[52] M. Kaveh, M. Kaveh, M. S. Mesgari and R. S. Paland, "Multiple criteria decision-making for hospital location-allocation based on improved genetic algorithm," Applied Geomatics, vol. 12, p. 291–306, 2020.

[53] F. Eldemir and I. Onden, "Geographical Information Systems and Multicriteria Decisions Integration Approach for Hospital Location Selection," International Journal of Information Technology & Decision Making, vol. 15, p. 975–997, 9 2016.

[54] A. Kmail, J. Jubran, W. Sabbah and P. Jenin, "Coupling GIS-based MCA and AHP techniques for Hospital Site Selection," International Journal of Computer Science and Information Security (IJCSIS), vol. 15, 2017.

[55] A. H. Ahmed, H. Mahmoud, A. M. M. Aly and others, "Site suitability evaluation for sustainable distribution of hospital using spatial information technologies and AHP: A case study of Upper Egypt, Aswan City," Journal of Geographic Information System, vol. 8, p. 578, 2016.

[56] E. A. Adalı and A. Tuş, "Hospital site selection with distance-based multi-criteria decision-making methods," International Journal of Healthcare Management, p. 1–11, 2019.

[57] S. Hashemkhani Zolfani, M. Yazdani, A. Ebadi Torkayesh and A. Derakhti, "Application of a gray-based decision support framework for location selection of a temporary hospital during COVID-19 pandemic," Symmetry, vol. 12, p. 886, 2020.

[58] C.-T. Lin and M.-C. Tsai, "Development of an expert selection system to choose ideal cities for medical service ventures," Expert Systems with Applications, vol. 36, p. 2266–2274, 2009.

[59] C.-T. Lin and M.-C. Tsai, "Location choice for direct foreign investment in new hospitals in China by using ANP and TOPSIS," Quality & Quantity, vol. 44, p. 375–390, 2010.

[60] S. Behzadi, A. A. Alesheikh and others, "Hospital site selection using a BDI agent model," International Journal of Geography and Geology, vol. 2, p. 36–51, 2013.

[61] M. Dell'Ovo, S. Capolongo and A. Oppio, "Combining spatial analysis with MCDA for the siting of healthcare facilities," Land Use Policy, vol. 76, p. 634–644, 2018.

[62] E. M. Khotbehsara and H. Safari, "A Systematic Review of Affective Factors on Locating Specialized Hospitals," Civil Engineering Journal, vol. 4, p. 2210–2217, 2018.

[63] J.-E. Chiu and H.-H. Tsai, "Applying analytic hierarchy process to select optimal expansion of hospital location: The case of a regional teaching hospital in Yunlin," in 2013 10th International Conference on Service Systems and Service Management, 2013.

[64] S. Abdullahi, A. R. b. Mahmud and B. Pradhan, "Spatial modelling of site suitability assessment for hospitals using geographical information system-based multicriteria approach at Qazvin city, Iran," Geocarto International, vol. 29, p. 164–184, 2014.

[65] D. Chatterjee and B. Mukherjee, "Potential hospital location selection using AHP: a study in rural India," International Journal of Computer Applications, vol. 71, 2013.

[66] H. A. Mohammed, M. N. Ahmed and A. J. Alsaad, "Evaluation of Sustainable Site Selection Using Analytical Hierarchy Process for Hospitals: Karbala City as A Case Study," International Journal of Engineering & Technology, vol. 7, p. 347–350, 2018.

[67] T. Şahin, S. Ocak and M. Top, "Analytic hierarchy process for hospital site selection," Health Policy and Technology, vol. 8, p. 42–50, 2019.

[68] E. W. T. Ngai and E. W. C. Chan, "Evaluation of knowledge management tools using AHP," Expert Systems with Applications, vol. 29, p. 889–899, 11 2005.

[69] M. H. Vahidnia, A. A. Alesheikh and A. Alimohammadi, "Hospital site selection using fuzzy AHP and its derivatives," Journal of Environmental Management, vol. 90, p. 3048–3056, 7 2009.

[70] D. Chatterjee, "Can fuzzy extension of Delphi-analytical hierarchy process improve hospital site selection?," International Journal of Intercultural Information Management, vol. 4, p. 113–128, 2014.

[71] A. Soltani and E. Z. Marandi, "Hospital site selection using two-stage fuzzy multi-criteria decision making process," Journal of Urban and environmental engineering, vol. 5, p. 32–43, 2011.

[72] B. D. Weinstein, "What is an expert?," Theoretical medicine, vol. 14, p. 57–73, 1993.

[73] O. Helmer and N. Rescher, "On the epistemology of the inexact sciences," Management science, vol. 6, p. 25–52, 1959.

[74] T. L. Saaty, "How to make a decision: The analytic hierarchy process," European Journal of Operational Research, vol. 48, p. 9–26, 9 1990.