

Developing A Sustainable Balanced Scorecard (SBSC) Model by Integrating EESG (Economic, Environmental, Social, and Governance) Performance Indicators for Private Hospitals in Egypt

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Abstract

This study constructs a model for Sustainable Balanced Scorecard (SBSC) by identifying the critical indicators from eight perspectives (Finance, Internal Business Process, Customer/Patient, Learning and Growth, Economic, Environmental, Social, and Governance). Moreover, in this study, a structural evaluation approach is presented to link the important SBSC indicators to a strategy map for private hospitals in Egypt. The most important metrics for measuring hospital performance are compiled from relevant literature and evaluated by a panel of experts in accordance with the eight SBSC perspectives. Then, using the DEMATEL (Decision-Making Trial and Evaluation Laboratory) approach, a tool to analyze multiple criteria, the study ascertains the causal connections among the indicators, pinpoints the crucial core and deciding factors, and creates a visual strategy map with logical connections to boost hospital performance. To assess sustainable performance of private hospitals, 49 metrics were chosen based on the perspectives of the SBSC. Also, the study reveals that “Governance Control Activities”, “Governance Financial Activities”, “Non-compliance with laws and regulations”, “Return on Investment”, “% of Revenue from repeat business”, “Net Promoter Score (NPS)”, and “Patient Complaints”, are the most essential evaluation indicators for private hospitals’ performance. The strategy map results demonstrate a clear road map to assist hospital leaders in ranking performance metrics and focusing on strategy-related actions for the essential indicators, where they could more effectively direct their limited resources toward areas that need the most improvement.

Keywords: Sustainable Healthcare, SBSC, Private Hospitals, Performance Measurement, DEMATEL.

1. Introduction

Better models are required for healthcare companies in order to enable corporate governance and performance monitoring (Chang, Wang, & Wang, 2017). (Khan, Hussain, Gunasekaran, Ajmal, & Helo, 2018) ; (Delai & Takahashi, 2011) both claim that combining management and control with sustainability may result in increased stakeholder's accountability and engagement throughout the value chain. Challenges of social integration, environmental preservation and economic growth continue to be obstacles to the sustainable healthcare service delivery, especially in underdeveloped nations. However, there isn't a framework or model in place in the context of healthcare for measuring social, environmental, and economic sustainability.

By integrating environmental and social concerns into organizational strategies through the use of ecologically friendly products, establishment of secure working conditions, and the creation of beneficial social and environmental impacts, the Sustainable Balanced Scorecard (SBSC) offers a thorough overview of key sustainability performance parameters (Hansen & Schaltegger, 2016). In order to achieve environmental goals while also ensuring sustainable business success, the various SBSC architectures make an effort to integrate a more comprehensive view of short- and long-term goals in all three elements of firm performance (i.e., social, environmental, and economic). However, due to the dearth of trustworthy sources of performance metrics for private hospitals, hospitals frequently struggle to discover adequate performance indicators. A limited number of studies have investigated private hospital performance indicators, despite the fact that there have been many studies on measuring performance (Behrouzi & Ma'aram, 2019). This study aims to create a Sustainable Balanced Scorecard (SBSC) model with the integration of Economic, Environmental, Social, and Governance (EESG) indicators in order to efficiently and effectively monitor, evaluate, and control hospital performance considering that Egypt lacks a national indicator set for benchmarking and improvement of hospital performance. Second, the study intends to demonstrate linkages of cause and effect between the various SBSC dimensions and indicators using the DEMATEL (Decision-Making Trial and Evaluation Laboratory) approach.

2. Literature Review

2.1 Organizational Performance Management

There are numerous performance management frameworks and models that can be found in the literature and used by business professionals, such as the Balanced Scorecard (Kaplan & David, 1992), the "Hoshin Kanri" methodology (Akao, 1991), The SMART pyramid (Lynch & Cross, 1995); Performance Measurement System (Bradley, 1996); (Medori & Steeples, 2000) Performance Measurement system; Performance Measurement System for Extended and Virtual Enterprises (PM-EVE) (Saiz, Rodríguez, & Bas, 2005); Global Performance Management for Small and Medium-Sized Enterprises (GPM-SME) (Alba, Diez, Olmos, & Rodríguez, 2005), Performance Prism Model (Neely, Adams, & Kenerly, 2002), Supply-Chain Operations Reference model (SCOR) (Cabral, Doumeingts, Li, & Popplewell, 2005).

Four concepts served as the foundation for the earliest contemporary performance measuring techniques: activity-based costing, market, shareholder, and economic added value. The need for comprehending and developing the connections between various key performance indicators (KPIs) is emphasized by (Kang, Zhao, Li, & Horst, 2016) with the use of a performance management system, to enable continual improvement operations. The ISO 22400 standard, that is viewed as a crucial reference when referring to operations management to promote ongoing improvement (Di Luoazzo, Varisco, & Schiraldi, 2020), **Domnguez et al., 2019**), is employed by the authors in their research to establish a hierarchical structure for a system of key performance indicators (KPIs). The authors then analyzed the relationships between the KPIs one at a time.

2.2 Performance Indicators

Indicators, in the opinion of (Franceschini, Galetto, & Maisano, 2019), serve as a method of "distilling" the bigger number of data that organizations gather. Data management gets more and more challenging as data volume grows as a result of increased operational complexity or a wider range of control. The kind, application, and time scope (such as short- or long-term) of indicators have a significant impact on actions and decisions.

In healthcare organizations, indicators could be classified according to their functionality. For example, the AHRQ classifies its indicators into process and output, where process measures are used to evaluate the degree of compliance with protocols while output indicators are used to transform utilization into a measurable element.

The hospital executives and top management are supposed to monitor the performance indicators across the hospital, like morbidity and mortality rates, patient census, number of complaints, patient satisfaction, employee turnover rate, number of cases referred outside the hospital, and nosocomial infection rate. On the other hand, each department monitors the operational indicators, for example, turnaround time, discarded samples, and needlestick injuries for the laboratory department.

2.3 Healthcare Performance Management

The accomplishment of specific objectives, whether they be managerial or medical, defines hospital performance. In addition to quality, the term "performance" also includes additional components, such as the cost of care, the availability of care, and the connection between patient expectations and satisfaction. According to (Markazi-Moghaddam, et al., 2016), high performance is defined as the provision of efficient, high-quality, widely accessible health services that result in patient satisfaction.

The recent decades have seen a significant increase in scholarly interest in the topic of performance management in healthcare organizations. To give one example, (Behrouzi & Ma'aram, 2019) offered a flexible way to help private hospitals discover and rate workable and pertinent performance indicators under the balanced scorecard perspectives. In order to enhance healthcare performance, (Cinaroglu & Baser, 2018) used a route analytic model to investigate the relationship between efficacy and health outcome measures. (Gu & Itoh, 2016) explored the factors influencing experts' perceptions of the usefulness of indicators and their important attributes when designing KPIs for hospital management. (Gu & Itoh, 2016) two questionnaire surveys were used to gather performance metrics for managing dialysis facilities in Japan.

In order to track and control emergency departments' effectiveness, (Núñez, Neriz, Mateo, Ramis, & Ramaprasad, 2018) created five types of key performance indicators (KPIs). Principal component and cluster analysis approaches were used by (Peixoto, Musetti, & Mendonça, 2018) to evaluate the effectiveness of Brazil's Federal University Hospitals. A performance score methodology was created by (Soysa, Jayamaha, & Grigg, 2018) to evaluate Australian non-profit healthcare facilities' overall strategic performance. (Si, You, Liu, & Huang, 2017) published a framework for identifying and assessing hospital management performance metrics.

In Egypt, the establishment of a tightly managed, open, and equitable regulatory framework is one of Egypt's 2030 Vision's key goals. It was decided that the requirement of accreditation is important for contracting with health institutions in order to assure the quality and safety of healthcare provision, thanks to the existence of an independent body. The General Authority for Healthcare Accreditation and Regulation (GAHAR) was established under Law No. 2 for the year 2018 pertaining to the Universal Health Insurance system. GAHAR has a legal obligation to uphold its standing as the organization in charge of accrediting and regulating the healthcare institutions. This obligation is firmly grounded in its independence. Under the direct control of the president, GAHAR is an independent authority responsible for developing standards to guarantee that healthcare services are delivered at various facilities in a safe and high-quality manner. Experts in healthcare quality established these standards, which are meant to be up to date with both domestic and international safety standards. The standards are intended to serve as a foundation for offering patients safe services. GAHAR's work is centered on the patient as its core element. GAHAR's mission extends beyond the evaluation of healthcare facilities by experts with recognized global credentials; It also goes beyond that to assist medical facilities in improving their efficiency and lowering risk factors (gahar.gov.eg).

2.3.1 The Balanced Scorecard (BSC)

Realizing that monitoring the organizational performance extends beyond of the financial sector, the BSC technique was created (Santos, Catânio, & Pizzo, 2019). For more than 30 years, the BSC has drawn the most consideration for converting strategic goals into a collection of

quantifiable performance indicators. According to (Vitzec, Cankar, & Linsak, 2019), in this context, the word "balanced" refers to the harmony of internal and external processes, short- and long-term performance targets, and financial and non-financial factors. Hospitals and health services are two sectors where the BSC has been successfully adopted (Malbašić & Marimon, 2019), (Catuogno, Arena, Saggese, & Sarto, 2017). There is no other method for evaluating a complicated system like healthcare that creates clear and direct links between a number of performance metrics.

Liu investigated how employing a balanced scorecard affected how well private clinics in Taiwan performed and provided care. His case-control study demonstrated that the performance of doctors and nurses improved more in the balanced scorecard-using clinics than in the control clinic (Liu, 2017.). A study in Malaysia focuses on the perspectives of those in positions of power to evaluate the organizational structure and performance of hospitals using the Balanced Scorecard. The results revealed that most private hospitals in Malaysia that apply the Balanced Scorecard are very organized and institutionalized, i.e., they follow formal written rules and procedures to make sure that management and governance of healthcare professionals follow the stated values. As a result, there is a valid connection between better performance in this industry and the following crucial factors: patient service quality, learning and organizational growth, internal business processes, safety and satisfaction, and finances (Shukri & Ramli, 2015).

In Malaysia, 35 private hospitals were surveyed using a questionnaire to determine the most practical and pertinent performance metrics. Senior managers and hospital directors provided answers to questions in this survey. The four BSC viewpoints as well as indicators from other surveys were used to define the measurements (Behrouzi & Ma'aram, 2019). In this study, it was shown that metrics connected to the 'customer' viewpoint, including incidents of complaints and clinical errors as well as patient satisfaction percentage, yielded better ratings than metrics related to the financial perspective. This result illustrates that non-financial factors in the health industry can significantly affect an institution's profitability and overall performance (Behrouzi & Ma'aram, 2019). When assessing the BSC's implementation in cosmetology services in Ukraine, (Delen, Dorokhov, Dorokhova, Dinçer, & Yuksel, 2020) found results that were

consistent with those found by (Behrouzi & Ma'aram, 2019). The metrics referencing the BSC's customer perspective, i.e., the factors related to service diversity, feedback, and loyalty, were found to be more important in evaluating the performance of this type of services, according to a survey these authors conducted of the 13 primary clinics in this specialty (Delen, Dorokhov, Dorokhova, Dinçer, & Yuksel, 2020). The authors also added that in order to meet customer expectations and keep up with changes in the consumer market for health services, it is crucial for this industry to diversify its offerings.

2.4 Sustainability

Theoretical support for sustainability research is still lacking, but notable examples include those by (Eriksson & Svensson, 2016); (Tate & Bals, 2016). The identification and classification of several aspects for inclusion in sustainability have also been attempted in literature. (Hueskes, Verhoest, & Block, 2017) noted in particular: "The social aspects of sustainability are ignored." The difficulty in creating quantifiable social sustainability standards appears to be the root of this neglect. According to (Nikolaou, Evangelinos, & Allan, 2013), including sustainability factors in the selection process and giving them significant weight is another crucial governance option. Setting a minimum standard for each sustainability award criterion could discourage bid strategies.

2.4.1 Sustainable Balanced Scorecard (SBSC)

One of the key methods to assess business sustainability performance is the SBSC since the four perspectives of the BSC are combined with the sustainability dimensions to expressly include ethical, social, and environmental factors (Küçükbay & Sürücü, 2019). Through the achievement of an integrated strategy for sustainable development, the integration of environmental indicators into the balanced scorecard creates an interdependence between them and the institution's overall mission, as well as the possibility of their implementation and application across the institution (Abdelsadek, 2023). According to literature, the SBSC could be a useful tool to address various management needs related to business sustainability challenges, fulfilling regulatory data requirements, meeting stakeholder information needs, and advancing sustainability management

standards and decision-making are just a few examples (Schaltegger & Wagner, 2006). (Khalid, Beattie, Sands, & Hampson, 2019) suggested many strategies to integrate sustainability within the BSC. They emphasize that businesses can select between various levels of integration depending on the strategy they are pursuing and admit that the organizational environmental strategy has the greatest influence on environmental performance measurement.

3. Methodology

3.1 Method and Participants

The study population consisted of the tertiary, for-profit private hospitals (>100 beds to 499 beds) in Egypt. "One private hospital" is identified as the unit of analysis. According to the Egyptian Ministry of Health's (MOH) most recent records, the total number of private hospitals is 1325 (MOH Statistical Year Book 2021), of which 23 private hospitals meet the inclusion criteria of this study. 22 hospitals are required to power the study with a confidence level of 95% and a 5% error margin.

The first step is literature screening to extract relevant indicators for the traditional balanced scorecard perspectives (Financial, Internal Business Process, Customer/Patient, and Learning and Growth) as well as the sustainability perspective (Economic, Environmental, Social and Governance). Second step is to use questionnaires compiled from the initial compiling of the performance set to score the importance of each indicator for the hospital's performance monitoring, evaluation, and control using an 11-point Likert scale ranging from 0 (Not at all important) to 10 (Extremely important). The 11-point Likert scale has been chosen because it has the highest test-retest reliability, as well as the highest Cronbach alpha coefficient and validity with high respondents' preferences (Preston & Colman, 2000).

Content validation was done to increase the validity of the indicators taken from the literature. In order to ascertain how accurate the scales created to measure an interest characteristic are, content validation entails the subjective evaluation of professionals or experts in the study's field (Berk, 1990). In order to ensure that an instrument is measuring what is intended and that the

items accurately reflect the content domain, content validation should be certified. (Nunnally, 1978) advises using at least 5–10 experts to evaluate the subject domains using rating scales.

In this study, which gathered expert responses via questionnaires that were personally delivered through interviews, the validity of the expert evaluations was determined by their knowledge and skill from a career standpoint (Chang, Wang, & Wang, 2017). Surveys are a cost-effective and efficient way to gather factual data from a research population (Creswell, 2014). According to (Denscombe, 2010), individuals who are competent and able to provide reliable information were chosen through the use of purposive sampling. To this end, a total of 22 healthcare leaders, including one Regional Director, 11 CEOs (Chief Executive Officer), 5 COOs (Chief Operating Officer), 4 CMOs (Chief Medical Officer), and One CQO (Chief Quality Officer) participated in this study. All participants have healthcare management backgrounds with a minimum of 15 years of experience in hospital management. Third step: compiling indicators with (Very important and Extremely important; scores (9 and 10, respectively) and validating them as the most critical indicators. Finally, the link of cause and effect between the various dimensions and performance measures is demonstrated using the Decision-Making Trial and Evaluation Laboratory (DEMATEL) technique.

3.2 Data Extraction

The literature study was conducted to find pertinent papers by looking through electronic databases, including Google Scholar, Emerald, Taylor & Francis, ScienceDirect, Springer Nature, Wiley, and ProQuest databases. Combinations of the terms "hospital," "performance," "assessment," "evaluation," "measurement," "indicator," "sustainability," "balanced scorecard," "ESG," "economic indicators," "environmental indicators," "governance indicators," "social indicators," and "private hospitals" were used in the search. Between each keyword in the search, the Boolean OR AND operators were used. Prior to reviewing the abstracts of the chosen articles, the titles of all articles were first examined. Articles about hospital performance measurement and indicators that were most pertinent to the goal of the study were chosen after the complete texts of the selected articles had been thoroughly read.

3.4 Data Synthesis

The initial compiled set was reviewed to remove duplicated indicators. A total of 115 indicators were identified and categorized into the eight perspectives of the proposed SBSC (25 from Financial, 50 from Internal Business Process, 8 from Customer/Patient, 7 from Learning and Growth, 6 from Economic, 8 from Environmental, 3 from Social and 8 from Governance perspectives).

3.5 Cause and Effect Relationship

The identified critical factors from the previous step are presented to the participants for evaluation using a six-point Likert scale on the degree of impact on the selected indicators, from 0 (no impact) to 5 (strong impact). To create cause-and-effect correlations among the different perspectives and indicators, the DEMATEL (Decision Making Trial and Evaluation Laboratory) is employed in the proposed Sustainable Balanced Scorecard (SBSC) framework.

3.6 DEMATEL

The Battelle Memorial Institute's science and human affairs program in Geneva developed the Decision-Making Trial and Evaluation Laboratory (DEMATEL) technique between 1972 and 1976 (Chang, Wang, & Wang, 2017), (Gabus & Fontela, 1972). It was employed to investigate the intricate connections between the criteria and to pinpoint the driving forces behind the contradictory findings (Li, Hu, Zhang, Deng, & Mahadevan, 2014); (Liou, 2015). It may effectively create a visible causal diagram by combining a number of intricate parts into cause-and-effect groups. According to research (Golcuk & Baykasoglu, 2016), The following steps illustrate how this study applied the DEMATEL approach algorithm as described by (Kala & Bagri, 2016) ; (Tzeng, Chiang, & Li, 2007):

Step 1: Obtain experts' opinions and compute the average matrix (Z).

This stage makes use of a set of h experts and n elements. Per expert, it is requested to judge the extent of direct effect drawn on pair-wise elements. The integer score is between 0 and 5, where 0 is "no impact" and 5 is "strong impact. The extent to which an expert believes an element i affects a element j is indicated by the variable ij . An $n \times n$ positive matrix is generated separately

for each expert, whereas k is the total number of experts who participated in the assessment procedure with $1 \leq k \leq h$. Hence, $X^1, X^2, X^3, \dots, X^h$; are matrices created by h experts. Equation (1) illustrates the average matrix for aggregating all assessments from h experts.

$$Z_{ij} = \frac{1}{h} \sum_{k=1}^h X_{ij}^k \quad (1)$$

Step 2: The Initial Direct-Relation by Computing Matrix (D)

The normalized initial direct-relation matrix $D = [d_{ij}]$, whereas the weights of every factor in matrix D would be ranged between $[0, 1]$, Equation (2) illustrates the computation.

$$D = \frac{Z}{\max(\max_{1 \leq i \leq n} \sum_{j=1}^n Z_{ij}, \max_{1 \leq i \leq n} \sum_{i=1}^n Z_{ji})} \quad (2)$$

Step 3: The Total Relation Estimate by Computing Matrix (T)

The aggregate-impact matrix T is generated using equation (3), where I is an $n \times n$ identity matrix. The characteristic t_{ij} denotes the indirect impacts that element i has on element j , and then the matrix T represents the total relation between every pair of elements. $T(t_{ij})$ factors clarify the significance of that relationship (from element i to element j) compared to all potential connections between elements.

$$T = D(I - D)^{-1} = [t_{ij}]_{j=1, \dots, n}^{i=1, \dots, n} \quad (3)$$

Step 4: Compute the Sums of Rows and Columns of Matrix (T)

The vectors R and C in the complete-impact matrix T , respectively, describe the sum of the rows and columns. Consider that R is the sum of the rows in matrix T . The value of R demonstrates the direct and indirect impacts that factor has on other factors. Let C is the sum of the columns in matrix T . Equations 4 and 5 show the R and C calculations. $(R+C)$ value indicates the "degree of significance" of both dispatch and reception. The greater the factor's values $(R+C)$, the more interconnected they are. Likewise, the $(R-C)$ value indicates the 'severity of impact,' showing how factors are prioritized. If $(R-C)$ is positive, then the factor is a causal factor, dispatching the

impact to other factors. If $(R-C)$ is negative, the component is an effect factor, meaning other factors impact it. The higher the values $(R-C)$ of the components, the more effect they have on others, and the more impact they have, the higher their emphasis is supposed to be. In other expressions, the smaller the value assigned to $(R-C)$ components, the higher the impact they get from other components, and the less the anticipated importance. Equations 4 and 5 show the R and C calculations.

$$R = (R_i)_{n \times 1} = \left[\sum_{j=1}^n t_{ij} \right]_{n \times 1} \quad (4)$$

$$C = (C_j)_{1 \times n} = \left[\sum_{i=1}^n t_{ij} \right]_{1 \times n} \quad (5)$$

Step 5: Designated a threshold value (α)

Given that matrix T contains evidence about how single component affects another, it is critical to choose a threshold value to exclude any unimportant impacts. This way, only impacts higher than the threshold value should be chosen and plotted. In the current study, the threshold value is obtained by averaging the components of matrix T . The average of the components calculates the threshold value (α) in matrix T , as shown in Equation (6). The computation seeks to ignore some components with negligible impacts in matrix T (Yang & Tung, 2006).

$$\alpha = \frac{\sum_{i=1}^n \sum_{j=1}^n [t_{ij}]}{N} \quad (6)$$

Whereas, N is the entire number of components in matrix T .

Step 6: Create a graph based on cause-and-effect relation

The graph is created using the dataset's mapping of $(R+C, R-C)$ to visualize the complicated interrelationships and deliver details to consider the important critical factors and how they impact other influencing factors (Shieh, Wu, & Huang, 2010). The elements where t_{ij} is greater than the value of α , are nominated to be displayed in the cause-effect graph (Yang & Tung, 2006). The graph could be obtained by mapping all coordinate sets of $(R+C, R-C)$. DEMATEL algorithm was done by R version 4.2.2. using package{dematel} in the analysis and packages {ggplot2} and {ggrepel} in plotting (Ozdemir & Celikbilek, 2021); (Slowikowski, 2021); **H.**

Wickham, 2016).

4.Data Analysis and Research Findings

4.1 SBSC Critical Performance Indicators for Private Hospitals

Participants were asked to score the identified indicators in the first section of the questionnaire according to their significance for the hospital's monitoring, evaluation, and control. Only scores of (Very Important) and (Extremely Important) are considered. Participants were then instructed to review the final set of validation critical indicators and indicate any errors or ambiguities in the content. The Cronbach's alpha value for the questionnaire is 0.95. From the financial perspective, 4 out of 25 (16%) indicators were identified as critical. From the governance perspective, 3 out of 8 indicators (38%) were identified as critical. In contrast, for the customer/patient indicators, 6 out of 6 (100%) were identified as critical. From the internal business process perspective, 20 out of 50 (40%) were identified as critical. For the Learning and Growth perspective, 5 out of 7 (71%) were identified as critical. For the economic perspective, 5 out of 6 (83%) were identified as critical. For the social perspective, 2 out of 3 (67%) were identified as critical, and finally, for the environmental perspective, 4 out of 8 (50%) were identified as critical.

4.2 Construction of Casual Diagrams

This DEMATEL analysis provides a comprehensive investigation on two levels, including the indicators and the perspectives, as each step of DEMATEL analysis was implemented first for the individual indicators and then for the eight SBSC perspectives (Sayed & Lento, 2018), (Al-Mawali, 2021). Table 1 showed each perspective with its indicator and their coding.

Table (1): Coding of the Indicators

F	Financial Indicators	G	Governance Indicators
F1	Return on Investment (ROI)	G1	Annual Reports of financial Activities
F2	Net Operating Margin	G2	Annual Reports of Control Activities

F3	Net Operating Profit After TAX (NOPAT)	G3	Cash value of fines and the total number of non-monetary penalties for non-compliance with laws and regulations
F4	Market Share	P	Customer/Patient Indicators
IP	Internal Business Process Indicators	P1	Patient Satisfaction Rate (%)
IP1	ER waiting time	P2	Patient Complaints/Incidence Rate (%)
IP2	Readmission for same diagnosis within 48 h	P3	Patient Retention Rate
IP3	Waiting time from ER to bed (admission)	P4	New Customer Acquisition (%)
IP4	% of total admissions transferred out to another hospital	P5	% of Revenue from repeat business
IP5	Wrong site surgery	P6	Net Promoter Score (NPS)
IP6	Foreign body left in during procedure	L	Learning & Growth Indicators
IP7	Inpatient mortality rate	L1	Training hours per employee
IP8	Maternal mortality rate	L2	Employee Absenteeism
IP9	Infant mortality rate	L3	Staff turnover rate
IP10	Discharge Against Medical Advice (DAMA)	L4	Rate of employee-sick-leave
IP11	Bed Occupancy Rate	L5	Training expenditures per capita
IP12	Leave Against Medical Advice (LAMA)	E	Economic Indicators
IP13	Conversion Rate	E1	Interest rates

IP14	Cancelled operations	E2	Gross Value Added (GVA)
IP15	Sentinel event rate	E3	Net Value Added (NVA)
IP16	Legal complaints against the hospital	E4	Income and Wage Growth/Decline
IP17	Daily staffing vs occupancy	E5	Tax rates
IP18	Resource utilization (\$ value of outputs/net operating costs)	S	Social Indicators
IP19	Performance against contract (\$ value of outputs/\$ value of contract)	S1	No. of Fatalities
IP20	Surplus inventory (% of current assets)	S2	Number of Community Engagement Activities/year
EV	Environmental Indicators		
EV1	Carbon Emission (%)	EV3	Waste by unit produced (%)
EV2	Energy and water conversation %	EV4	% of energy in kwh from renewable energy sources

4.2.1 Initial Direct Impact, Normalized Direct Impact, and Total Relations Matrices

To assess the inner relations matrix, a threshold value should be designated. Consequently, partial linkages are ignored, scheming the network relationship map. Only connections with values in matrix T that are more influential than the threshold value are displayed in the map. To determine the threshold value for associations, it is acceptable to compute the average values of the matrix T. Subsequently, the threshold value is defined, and all values in matrix T that are lower than the threshold value are assigned to zero, so the cause-effect relationship noted earlier is disregarded. In the current study, the threshold values are equal to 0.1709 and 0.0212 for SBSC and individual indicators, respectively; thus, all the values in matrix T that are lower than the threshold values were set to zero.

4.2.2 Output of “C+R” and “C–R” and Create a Causal Diagram

The "C+R" values (causal) and "C-R" values (effect) were calculated based on Equations (4) and (5) and are shown in Table 2. The values of (C+R) designate the effect of each SBSC perspective on the whole SBSC and other dimensions effects on the particular dimension. The values of (C+R) demonstrate the impact of each indicator on the whole model and the other indicators on a particular indicator. On the other side, (C-R) values describe the extent of a factor's effect (SBSC perspective and KPIs) on the complete model. Generally, the positive value of C-R denotes a causal factor, and the negative value of C-R denotes an effect. Moreover, the model could be described as a graph, where the values of (C-R) are placed on the vertical axis (Y-axis) and the values of (C+R) are placed on the horizontal axis (X-axis). The coordinate technique determines the relations and place of each factor with a point in the coordinates (C+R, C-R). Figure 1 demonstrates the significant relations of SBSC perspectives, and Figure 2 illustrates the significant relations of indicators.

In the current study, (C-R) values represent the degree of impact of SBSC dimensions and indicators. As shown in Figures 1 and 2, the Finance, Governance, Customer/Patient, and Internal Business Process perspectives are considered causal variables, while Learning and Growth, Economic, Social and Environmental perspectives are regarded as an effect. Moreover, concerning the individual indicators, all Financial (F1-F4), Governance (G1-G3), and Customer/Patient (P1-P6) are considered causal variables, whereas all Economic (E1-E5), Learning and Growth (L1-L5), Social (S1&S2) and Environmental (EV1-EV4) are regarded as an effect. However, some Internal Business Process KPIs are causal (IP2, IP3, IP5, IP7, IP8, IP9, IP10, IP11, IP12, IP13, IP14, IP15, IP16 and IP18) and others (IP1, IP4, IP6, IP13, IP14, IP17, IP19 and IP20) are effect.

In terms of the degree of importance, Figures 1, 2, and Table 2 indicate the ranking of "C+R" values for the eight SBSC dimensions, which [in descending order] are: Governance (4.17), Financial (3.73), Customer/Patient (3.34), Learning and Growth (2.45), Social (2.29), Internal Business Process (2.24), Economic (1.91), and Environmental (1.75). The fifteen crucial indicators with the highest "C+R" values are: G2: Annual Reports of Control Activities (4.01), G1: Annual Reports of Financial Activities (3.52), G3: Cash value of fines and the total number

of non-monetary penalties for non-compliance with laws and regulations (3.41), F1: Return on Investment (3.18), P5: Percentage of revenue from repeat business (3.13) P6: Net Promoter Score (3.11), P2: Patient Complaints/Incidence Rate (3.09), F4: Market Share (3.05), F3: Net Operating Profit After Tax (2.98), P3: Patient Retention Rate (2.88), F2: Net Operating Margin (2.86), P1: Patient Satisfaction Rate (2.85), P4: New Customer Acquisition (2.83), L5: Training expenditures per capita (2.49), and IP16: Legal complaint against the hospital (2.43).

The order of "C-R" values of the eight SBSC dimensions are Finance (0.79), Customer (0.25), Internal process (0.12), Governance (0.12), Social (-0.03), Environmental (-0.17), Economic (-0.39) and Learning (-0.70). The top ten measures with the highest "C-R" values are F1: Return on Investment (0.96), F4: Market Share (0.91), F3: Net Operating Profit After Tax (0.74), P6: Net Promoter Score (0.72), IP16: Legal complaint against the hospital (0.70), F2: Net Operating Margin (0.64), P5: Percentage of revenue from repeat business (0.61), P2: Patient Complaints/Incidence Rate (0.57), IP10: Discharge against medical advice (0.41) and IP18: Resource utilization (0.39). The main ten KPIs with the lowest "C-R" values are L4: Rate of employee-sick-leave (-1.21), L2: Employee Absenteeism (-1.16), L3: Staff turnover rate (-1.15), L1: Training hours per employee (-1.14), L5: Training expenditures per capita (-1.05), IP17: Daily staffing vs occupancy (-1.05), IP19: Performance against (-0.44), IP20: Surplus inventory (-0.43), EV2: Energy and water conversation (-0.35) and EV4: percentage of energy in kwh from renewable energy sources (-0.33). Table 3 can also determine the main roles, leading cause dimensions, and central effect dimensions for each of the eight SBSC dimensions. For instance, in the financial dimension, F1 has the principal position and the key effect factor, and the main causal factor. Concerning the Governance indicator, G2 is the main effect factor for the Governance dimension, whereas G3 is the main cause factor. In addition, P5 and P6 play the main effect and cause factors, respectively, in the customer/patient dimension. Furthermore, in the internal business process dimension IP16, both the main effect and cause factors. Concerning the sustainable indicators, all indicators in learning and growth have nearly the same effect (L2 is a bit lower), whereas for the economic and environmental indicators, E4 and EV3 respectively are the main effects in their dimensions, and none of those three dimensions has a cause

indicator. In the social dimension, S2 is a main effect and also a cause indicator.

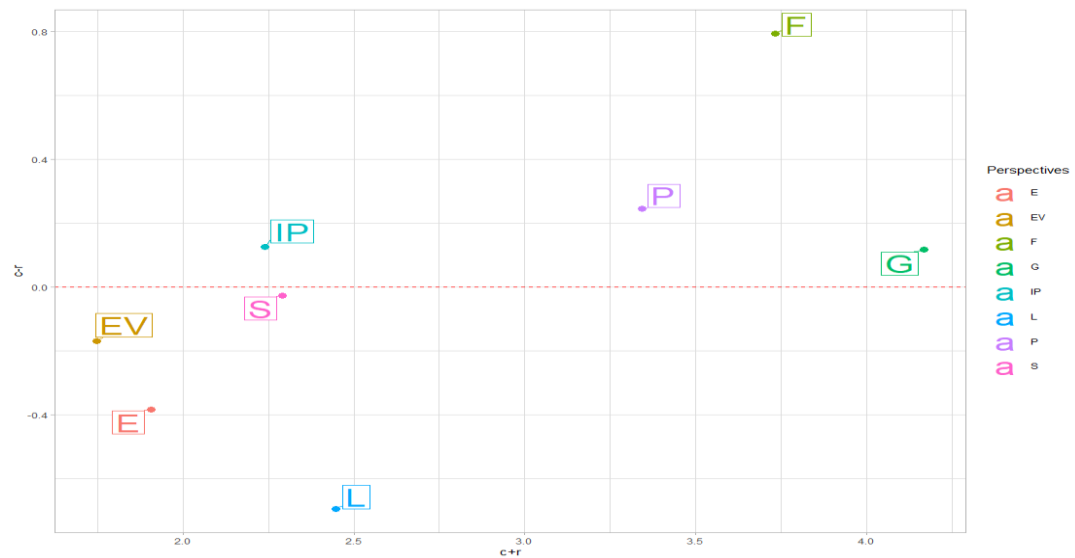


Figure 1:

Cause-Effect Diagram of SBSC Perspectives

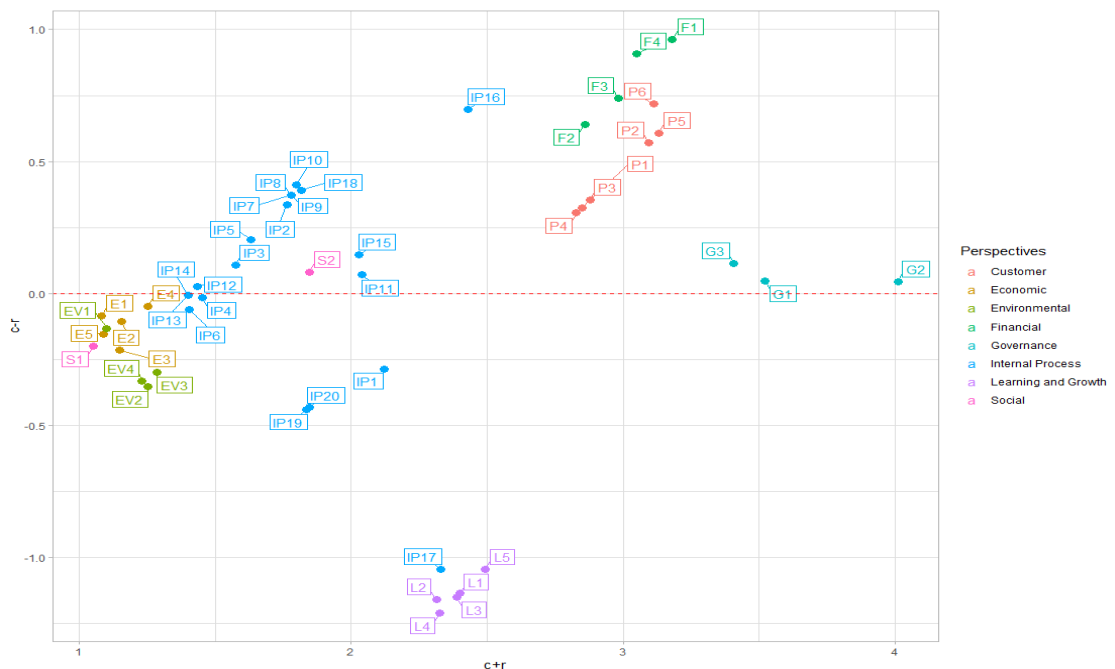


Figure 2:
Cause-Effect

Diagram of the Individual Indicators

Table (3a): Outcomes of the (C+R) (casual) and (C-R) (effect) for SBSC Indicators

	C	R	C+R	Rank [C+R]	C-R	Rank [C-R]
Financial	2.26	1.47	3.73	2	0.79	1
F1	2.07	1.11	3.18	4	0.96	1
F2	1.75	1.11	2.86	11	0.64	6
F3	1.86	1.12	2.98	9	0.74	3
F4	1.98	1.07	3.05	8	0.91	2
Governance	2.14	2.03	4.17	1	0.12	4
G1	1.78	1.74	3.52	2	0.05	24
G2	2.03	1.98	4.01	1	0.04	25
G3	1.76	1.65	3.41	3	0.11	20
Customer	1.79	1.55	3.34	3	0.25	2
P1	1.59	1.26	2.85	12	0.33	16
P2	1.83	1.26	3.09	7	0.57	8
P3	1.62	1.26	2.88	10	0.35	14
P4	1.57	1.26	2.83	13	0.30	17
P5	1.87	1.26	3.13	5	0.61	7
P6	1.91	1.20	3.11	6	0.72	4
Internal Business Process	1.18	1.06	2.24	6	0.12	3
IP1	0.92	1.20	2.12	21	0.29	38
IP2	1.05	0.71	1.76	32	0.34	15
IP3	0.84	0.73	1.57	34	0.11	21
IP4	0.72	0.73	1.45	35	0.02	29
IP5	0.92	0.71	1.63	33	0.21	18
IP6	0.67	0.73	1.41	37	-0.06	31
IP7	1.08	0.70	1.78	30	0.37	12
IP8	1.08	0.70	1.78	31	0.37	11

IP9	1.08	0.70	1.78	29	0.37	13
IP10	1.10	0.69	1.80	28	0.41	9
IP11	1.05	0.99	2.04	22	0.07	23
IP12	0.73	0.70	1.43	36	0.03	26
IP13	0.70	0.70	1.40	38	-0.01	28
IP14	0.70	0.70	1.40	39	-0.01	27
IP15	1.09	0.94	2.03	23	0.15	19
IP16	1.56	0.87	2.43	15	0.70	5
IP17	0.64	1.69	2.33	18	-1.05	44
IP18	1.10	0.71	1.82	27	0.39	10
IP19	0.70	1.14	1.84	26	-0.44	43
IP20	0.71	1.14	1.85	24	-0.43	42

Table (3b): Outcomes of the (C+R) (casual) and (C-R) (effect) for SBSC Indicators

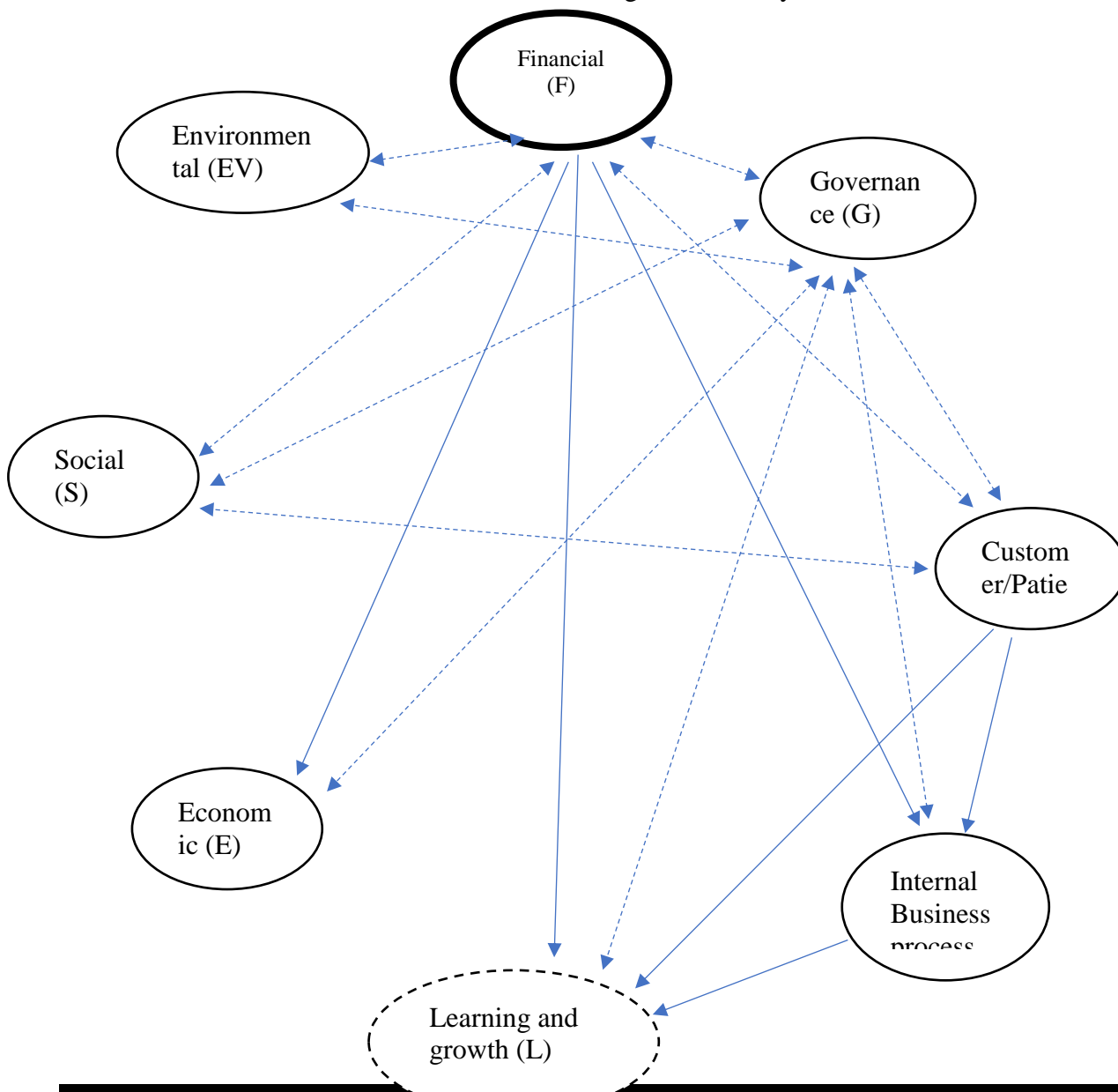
	C	R	C+R	Rank [C+R]	C-R	Rank [C-R]
Learning and Growth	0.88	1.57	2.45	4	-0.70	8
L1	0.63	1.77	2.40	16	-1.14	46
L2	0.58	1.74	2.31	20	-1.16	48
L3	0.62	1.77	2.39	17	-1.15	47
L4	0.56	1.77	2.33	19	-1.21	49
L5	0.72	1.77	2.49	14	-1.05	45
Economic	0.76	1.15	1.91	7	-0.39	7
E1	0.50	0.58	1.08	48	-0.09	32
E2	0.53	0.63	1.16	44	-0.11	33

E3	0.47	0.68	1.15	45	-0.22	37
E4	0.60	0.65	1.25	41	-0.05	30
E5	0.47	0.62	1.09	47	-0.15	35
Social	1.13	1.16	2.29	5	-0.03	5
S1	0.43	0.63	1.05	49	-0.20	36
S2	0.96	0.88	1.85	25	0.08	22
Environmenta l	0.79	0.96	1.75	8	-0.17	6
EV1	0.49	0.62	1.10	46	-0.13	34
EV2	0.45	0.80	1.25	42	-0.35	41
EV3	0.49	0.79	1.29	40	-0.30	39
EV4	0.45	0.78	1.23	43	-0.33	40

4.2.3 A Strategy Map of SBSC for Private Hospitals in Egypt

When constructing a strategy map, determining proper threshold values for specifying significant and substantial relations among the SBSC dimensions and sub-elements is crucial (Sayed & Lento, 2018). Threshold values can ignore unimportant relations that appear from the DEMTATEL outcomes. Concentrating on the abovementioned relations, the threshold value might eliminate insignificant connections while ensuring that the SBSC structure remains controllable overall (Liou et al., 2008). Similar to earlier studies (Sayed & Lento, 2018), the threshold values for the relationships among the eight SBSC dimensions and the 49 KPIs have been established as averages. As a consequence, the thresholds are placed at 0.1709 and 0.02123 for the SBSC dimensions and indicators, respectively. Firstly, a strategy map of SBSC perspectives was created (Figure 3). As illustrated in Figure 3, the Financial dimension is the leading cause dimension for private hospitals in Egypt, as it has the most substantial influence on the other 7 SBSC dimensions. In contrast, the Learning and Growth dimension is the primary influence, as it is affected more by the four traditional SBSC dimensions. Moreover, the strategy map of SBSC perspectives showed that the Governance perspective has the most two-way interdependence with all other seven perspectives whereas the Financial Perspective has only

four two-way interdependences with (Governance, Environmental, Customer and Social) and finally, Customer and Social perspectives have two-way interdependence with each other. Concerning one-way effect, Financial can affect three perspectives (Internal process, Learning and Growth, as well as Economic) while Customer can affect only two perspectives (Internal Business Process and Learning & Growth) and finally Internal process can affect only one perspective (Learning & growth). It deserves noting that none of the Learning & Growth, Social, Economic and Environmental indicators affect or got effected by each other.



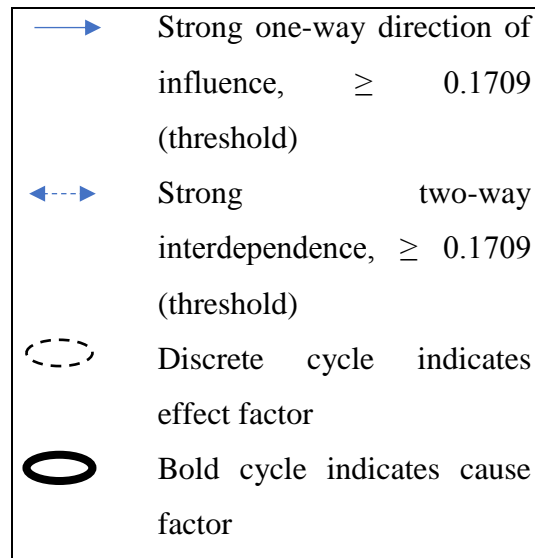


Figure 3: Strategy Map of SBSC Perspectives

5. Discussion

5.1 Sustainable Balanced Scorecard (SBSC)

Better models are required for healthcare institutions to enable corporate governance and performance monitoring (Chang, Wang, & Wang, 2017). According to (Delai & Takahashi, 2011); (Khan, Hussain, Gunasekaran, Ajmal, & Helo, 2018), through the value chain, increasing stakeholder accountability and participation may result from combining sustainability with management and control. This study's goal is to explain the significance and effects of sustainability integration utilizing SBSC within the performance measuring system used by private hospitals, which may serve as a useful tool to meet various management requirements for company sustainability challenges, including to support regulatory data requirements and to help companies implement a sustainable strategy. The study also aims to present a model for SBSC

with the critical indicators required to better monitor, evaluate, and control hospital performance, as well as relationships between causes and effects to assist hospital leaders in understanding the relationships between long-term capabilities and resources, particularly sustainability concerns and short-term financial results.

Achieving an effective sustainability integration could gain more investments and political support through alignment and support of government initiatives. For instance, presenting the economic value-added indicators that represent capital allocation together with governance practices indicators would give investors a glimpse about the hospital's performance and growth. Investors only invest their capital where they also have financial benefits. Moreover, according to Law No. 2 for the year 2018 pertaining to the Universal Health Insurance System, only accredited hospitals could provide healthcare services under the umbrella of the Universal Health Insurance System to the Egyptian community by 2030.

5.2 Cause and Effect Relationships

Using the Decision-Making Trial and Evaluation Laboratory (DEMATEL) method, this study investigated the connections between the various SBSC perspectives and the various important indicators. For instance, among the perspectives, the finance (F) perspective with the highest value of C-R demonstrated the biggest impact on the other indicators and was therefore thought to be the main "cause factor", then customer/patient comes in as the second perspective, followed by internal business process, and finally governance. Their goal at private hospitals is to obtain financial advantages, and to gain these benefits, private hospitals need to attract more customers who seek high-quality healthcare services delivered through internal business processes. To ensure sustainability, corporate governance is the overarching umbrella. On the other hand, Learning and Growth (L) with the lowest value of C-R took the strongest effect from the other indicators and was deemed to be the main "effect factor" among the perspectives. Therefore, investing in learning and growth without proper measurement of the return and added value, considering the real patients' needs, and understanding the hospital's main activities may not lead to sustainable performance for private hospitals.

5.2 1 The Central Indicators of the SBSC Perspectives for Private Hospitals

According to the study results, the other SBSC perspectives of the studied hospitals are most strongly influenced by the financial perspective, while Governance (G), with the largest value of C+R, exhibited the strongest correlation with the other indicators and was crucial to the SBSC perspectives for the sampled private hospitals. These results are comparable to (Chang, Wang, & Wang, 2017) in terms of defining the crucial elements for sustainable healthcare institutions' metrics in Taiwan. Through its operations, corporate governance may improve social, economic, and environmental well-being (A.G., et al., 2020). In the Learning and Growth (L) perspective, two indicators, L4: Rate of Employee Sick Leave and L2: Employee Absenteeism, are the central roles among the other indicators, according to DEMATEL. This finding demonstrates that L4: Rate of employee sick leave is the most critical lagging indicator used to measure a private hospital's performance because it is the main "effect-factor" affected by 37 indicators. According to the strategy map, L4: Rate of Employee Sick Leave, L2: Employee Absenteeism, and L3: Staff Turnover Rate are all affected by many other indicators, particularly, P1: Patient Satisfaction Rate, P2: Patient Complaints, P3: Patient Retention Rate, and F1: Return on Investment (ROI).

Return on Investment (ROI) with the highest value of C-R most strongly affected the other indicators and was considered the main "cause factor" among the indicators. The results show that the percentage of revenue from repeat business (corporate business), Net Promoter Score (NPS), and resource utilization have an influence on ROI, indicating that investing in a hospital's reputation and positioning in the market by building good relationships with different customers as well as working on the optimization of resource utilization would increase the ROI for the private hospitals.

In the Customer/Patient perspective (P), P5: Revenue from repeat businesses (corporate business) (main effect factor in this perspective), P6: Net Promoter Score (NPS) (main cause factor in this perspective), and P2: Patient Complaints Rate (PCR) are the most central and crucial indicators. Moreover, according to the strategy map, to increase the percentage of revenue from repeat business, three internal business process indicators have been identified as

having influence, namely IP10: Discharge Against Medical Advice (DAMA), IP: 15 Sentinel Event Rate, and IP16: Legal Complaints Against the Hospital. Those three indicators are strongly affected by G2: annual reports of control activities indicate that governance can affect the internal hospital's performance; in other words, with good governance, it's not only the financial or sustainability indicators that would improve but also the internal hospital's performance that can be promoted considerably.

In the Internal Business Process Perspective (IP), the strategy map results show that IP16: Legal complaints against the hospital, IP17: Daily staffing vs. occupancy, IP1: ER waiting time, IP11: Bed occupancy rate, and IP15: Sentinel event rate are the top crucial central indicators of a private hospital's performance. ER waiting time is a severe issue that practically all hospitals are dealing with, and it makes patients frustrated. In addition, it increases the likelihood of hospital readmission and death for discharged patients from the ER. (Laupacis & Born, 2011). In this study, IP1: ER waiting time also affects the staff turnover rate, rate of employee sick leave, and training availability, indicating that the long waiting time will deprive the staff of time needed for training and development in addition to physical burden and burnout, resulting in high turnover and sick leaves.

5.2.2 The Prioritization of the Critical Indicators

The study results indicate that the top ten priorities of indicators for private hospitals are F1: Return on Investment (ROI), F4: Market Share, F3: Net Operating Profit After TAX (NOPAT), P6: Net Promoter Score (NPS), IP16: Legal Complaints Against the Hospital, F2: Net Operating Margin; P5: % of Revenue from Repeat Business; P2: Patient Complaints/Incidence Rate (%); IP10: Discharge Against Medical Advice (DAMA); and IP18: Resource Utilization (\$ value of outputs/net operating costs). In other words, according to the constructed strategy map, these ten indications represent the most important cause-factors. Referring to the strategy map, F4: Market Share has influence on P1: Patient satisfaction rate, P3: Patient retention rate and P5: % of Revenue from Repeat Business. These results match those of (Wu, 2012); however, in Wu's study, Market Share was considered the most critical cause factor, whereas in this study it comes

in second place after Return on Investment (ROI).

5. Conclusion and Managerial Implication

The study's findings supported the significance of sustainability integration into the BSC of private hospitals, resulting in a new model of Sustainable Balanced Scorecard (SBSC). Moreover, the study's findings override one of the literature-reported obstacles to decision-makers using SBSC frameworks, which is that, whereas the four BSC perspectives are frequently quantitative, sustainability measures are qualitative in nature. (Hansen & Schaltegger, 2016). 49 performance indicators for private hospitals in Egypt were identified using the SBSC model described in this study. Leaders of private hospitals that needed to find a suitable sustainable performance assessment framework for their facilities now needed to exert less effort and go through less of a learning curve. A strategy map has been constructed using DEMATEL method by combining the hospital executives' viewpoints to identify the causal links and levels of influence among the SBSC indicators. The outcomes of this prioritizing show how hospital administrators can better allocate resources to the areas that most require improvement. The study's findings suggest the following managerial applications:

First, since the logical connections between all the indicators are disclosed, the DEMATEL technique, based on the methodically built strategy map, can offer workable references for the prioritizing of strategic initiatives for private hospitals in practice. Focusing on the crucial few indicators with higher levels of influence among these indicators would be beneficial as managers' top priority, particularly under the restrictions of limited time, financial resources, infrastructure, and human resources. Second, hospital managers need to focus more on the interdependencies between the indicators since they might reinforce the indications in a way that is beneficial. Third, the study results reveal that “Governance Control Activities”, “Governance Financial Activities”, “Non-compliance with laws and regulations”, "Return on Investment", "% of Revenue from Repeat Business,", "Net Promoter Score (NPS)", and "Patient Complaints/Incidence Rate", are the most important metrics for assessing the performance of private hospitals. The first three critical indicators belong to the governance perspective of the

SBSC, while the last three critical indicators belong to the customer/patient perspective, with only one indicator (ROI) belonging to the financial perspective. Therefore, it can be concluded that private hospitals may emphasize sustainability and non-financial measures more effectively than the financial metrics commonly placed at the top (financial perspective) of the basic Kaplan and Norton strategy map template for classic BSC implementations as final result measures (Kaplan and Norton, 2004a). In particular, those within the governance and customer/patient perspectives. To put it another way, setting up the strategic objectives for private hospitals should be driven by governance and customer orientation.

Future Research

The typical drawbacks of survey-based research apply to this study, including: First off, due to the nature of decision making, which is represented in human subjectivity, responses to the DEMATEL questionnaire survey must unavoidably be constrained to human subjective consciousness. Second, bias in selection will unavoidably occur when an expert panel is formed. Third, related experts' subjective assessments of the various SBSC perspectives may differ from one another. Fourth, it's possible that other industries or institutions would not find the SBSC's chosen critical indicators to be appropriate. Future research should go further and encompass other SBSC features like targets and initiatives to be more helpful to SBSC developers in the healthcare industry. Further studies are required to determine whether the suggested SBSC can be modified for both governmental and private institutions in other nations and circumstances.

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References

- A.G., Pencheon, D., Pollard, A., Robaire, B., Rockne, K., Sadler, B., . . . Bilec, M. (2020). The green print: advancement of environmental sustainability in healthcare. *Resour. Conserv., Recycl.* 161.
- Abdelsadek, O. S. (2023). "The Role of Strategic Management Accounting Tools in Developing

- Accounting Measurement and Disclosure for the Effects of Climate Changes”, *International Journal of Accounting and Management Sciences* , Vol.2 No.1 .
- Akao, Y. (1991). *Hoshin Kanri: Policy Development for Successful TQM*, Productivity Press, . Cambridge, Massachusetts, MA., doi: 10.1080/07408179208964258.
- Alba, M., Diez, L., Olmos, E., & Rodri ´guez, R. (2005). “Global performance management for small and medium-sized enterprises (GMP_SME)”. in *Camarinha-Matos, L.M., Afsarmanesh, H. and Ortiz, A. (Eds), Collaborative Networks and Their Breeding Environmen*Springer, New York., pp. 313-20.
- Al-Mawali, H. (2021). Environmental cost accounting and financial performance: Themediating role of environmental performance. *Accounting*, <https://doi.org/10.5267/j.ac.2021.1.005>, 7(3), 535–544.
- Behrouzi, F., & Ma’aram, A. (2019). ‘Identification and ranking of specific balanced scorecard performance measures for hospitals: a case study of private hospitals in the Klang Valley area, Malaysia’, *Int. . J. Health Plann. Mgmt.*, Vol. 2019, No. 4, pp.1–1.
- Berk, R. (1990). “Importance of expert judgment in content-related validity evidence”, *Western Journal of Nursing Research* , Vol. 12 No. 5, pp. 659-671.
- Bradley, P. (1996). “A Performance Measurement Approach to the R e-engineering of Manufacturing Enterprises”, *PhD Thesis, University College Galway*.
- Cabral, R., Doumeingts, G., Li, M.-S., & Popplewell, K. (2005). “Supply-chain operations reference-model: SCOR version 7 overview”, . in *Enterprise Interoperability Research Roadmap, V2.0, Information Society Technology*.
- Catuogno, S., Arena, C., Saggese, S., & Sarto, F. (2017). ‘Balanced performance measurement in research hospitals: the participative case study of a hematology department’, *BMC Health Services Research*, Vol. 17, No. 522, pp.1–11.
- Chang, D.-S., Wang, W.-S., & Wang, R. (2017). Identifying critical factors of sustainable healthcare institutions’ indicators under Taiwan’s national health insurance system. . *Soc. Indicat. Res.* , 140 (1), 287–307.
- Cinaroglu, S., & Baser, O. (2018). Understanding the relationship between effectiveness and outcome indicators to improve quality in healthcare,. *Total Qual. Manag. Bus. Excell.*, 29 (11–12) 1294-1311.
- Creswell, J. (2014). *Research Design: Qualitative, Quantitative and Mixed Methods Approaches*,. 4th ed., Sage Publications, Thousand Oaks, London.
- Delai, I., & Takahashi, S. (2011). Sustainability measurement system: a reference model proposal. . *Soc. Responsib. J.* , 7 (3), 438–471.
- Delen, D., Dorokhov, O., Dorokhova, L., Dinçer, H., & Yuksel, S. (2020). ‘Balanced scorecard-

- based analysis of customer expectations for cosmetology services: a hybrid decision modeling approach', . *Journal of Management Analytics*,, Vol. 7, No. 4, pp.1–33.
- Denscombe, M. (2010). *The Good Research Guide: For Small-Scale Social Research Projects*, . 4th ed., McGraw-Hill Education, Berkshire.
- Di LuoZZo, S., Varisco, M., & Schiraldi, M. (2020). "The diffusion of international standards on managerial practices",. *International Journal of Engineering Business Management*, , Vol. 12, pp. 1-17.
- Eriksson, D., & Svensson, G. (2016). "The process of responsibility, decoupling point, and disengagement of moral and social responsibility in supply chains: empirical findings and prescriptive thoughts",. *Journal of Business Ethics*, , Vol. 134 No. 2, pp. .
- Franceschini, F., Galetto, M., & Maisano, D. (2019). Designing a Performance Measurement. In F. Franceschini, M.Galetto, & D. Maisano, . *Designing Performance Measurement Systems*. Springer International Publishing. <https://doi.org/10.1007/978->, (pp. 133–205).
- Gabus, A., & Fontela, E. (1972). World problems, an invitation to further thought within the framework of DEMATEL. *Geneva, Switzerland: Battelle Geneva Research Center*.
- Golcuk, I., & Baykasoglu, A. (2016). An analysis of DEMATEL approaches for criteria interaction handling within ANP. . *Expert Systems with Applications*, doi: 10.1016/j.eswa.2015.10.04, 46, 346–366.
- Gu, X., & Itoh, K. (2016). Performance indicators: healthcare professionals' views. *Int J Health Care Qual Assur*. 2016 Aug 8; doi: 10.1108/IJHCQA-12-2015-0142. PMID: 27477935., 29 (7):801-15.
- Hansen, E. G., & Schaltegger, S. (2016). The sustainability balanced scorecard: A systematic review of architectures. *Journal of Business Ethics*, <https://doi.org/10.1007/s10551-014-2340-3>, 133(2), 193–221.
- Hueskes, M., Verhoest, K., & Block, T. (2017). "Governing public-private partnerships for sustainability: an analysis of procurement and governance practices of PPP infrastructure projects",. *International Journal of Project Management*,, Vol. 35 No. 6, pp.
- Kala, D., & Bagri, S. C. (2016). Designing the strategy map for hotels with key performance indicators of balanced scorecard using DEMATEL technique. *International Journal of Business Excellence*,, 10(2), 240-263.
- Kang, N., Zhao, C., Li, J., & Horst, J. (2016). "A Hierarchical structure of key performance indicators for operation management and continuous improvement in production systems",. *International Journal of Production Research*, Taylor & Francis, , Vol. 54 .
- Kaplan, R. S., & David, P. N. (1992). "The Balanced Scorecard-Measures That Drive Performance",. *Harvard business review*, , 70(1), 71-79.

- Khalid, S., Beattie, C., Sands, J., & Hampson, V. (2019). “Incorporating the environmental dimension into the balanced scorecard: A case study in health care”,. *Meditari Accountancy Research*, DOI 10.1108/MEDAR-06, Vol. 27 No. 4, 2019 pp. 652-674.
- Khan, M., Hussain, M., Gunasekaran, A., Ajmal, M., & Helo, P. (2018). Motivators of social sustainability in healthcare supply chains in the UAE-stakeholder perspective. . *Sustain. Prod. Consum.*, 14, 95–104.
- Küçükbay, F., & Sürücü, E. (2019). Corporate sustainability performance measurement based on a new multicriteria sorting method. *Corporate Social Responsibility and Environmental Management*, <https://doi.org/10.1002/csr.1711>, 26(3), 664–680.
- Laupacis, A., & Born, K. (2011). The risks of emergency department overcrowding.
- Li, Y., Hu, Y., Zhang, X., Deng, Y., & Mahadevan, S. (2014). An evidential DEMATEL method to identify critical success factors in emergency management. . *Applied Soft Computing*, doi: 10.1016/j.asoc.2014.03.042, 22, 504–510.
- Liou, J. J. (2015). Building an effective system for carbon reduction management. *Journal of Cleaner Production*, doi: 10.1016/j.jclepro.2014.10.053, 103, 353–361.
- Liu, Y. (2017.). Using balanced scorecard to help improving the quality of care and service for the private clinics in Taiwan. *Johns Hopkins University*; .
- Lynch, R., & Cross, K. (1995). *Measure Up – How to Measure Corporate Performance*., Oxford: Blackwell.
- Malbašić, I., & Marimon, F. (2019). ‘A simplified balanced. balanced scorecard’,. *European Accounting and Management Review*, , Vol. 5, No. 2, pp.38–60.
- Markazi-Moghaddam, N., Arab, M., Ravaghi, H., Rashidian, A., Khatibi, T., & Zargar Balaye Jame, S. (2016). A Knowledge Map for Hospital Performance Concept: Extraction and Analysis: A Narrative Review Article. *Iranian Journal of Public Health*,, 45(7), 843–854.
- Medori, D., & Steeple, D. (2000). A framework for auditing and enhancing performance measurement systems. *International Journal of Operations & Production Management*, , Vol. 20, No. 5, pp. 520-533 .
- Neely, A., Adams, C., & Kenerly, M. (2002). *The Performance Prism: The Scorecard for Measuring and Managing Business Success*, . Prentice Hall/Pearson Education, London.
- Nikolaou, I., Evangelinos, K., & Allan, S. (2013). “A reverse logistics social responsibility evaluation framework based on the triple bottom line approach”, . *Journal of Cleaner Production*, , Vol. 56, pp. 173-184.
- Núñez, L., Neriz, R., Mateo, F., Ramis, A., & Ramaprasad. (2018). Emergency departments key performance indicators: A unified framework and its practice,. *Int. J. Health Plann. Manag.* , 33 (4) 915–933.

- Nunnally, J. (1978). *Psychometric Methods*,. McGraw-Hill, New York.
- Ozdemir, M., & Celikbilek, Y. (2021). dematel: Decision Making Trial and Evaluation Laboratory Technique in R. <https://CRAN.R-project.org/package=dematel>.
- Peixoto, M., Musetti, M., & Mendonça, M. (2018). *Multivariate analysis techniques applied for the performance measurement of Federal University Hospitals of Brazil*,. 16–29: Comput. Ind. Eng. 126.
- Preston, C. C., & Colman, A. M. (2000). Optimal number of response categories in rating scales: reliability, validity, discriminating power, and respondent preferences. *Acta Psychologica*,. 104(2000), 1-15.
- Saiz, J., Rodríguez, R., & Bas, A. (2005). “A performance measurement system for virtual and extended enterprises”, in Camarinha-Matos, L.M. and Afsarmanesh, H. (Eds), Collaborative Networked Organizations: A Research Agenda for Emerging Business Models, Springer, New York, NY, pp. 285-92.
- Santos, E., Catânio, A., & Pizzo, J. (2019). ‘Análise das modificações do BSC a partir de uma revisão sistemática da literatura de periódicos nacionais’,. *XXVI Congresso brasileiro de custos-Curitiba, PR, Brasil, Novembro*. [online] <https://anaiscbc.emnuvens.com.br/anais/article/viewFile/4592/4610>, p.26.
- Sayed, N., & Lento, C. (2018). “Developing a strategy map for environmental consulting firms”,. *International Journal of Productivity and Performance Management*,. ISSN: 1741-0401.
- Shieh, J. I., Wu, H. H., & Huang, K. K. (2010). A DEMATEL method in identifying key success factors of hospital service quality. *Knowledge-Based Systems*, , 23(3), 277-282.
- Shukri, N., & Ramli, A. (2015). Organizational structure and performances of responsible Malaysian healthcare providers: A balanced scorecard perspective. *Procedia Econ Finance*. doi: 10.1016/s2212-5671(15)01101-6, 28:202–12.
- Si, S., You, X., Liu, H., & Huang, J. (2017). Identifying key performance indicators for holistic hospital management with a modified DEMATEL approach. . *Int. J. Environ. Res. Public Health* , 14, 934.
- Slowikowski, K. (2021). ggrepel: Automatically Position Non-Overlapping Text Labels with 'ggplot2'. . <https://CRAN.R-project.org/package=ggrepel>.
- Soysa, I., Jayamaha, N., & Grigg, N. (2018). developing a strategic performance scoring system for healthcare nonprofit organizations. *Benchmarking* , 25 (9) 3654–3678.
- Tate, W., & Bals, L. (2016). “Achieving shared triple bottom line (TBL) value creation: toward a social Resource-Based view (SRBV) of the firm”,. *Journal of Business Ethics*,, Vol. 152 No. 3, pp. 1-24.
- Tzeng, G. H., Chiang, C. H., & Li, C. W. (2007). Evaluating intertwined effects in e-learning

- programs: A novel hybrid MCDM model based on factor analysis and DEMATEL. . *Expert systems with Applications*, , 32(4), 1028-1044.
- Vitcec, N., Cankar, S., & Linsak, Z. (2019). ‘Effectiveness measurement using DEA & BSC methods in public health services’,. *The NISPACEE Journal of Public Administration and Policy*,, Vol. 12, No. 1, pp.199–216.
- Wu, H. (2012). Constructing a strategy map for banking institutions with key performance indicators of the balanced scorecard. . *Eval. Program. Plann.*, 35, 303–320.
- Yang, M., & Tung, Y. (2006). “Using path analysis to examine causal relationships among balanced scorecard performance indicators for general hospitals: the case of a public hospital system in Taiwan”,. *Health Care Management Review*, , Vol. 31 No. 4, pp. 28.