AUT Journal of Civil Engineering

AUT J. Civil Eng., 3(2) (2019) 201-212
DOI: 10.22060/ajce.2019.15185.5524

Proposed List of Significant Indicators for Iran Airport Construction Projects

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ABSTRACT: Airports are vital national resources that play a prominent role in the transportation of passengers and freight in domestic and international commerce. Airports authorities are vying to capture the lion's share of the regional and global market while air travel is growing in popularity all over the globe, and mammoth projects are underway to keep up, new and expanded airports need to meet that rampant demand. The available sustainability tools and rating systems need to better incorporate the broader socioeconomic settings associated with the built environment, In other words, due to the lack of indigenous indicators, it is necessary to identify the significant indicators in this industry. This paper introduces significant assessment indicators (SAIs) for evaluating the sustainability performance of airport projects. A questionnaire survey among practitioners across the nation confirmed the necessity and identified priority Indicators of sustainability. Data for analyzing the significance of the assessment indicators collected through a questionnaire survey that given to three groups of experts, encompass government officials, professionals, and clients and Delphi method and Cronbach's alpha coefficient method has used in this study to evaluate the data reliability. This paper demonstrates the importance of sustainability knowledge, indicators, as a positive step towards meeting Sustainability in airport projects. Finally, the authors presented 52 SAIs of airport construction projects according to Iran conditions that are consistent with the principles of sustainable development.

Review History:

Received: 26 October 2018
Revised: 21 January 2019
Accepted: 21 January 2019
Available Online: 21 January 2019

Keywords:

Sustainable Development
Indicators
Rating Systems
Infrastructure
Assessment Frameworks

1- Introduction

In Iran, an airport project is a kind of public good in which government policy has an important role to influence the effects of the project on economic development and social needs. While project goals set the direction, project indicators provide the means to measure progress and they enable owners, engineers, and stakeholders to monitor progress toward sustainable development by comparing the performance achieved on a project with the intended performance. A comprehensive set of project indicators is also an essential tool for measuring accomplishments, demonstrating transparency to stakeholders and building a knowledge base for professionals [6].

The landmark definition of sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" was introduced by the World Commission on Environment and Development (WCED 1987) in a report called our common future, also known as the Brundtland Report. A number of recent studies reported the need for and significance of upgrading existing buildings to improve their sustainability. For example, Killien (2011) and Onat et al. (2014) reported that implementing policies of retrofitting existing buildings can be more effective in stabilizing or reducing greenhouse gas emissions and energy consumption than focusing only on the construction of new net-zero and high-performance buildings [1,3].

Although the need for assessing the sustainability of the built environment is widely recognized, there is little agreement about the most effective methods and tools. Daniell et al. (2005) points to previous research and literature concluding that governments and planners require more holistic sustainability assessment methods; they state that the narrow focus of the currently available assessment methods do not adequately address the sustainability goals of future developments and the temporal, spatial, and behavioral dimensions of sustainability. In addition, there is a lack of common methodology to collectively address resource usage together with various sustainability indicators (i.e., technical, environmental, economic, social/cultural, and individual). These shortcomings make it necessary to develop a new holistic assessment method to measure the sustainability of the built environment [5]. The available sustainability tools and rating systems need to better incorporate the broader socioeconomic settings associated with the built environment [7, 14]. Many sustainability rating systems have been developed to assess the sustainable development of the built environment and most rating systems rely on indicators to measure specific project features. However, there is no widely accepted framework to help evaluate sustainability rating systems [10]. Some of the purposes of rating systems

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are to make design decisions; monitor progress or trends; inform policy decisions; influence behaviors; or award achievement. Their implementation can depend on the measurement methods used and types of data available, which raises the question of what makes a sustainability rating system effective. Indicators are intended to make complex variables simpler to understand [8, 11].

Several studies have analyzed infrastructure project sustainability from different perspectives. Choguill (1996) proposed principles for policy formulation to improve infrastructure sustainability through serving and cooperating with communities in the processes of project planning, decision making, and implementation. Rackwitz et al. (2005) introduced a maintenance strategy for improving infrastructure effectiveness on the basis of cost-benefit analyses focusing on project performance during the operation stage. Ugwu and Haupt (2007) proposed an indicator system for assessing infrastructure sustainability focusing on the project operation stage. Other studies have investigated the methods for strategic environmental assessment (SEA) for infrastructure projects [2, 12].

Sustainable development is usually studied by using three primary categories: (1) social, (2) environmental, and (3) economical. These three categories are also expressed as people, planet, and profit, respectively (PPP or P3). In 2002, at the World Summit on Sustainable Development, P3 was revised from planet, people, and profit to people, planet, and prosperity, because the economic effects of sustainable development reach far beyond immediate financial profits [13, 15]. O'Connor, Torres, and Woo introduces 54 construction phase sustainability actions (CPSAs) that project teams can use during project execution to prioritize and carry out sustainability solutions. Further, it discusses the results of the sustainability survey on current and future capital project implementation of CPSAs, with a focus on frequency of use and barriers to deployment [9, 16, 17].

Airports are often pressing need of upgrades to improve their operational economic and environmental performance. Recent studies reported the need for and significance of improving the sustainability of existing airports to stabilize and reduce their greenhouse gas emission and minimize their negative environmental impact. Sustainability is getting more important to thrive air transportation industry. As airports are fundamental elements of the air transportation industry the indications for the sustainability of airport management should be stressed for the awareness of airport sustainability among the whole actors. This study was done according to Iran's best 10 airports information's where gathered annually by IAC, lead to formulated a list of SAIs by the writers of this paper that integrate the four dimensions of sustainability for evaluating the sustainability performance of infrastructure projects before their implementation.

2- Research Highlights

The major objectives of sustainability indicators are to comparatively investigate scenarios about the possibility of investment, plan, executive and operate that lead to integrate a project owner's goals for sustainable development into a project, connection between the achievements of a specific project and whole-society goals and priorities, create and maintain transparency in the development of goals and indicators and identified influences and dependency of project goals and indicators on project objectives and design.

3- Research Method

Indicators are observed or calculated parameters that show the presence, state of a condition or trend. They are the tools for measuring and monitoring progress towards goals, providing a basis for judging the extent to which progress has been made, or corrective action is required. They are also an essential management tool for communicating ideas, thoughts, and values [6]. To identify SAIs, the writers examined a set of feasibility reports for airport projects and referred to previous research work. The main steps are summarized in Figure 1 and include a comprehensive literature review, content analysis of the literature to identify criteria, refinement of criteria descriptions that can be practically applied to assessment indicators.

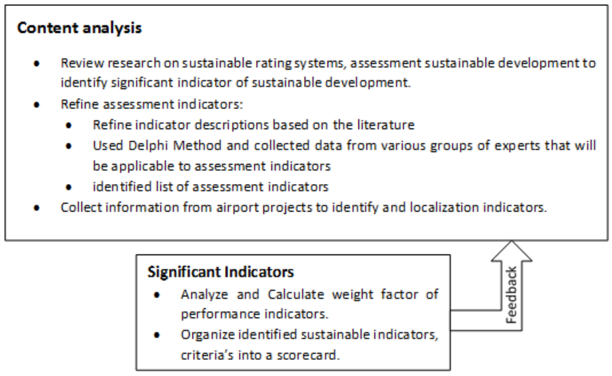

Figure 1. Research Method flowchart

The literature review was completed by searching library databases including technical articles from different journals, books, for example, the American Society of Civil Engineers (ASCE) library. Multiple searches covered the following keywords: sustainable performance criteria, sustainable performance indicator, sustainable performance framework, and sustainable performance assessment. Articles directly related to sustainable performance of buildings, infrastructure, and construction were selected. A content analysis method was used for conducting the examination. Content analysis is one of the classical approaches used to study research problems from documentary evidence (Holsti 1969). The adoption of the content analysis method in this study led to the generation of a list of optional indicators for assessing airport construction project sustainability. These optional indicators are divided into four groups: economical, social, environmental and technical factors. First, with the Brain Storming method, including 5 experts from government officials, professionals, and clients, 94 indicators identified. Then the indicators evaluated. Concepts are not always easy to keep distinct. Thus, through a flexible or emergent process, the criteria descriptions were refined into conceptual definitions. Indicators with same concept or context summarized.

For instance, analyze materials, minimizing surplus materials, sustainable material substitutions, analysis of local materials/services versus nonlocal/global alliance, sustainable consumable materials, minimization of material surplus, reusable shoring, formwork, scaffolding, material handling strategy summarized into material management indicator. Then a list of indicators for Sustainable Development in Airport Construction Projects included 70 indicators has established that from the formulation of the optional indicators for assessing airport construction project sustainability and Delphi method, a questionnaire survey was conducted to collect data from various groups of experts for analyzing the significance of each indicator. Experts were invited to indicate the significance of each indicator by using a five-point Likert scale. The responses from experts enabled the calculation of indicator significance, and consequently, used Interpretive Structural Modeling (ISM) method to identify the relation between indicators and then all indicators were ranked by significance in each factor group and both the reliability and the validity of the survey data were checked while reliability is estimated by examining the consistency with which different items express the same concept (de Vaus 2002). In this paper, the Cronbach's alpha coefficient method has used to assess the reliability of SAIs whereas the previous study suggested the value of Cronbach's alpha of 0.7 or higher normally indicates a reliable group classification set (Ceng and Huang 2005).

4- Data Collection

In the process of pursuing this research, information and reports of various types of airport projects were collected from the Iranian airports that contented geographic, environment, weather conditions, project economical effects on people and markets, project finance information, bids and contracts, cultural and social conditions. Three types of sources, government officials, professionals, and clients, provided these feasibility reports where the client refers to state-owned organizations, which is different than a government official. Based on previous studies and Literature review mentioned above and content analysis with indicators occurring more than three times, a list of 94 assessment indicators has identified. With the Brain Storming method, including 5 experts in the airport industry, and summarized indicators with the same concept or context, a list of indicators for sustainable development in airport construction projects included 70 indicators has established that shown in Table 1. Then the questionnaire prepared and distributed between 15 experts while the authors distributed the questionnaires two times between experts until reached consensus.

5- Analysis of collected data

Data for analyzing the significance of the assessment indicators listed in table 1 were collected through a questionnaire survey and Delphi method and proportions of identified assessment indicators shown in Figure 2.

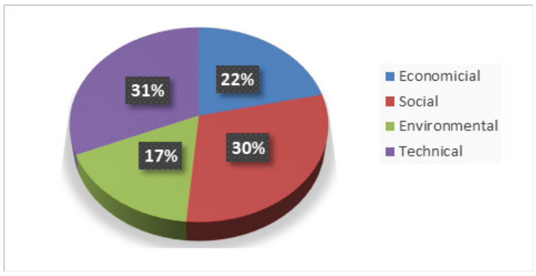

Figure 2. Proportions of identified assessment indicators

The adequacy and readability of the questionnaire were evaluated with a pilot study whereas three experts were involved in the pilot study, and their comments were incorporated into the final questionnaire. In responding to the questionnaire, respondents were invited to indicate the level of significance of each assessment indicator for addressing project sustainability by assigning a score between 1 and 5. A score of "5" indicated most important, "4" important, "3" average, "2" unimportant, and "1" negligible. Proportions of occupation and years of experience participants shown in Table 2 and Figure 3.

As the candidate respondents had knowledge of the research concerns in the process of providing these feasibility reports, the responses were of good quality, and a high response rate was ensured. In the first step, 15 valid questionnaires were received, 4 from government officials, 6 from professionals, and 5 from clients. By using the survey data, statistical calculations on the significance of assessment indicators have conducted. The calculation results are illustrated in Table 3. In the table, for instance, I22 represents the indicator "Waste management" with an overall average score of 3.75 and a standard deviation (SD) of 0.85. However, different groups gave different scores for individual indicators owing to the fact that different groups of experts have different perceptions about the priorities in assessing project sustainability. Then the results of the first step sent to the candidate and requested them to score the indicators.

In the second step, the calculation results are illustrated in table 3. In this table, for example, I_{22} with an overall average score of 4.03 and a SD of 0.55. As the experts' views (grades) approached the indicators and reached consensus, the grades were summarized and used for the next analyses.

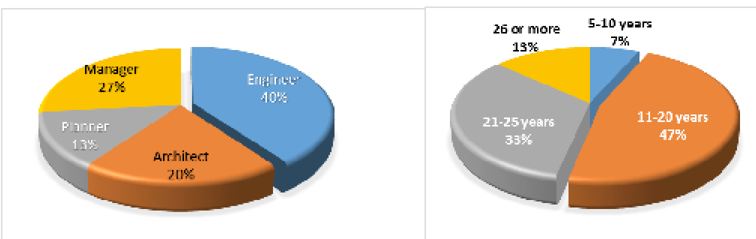

Figure 3. Proportions of Occupation and years of experience Participants

Table 1. Global List of Assessment Indicators for Airport Construction Projects sustainability

Group	Indicator		Indicator
Economical aspect	Analysis of market supply and demand	Social aspect	Effects on local development [6,9,12]
	Investment methods in the project [9]		Providing Ability Advice for Indigenous Peoples [9]
	Project budget [9,12]		Scale of serviceability
	Project financing channels [6,9]		Analysis of project Stakeholders [9,10]
	Project investment planning [7,12,18]		Social communication [6,9]
	Life-cycle Analysis [7,10-12,16]		Public safety [6,11,12,18]
	Financial risk		Public sanitation [6,11]
	Payback period		Land use and its influence on the public [7]
	Internal return ratio (IRR)		Protection to culture heritage [6,11,12]
	Work schedule to reduce electricity impacts [6,9]		Promotion of community development [9]
	exploration potential financial methods		Site work hour schedule to reduce traffic impacts [9]
	work efficiency		Provision of employment opportunities [6]
	identify potential request	Technical aspect	Development of skill and career [9,11]
	identify potential development/advance		Adaptation between Employer's View and Designer Consulting Approaches [7,9]
	identify budgeting methods [9,12]		Analyze Multiple Approaches [7]
Environmental aspect	Ecological effect [12]		Working experience of similar consultant projects [7]
	Effect on land pollution [6,9,12]		Working experience of similar Contractor projects [7]
	Effect on air quality [6,12]		Design and analysis of project specifications [9,17]
	Effect on water quality [6,9,12,18]		Analysis and evaluation of participating contractors
	Water consumption [9,12]		Analyze and review project changes [19]
	Noise effect [7,9,12,16,18]		Project execution methods [18]
	Waste management [6,7,9,12,16,18]		Material Management [9,12,17]
	Influence on public health [6,11,16]		Project Planning [18]
	Environment protection measures in project design [7]		Equipment Management [9,12,18,20]
	energy management [1,9,16,18,20]		Risk management [9]
	Use of natural resources [11,12]		Preassembly and prefabrication of construction elements [9]
	Reduce greenhouse gas emissions [6,9,17]		Sustainable material substitutions [9]
	Protection to landscape and historical sites [7]		Construction noise/vibration abatement and mitigation [12,16,18]
	Protection of cultural artifacts and endangered species [6,7,9]		Reusable shoring, formwork, and scaffolding [12]
	Protection of trees and vegetation [7]		Analysis of local materials/services versus nonlocal/global alliance [9]
	Sustainable temporary facilities [9]		Selection and replacement of construction equipment [12,18]
	Sustainable temporary worker camps [9]		Inspection and maintenance of construction equipment [9]
	Energy-autonomous remanufactured reusable facilities [9,20]		Quality management and facility start-up planning [9,12]
	Indoor air quality improvements [6,9,18]		Sustainability lessons learned [9]
	Environmentally friendly dust and erosion control [9,11]		
	Collection, sorting, and recycling of construction wastes [7,9]		

Table 2. Occupation and years of experience Participants

Occupation	n	Percentage (%)	Years of experience	n	Percentage (%)
Engineer	6	40.0	5-10 years	1	6.7
Architect	3	20.0	11-20 years	7	46.7
Planner	2	13.3	21-25 years	5	33.3
Manager	4	26.7	26 or more	2	13.3
Total	15	100	Total	15	100

Table 3. Assessment results of indicator for Iran Airport Construction Projects

Group	Indicator	Mean (step1)	Mean (step2)	difference Step 1,2 %
Economical aspect	Analysis of market supply and demand	3.20	3.53	10.4%
	Investment methods in the project	3.35	3.30	-1.5%
	Project budget	3.30	3.40	3.0%
	Project financing channels	2.90	2.95	1.7%
	Project investment planning	3.20	3.33	4.2%
	Life-cycle Analysis	3.20	3.30	3.1%
	Financial risk	3.15	3.07	-2.6%
	Payback period	2.97	3.20	7.7%
	Internal return ratio (IRR)	3.00	3.10	3.3%
	Work schedule to reduce electricity impacts	2.95	3.00	1.7%
	exploration potential financial methods	2.60	2.85	9.6%
	work efficiency	3.00	3.00	0.0%
	identify potential request	2.50	2.60	4.0%
	identify potential development/advance	3.00	3.00	0.0%
	identify budgeting methods	2.70	2.90	7.4%
Environmental aspect	Ecological effect	3.00	3.00	0.0%
	Effect on land pollution	3.40	3.30	-2.9%
	Effect on air quality	3.30	3.27	-1.0%
	Effect on water quality	3.20	3.37	5.2%
	Water consumption	3.40	3.53	3.9%
	Noise effect	3.25	3.37	3.6%
	Waste management	3.75	4.03	7.6%
	Influence on public health	2.95	3.00	1.7%
	Environment protection measures in project design	3.00	3.03	1.1%
	energy management	4.00	4.50	12.5%
	Use of natural resources	3.20	3.03	-5.2%
	Reduce greenhouse gas emissions	3.00	3.07	2.2%
	Protection to landscape and historical sites	3.00	3.00	0.0%
	Protection of cultural artifacts and endangered species	2.97	3.07	3.3%
	Protection of trees and vegetation	2.90	2.93	1.0%
	Sustainable temporary facilities	2.80	2.90	3.6%
	Sustainable temporary worker camps	2.75	2.70	-1.8%
	Energy-autonomous remanufactured reusable facilities	3.00	2.95	-1.7%
	Indoor air quality improvements	2.90	2.93	1.0%
	Environmentally friendly dust and erosion control	3.10	3.03	-2.2%
	Collection, sorting, and recycling of construction wastes	3.00	3.10	3.3%

Social aspect	Effects on local development	3.00	3.40	13.3%
	Providing Ability Advice for Indigenous Peoples	2.97	3.00	1.0%
	Scale of serviceability	3.10	3.00	-3.2%
	Analysis of project Stakeholders	3.40	3.53	3.9%
	Social communication	3.00	3.00	0.0%
	Public safety	3.04	3.10	2.0%
	Public sanitation	3.00	3.13	4.4%
	Land use and its influence on the public	3.20	3.33	4.2%
	Protection to culture heritage	3.00	3.07	2.2%
	Promotion of community development	2.70	2.75	1.9%
	Site work hour schedule to reduce traffic impacts	3.00	3.17	5.6%
	Provision of employment opportunities	3.10	3.37	8.6%
Technical aspect	Development of skill and career	3.30	3.23	-2.0%
	Adaptation between Employer's View and Designer Consulting Approaches	3.20	3.30	3.1%
	Analyze Multiple Approaches	3.10	3.13	1.1%
	Working experience of similar consultant projects	3.30	3.23	-2.0%
	Working experience of similar Contractor projects	3.25	3.33	2.6%
	Design and analysis of project specifications	3.90	4.17	6.8%
	Analysis and evaluation of participating contractors	3.20	3.30	3.1%
	Analyze and review project changes	3.24	3.20	-1.2%
	Project execution methods	3.40	3.43	1.0%
	Material Management	4.40	4.53	3.0%
	Project Planning	4.40	4.43	0.8%
	Equipment Management	4.25	4.43	4.3%
	Risk management	3.97	4.00	0.8%
	Preassembly and prefabrication of construction elements	4.10	4.27	4.1%
	Sustainable material substitutions	2.90	3.05	5.2%
	Construction noise/vibration abatement and mitigation	2.80	2.85	1.8%
	Reusable shoring, formwork, and scaffolding	2.90	3.00	3.4%
	Analysis of local materials/services versus nonlocal/global alliance	3.00	3.00	0.0%
	Selection and replacement of construction equipment	2.90	2.95	1.7%
	Inspection and maintenance of construction equipment	2.80	2.97	6.1%
	Quality management and facility start-up planning	2.90	3.00	3.4%
	Sustainability lessons learned	3.20	3.27	2.1%

For identified the relationship between indicators have utilized the ISM method and MICMAC analysis that the results shown in Figure 4. Matrice d'Impacts croises-multiplication applique and classment (cross-impact matrix multiplication applied to classification) is abbreviated as MICMAC. The purpose of the MICMAC analysis is to assess the driving power and the dependence of the variables. For instance, in economical aspects, the factors 4, 11, 13 and 15 have weak driving as well as dependence power and are relatively disconnected from other factors in the organization. Factors 3,5,6,9 and 12 have weak derive power and strong dependence power. The factors 1 and 2, these factors have strong drive power that is likely to be strong dependence power. These variables are unstable within the indisputable fact that any impact on these variables can have an impact on others as well as are sponsor result on their own. Factors 7,8,10 and 14 have compelling drive power but weaker dependence power. A factor by using a very strong drive power, referred to as 'key factor' is categorized as a class of independent or linkage factors.

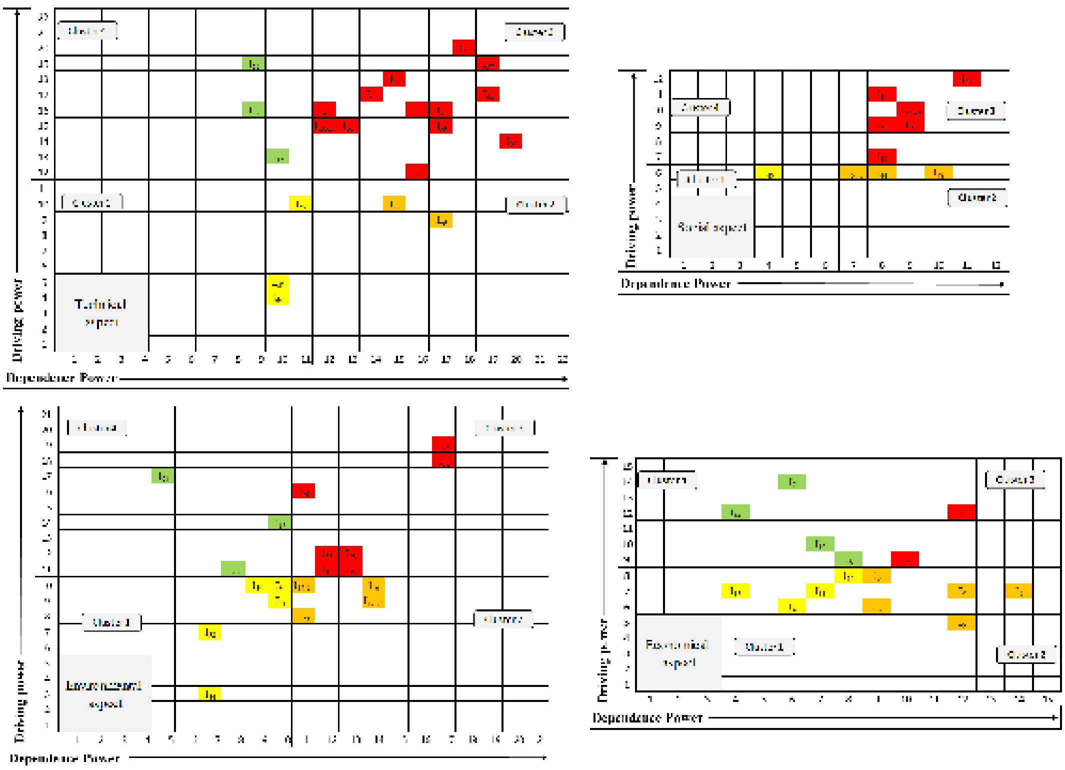

Figure 4. MICMAC analysis

6- Reliability Analysis

As mentioned above, the Cronbach's alpha coefficient method has used in this study to evaluate the data reliability. Calculations for Cronbach's alpha coefficients have derived for four-factor groups; economical, social, environmental and technical, from the information provided by the 15 valid respondents. The calculation results are shown in Table 4. The Cronbach's alpha coefficients for all indicators across the four groups are more than 0.7. Thus, the information from the questionnaires survey is considered reliable.

Table 4. Reliability Statistics

Cronbach's alpha coefficient	Cronbach's alpha based on Standardized Items	No. of Items
0.763	0.731	70

7- Result and Discussion

To identify the SAIs for airport construction projects sustainability from Table 3, it is reasonable to consider that if the mean of an indicator score is less than 3, the possibility for the indicator to be one of the SAI set is less than 50%. Thus, the indicator was in the first cluster and with a mean score less than 3 eliminated from SAIs list for instance, "sustainable temporary facilities" with average score 2.9 eliminated from list. Then indicators with same concept or context summarized such as "sustainable material substitutions" and "analysis of local materials/ services versus nonlocal/global alliance" summarized with "material management" or "selection and replacement of construction equipment" and "inspection and maintenance of construction equipment" summarized with "equipment Management". For better concept, a catalog page has prepared for each indicator that explained indicator description, sustainability impacts, effects on project management area, performance outputs and constraints of implementation shown in Table 5. Finally, table 6 provides the entire list of significant indicator that identified for Iran airport construction projects.

According to the identification of the SAIs shown in Table 6, eleven economic-dimension of indicators exist. The indicator "analysis of market supply and demand" is ranked as the most imperative indicator in this group because the implementation of airport projects should account for the demand by the market. Without considering the market, the consequence of the project implementation might be failure. Fifteen indicators have been identified in the environmental dimension. The indicator "energy management" is ranked the most essential. Energy management includes planning and operation of energy production, transportation, and energy consumption units. Energy management can be broadly defined as the proactive, organized and systematic management of energy used in a building, project or organization to satisfy both environmental and economic requirements. Eleven indicators make up the social dimension. The indicator "analysis of project stakeholders" is ranked the most important in this group. Stakeholder analysis is a prominent technique for stakeholder identification and analyzing their needs that would identify all key (primary and secondary) stakeholders who have a vested interest in the issues with which the project is concerned. Fifteen indicators have been identified in the technical dimension. The indicator "Material Management" is ranked the most influential. Material management is an approach for planning, organizing, and controlling all those activities principally concerned with the flow of materials into an organization or project that it is responsible for the coordination of planning, sourcing, purchasing, moving, storing and controlling materials in an optimum manner so as to provide service to the customer, at a pre-decided level at a minimum cost.

Table 5. Indicator catalog page

<table>
<tr><td colspan="6">Indicator No.:47</td></tr>
<tr><td>Indicator Title:</td><td colspan="5">Material Management</td></tr>
<tr><td>Group</td><td colspan="5">Technical aspect</td></tr>
<tr><td colspan="6">Indicator Description</td></tr>
<tr><td colspan="6">Analyze of materials, Minimizing surplus materials, Sustainable material substitutions, Analysis of local materials/services versus nonlocal/global alliance, Sustainable consumable materials, Minimization of material surplus , Reusable shoring, formwork, and scaffolding, Material- and equipment-handling strategy</td></tr>
<tr><td colspan="6">Sustainability Impacts Characterization</td></tr>
<tr><td>primary Impact</td><td colspan="5">Technical aspect</td></tr>
<tr><td>Secondary Impact</td><td colspan="5">Economical, Environmental aspect</td></tr>
<tr><td colspan="6"></td></tr>
<tr><td colspan="6">The Indicator has a Significant Positive influence on the following project management area</td></tr>
<tr><td>Project Cost</td><td colspan="2">■</td><td>Project Quality</td><td colspan="2">■</td></tr>
<tr><td>Project Schedule</td><td colspan="2">■</td><td>Scope of Project</td><td colspan="2">□</td></tr>
<tr><td colspan="6">Ease of Accomplishment/Implementation</td></tr>
<tr><td>Easy</td><td>■</td><td>Moderate</td><td>■</td><td>Challenging</td><td>□</td></tr>
<tr><td colspan="6"></td></tr>
<tr><td colspan="6">Performance Outputs of Indicator</td></tr>
<tr><td colspan="6">Analyze of Local materials, Sustainability of Materials, Minimizing Waste and surplus materials, Recycling, Reusable of Materials, Material Database</td></tr>
<tr><td colspan="6">Constraints of Implementation</td></tr>
<tr><td colspan="6">Technology of analyze and Use of Sustainable Materials
Equipment for Recycling
Existence of Mine and Local quality Material</td></tr>
</table>

Table 6. List of significant indicator for Iran Airport Construction Projects

Group	No.	Indicator
Economical aspect	1	Analysis of market supply and demand
	2	Investment methods in the project
	3	Project budget &financial analysis
	4	Project investment planning
	5	Life-cycle Analysis
	6	Financial risk
	7	Payback period
	8	Internal return ratio (IRR)
	9	Work schedule to reduce electricity impacts
	10	work efficiency
	11	Identify potential directing expertise
Environmental aspect	12	Ecological effect
	13	Effect on land pollution
	14	Effect on air quality
	15	Effect on water quality
	16	Water consumption
	17	Noise effect
	18	Waste management
	19	Influence on public health
	20	Environment protection measures in project design
	21	Use of natural resources
	22	Reduce greenhouse gas emissions
	23	Protection to landscape and historical sites
	24	Protection of cultural artifacts and endangered species
	25	energy management
	26	Environmentally friendly dust and erosion control
Social aspect	27	Effects on local development
	28	Providing Ability Advice for Indigenous Peoples
	29	Scale of serviceability
	30	Analysis of project Stakeholders
	31	Social communication
	32	Public safety
	33	Public sanitation
	34	Land use and its influence on the public
	35	Protection to culture heritage
	36	Site work hour schedule to reduce traffic impacts
	37	Provision of employment opportunities

Technical aspect	38	Development of skill and career
	39	Adaptation between Employer's View and Designer
	40	Analyze Multiple Approaches
	41	Working experience of similar consultant projects
	42	Working experience of similar Contractor projects
	43	Design and analysis of project specifications
	44	Analysis and evaluation of participating contractors
	45	Analyze and review project changes
	46	Project execution methods
	47	Material Management
	48	Project Planning
	49	Equipment Management
	50	Risk management
	51	Preassembly and prefabrication of construction elements
	52	Sustainability lessons learned

8- Conclusion

Paucity of effective assessment indicators in practice, the sustainability of airport projects would not assessed effectively. This paper, therefore, introduced a set of significant assessment indicators for evaluating the sustainability of airport construction projects. The detailed list of SAIs is provided in Table 6 that the sustainability performance of an airport construction project can be assessed by calculating a weighted sustainability score. To analyze the sustainability of an airport project, first, significant assessment indicators should be scored by experts, and then the average of each section is calculated and considered as the sustainability score of the project. Thus, the more average score of indicators leads to, the more sustainability of the project. The major contribution of this paper is the identification of construction-related decisions and actions to advance sustainability implementation with considering the indicators of sustainability assessment that Table 6 provides the entire list of significant indicator that identified for Iran Airport Construction Projects.

9- Recommendations for Future Research

The authors recommend that the following research questions be addressed for better implementation of SAIs:

1. How can evaluated and rating SAIs based on project objectives or characteristics?
2. After SAIs implementation, how can practitioners measure the magnitude of sustainability between scenarios?

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Please cite this article using:

A. Sharifi Orkomy, M. K. Sharbatdar, Proposed List of significant indicators for Iran Airport Construction Projects, *AUT J. Civil Eng.*, 3(2) (2019) 201-212.

DOI: 10.22060/ajce.2019.15185.5524