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Green Schools based on Environmental, Health, Safety and Energy Strategy

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Abstract
Schools play a vital role in creating a greener future. They will likely be the first place most students encounter determined efforts to conserve energy and water or to reduce waste. The method used in this article is comparative and matching method, by using ISO 14001, OHSAS 18001 and ISO 50001 standards. Implementing energy management along with other standards is the main objective of present research for improvement of energy performance, energy efficiency, and energy conservation into HSE-MS to access sustainable development. According to the questionnaires form filled in over 100 schools in Tehran, about 56% of schools are in EMS/OHS status; in addition 48% of EMS/OHS legal support in schools is not satisfactory. This case study has attempted the Implementation of EHSE Strategy for Green schools. EHSE modeling will overarch strategic document and central to the future of the green schools. Matching requirements of the environment with energy, safety and health is the ultimate goal of this research.

Keywords: Sustainable Development Goals (SDG)–Environmental, Health, Safety and Energy Management System (EHSEMS) – Tehran- Green Schools

Introduction

Schools play an important role in creating a brighter future. They are the first place where most students encounter disciplined efforts to conserve energy and water or to reduce waste. They can help students understand the relationship~~s~~ between human needs and activities and the ecosystems on which all life forms depend on. If children are supposed to grow with environmental mind-set, capable of saving fragile ecosystems, they need to accept the environment as an integral part of their lives in their very initial stages of their studies (Freeman, 1995). A sustainable school is a place that is designed with consideration of environmental issues. This is normally established by the team of school dedicated to minimization of required inputs of energy, water and paper. Also sustainable school should minimize heat loss, air pollution and water pollution in order to maximize the health and safety in the school. Green schools are coordinated by the Foundation for Environmental Education (FEE). Ideally, a green school brings out four domains of ecology, economics, politics and culture (Roseland, 2000). Sustainable development is a pattern of resource use

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that aims to meet present human needs and also those of future generations (Behrens et al., 2007). In other words, sustainable development should meet the needs of the present without compromising the ability of future generations to meet their own needs (Padash et al., 2011).
The idea of the SDGs has quickly gained ground because of the growing urgency of sustainable development for the entire world (Sachs, 2012). Still, a shared focus on economic, environmental, and social goals is a hallmark of sustainable development and represents a broad consensus on which the world can build (Sachs, 2012). The field of sustainable development can conceptually be broken into three constituent parts: environmental sustainability, economic sustainability and sociopolitical sustainability (Kates et al., 2005). Figure 1 shows confluence of the three constituent parts of sustainable development.

Figure 1. Confluence of three constituent parts of sustainable development (Munasinghe, 2009)

The necessity of the triple bottom line arises from a new realization brought to global awareness by earth science and the yearly changes around us. Sustainable development is eluding the entire planet. The SDGs should therefore pose goals and challenges for all countries—not what the rich should do for the poor, but what all countries together should do for the global wellbeing of this generation and those to come (Sachs, 2012).
The final wording of the targets, which will be formally adopted by world leaders at a special summit in New York in September 2015, are (Assembly, 2015):
Goal 3: Ensure healthy lives and promote well-being for all at all ages (Barredo et al., 2015):
- 3.8 Achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all.
Goal 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all (Tang, 2015):
- 4. a: Build and upgrade education facilities that are child, disability and gender sensitive and provide safe, non-violent, inclusive and effective learning environments for all.
Goal 11: Make cities and human settlements inclusive, safe, resilient and sustainable (Rifkin, 2014) .

Location (Tehran)

Tehran is one of the largest cities in west Asia and 27th in the world. Tehran city is located in north of Iran and south of the Alborz mountain range (Figure 2).

Figure 2. Map of the study area, Tehran, Iran (Tehrani et al., 2010)

Method and Materials

Green schools can be achieved through low cost to high costs measures. The implementation of green schools needs motivations of higher authorities than money. For an easy transition to ISO 14001 or OHSAS 18001 or ISO 50001; the road to an effective HSE-MS can be achieved by trial and error. There are many reasons why organizations implement Environmental Health and Safety Management Systems that conform to ISO 50001, ISO 14001 and OHSAS 18001 standards. Identifying occupational health and safety hazards and risks and the environmental impacts and also the procedure of usage the energy and also the energy efficiency of school is a given. The method used in this article is comparative and matching method, by using ISO 50001, ISO 14001, OHSAS 18001 and OGP for HSE-MS. All of these models are international models, but the main goal is to match the requirement of energy management in Health, Safety and Environmental Management. In the present investigation 4 components of sustainable development goals is taken into consideration.

ISO 14001: ISO 14000 is a series of environmental management standards developed and published by the International Organization for Standardization (ISO) for organizations.

The ISO 14001 standard is the most important standard within the ISO 14000 series. ISO 14001 specifies the requirements of an environmental management system (EMS) for small to large organizations. An EMS is a systemic approach to handling environmental issues within an organization (Heras-Saizarbitoria and Boiral, 2013). The ISO 14001 standard is based on the Plan-Check-Do-Review-Improve cycle (Figure 3).

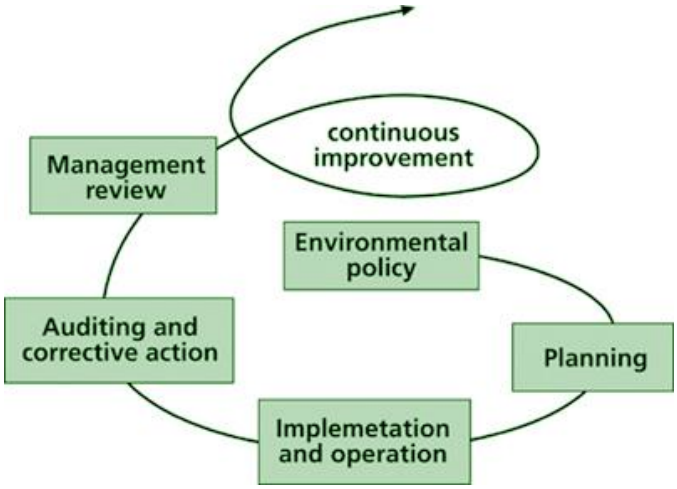

Figure 3. ISO 14001 Standards

OHSAS 18001:
The Occupational Health and Safety (OHS) management aims to create and maintain a safe working environment, while protecting and maintaining good health of the workers (Zeng et al., 2007). OHSAS 18001 was first published in 1999 as compatible with ISO 9001 and ISO 14001 management system standards in order to facilitate an integration of the three systems (Zeng et al., 2008), (Figure 4).

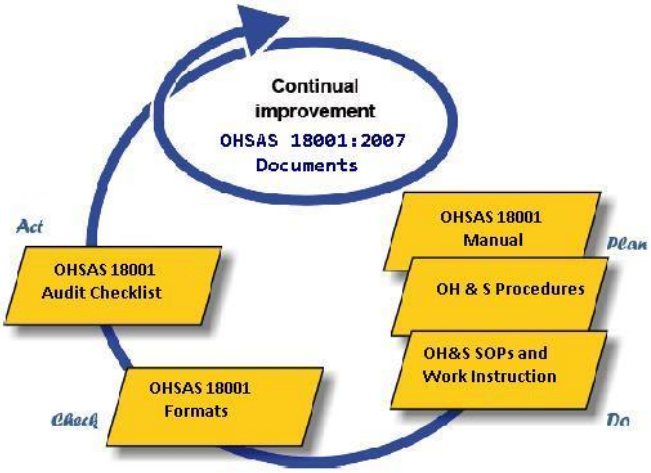

Figure 4. OHSAS 18001 diagram

ISO 50001– Energy Management System:
ISO 50001 is based on the management system model of continual improvement also used for other well-known standards such as ISO 9001 or ISO 14001. This makes it easier for organizations to integrate energy management into their overall efforts to improve quality and environmental management (McKane, 2010), (Figure 5).

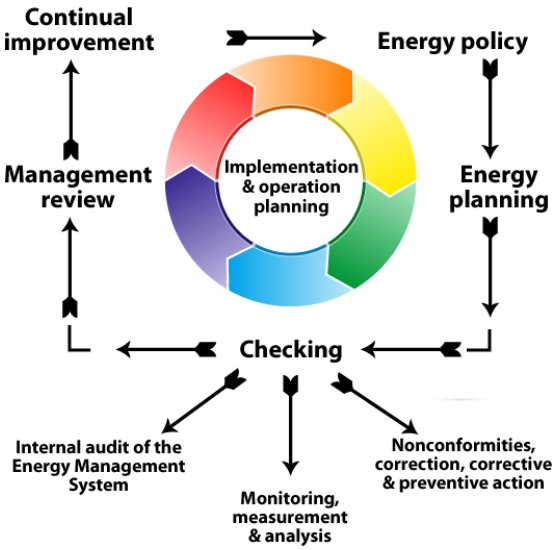

Figure 5. ISO 50001-Energy Management System

To investigate the existing status in implementing the OHSAS 18001 and ISO 14001 in the 5 regions of Tehran schools, a questionnaire survey is conducted. The content of the questionnaire focuses on:

- Evaluation of the EMS/OHS status in the schools;
- Evaluation of EMS/OHS legal support in schools;
- Measure for OHSAS 18001 and ISO 140001 management systems.

Before designing the questionnaire, 20 senior managers in charge of environment and safety management responsibility were interviewed. Then the structured questionnaires were sent to senior management representatives of about 100 schools in Tehran.

Therefore, in order to implement the right and fundamental components relying on international standards on the one hand and the principles of sustainable development on the other, this model has been proposed.

Results and Discussion

Table 1 summarizes the survey results of the existing EMS/OHS status in the schools and Table 2 summarizes the survey results of the existing EMS/OHS legal support in schools.

Table 1. EMS/OHS status in the schools

Item	Response	Percentage
Evaluation of the EMS/OHS status in the schools	Satisfactory	13%
	Average	56%
	Not satisfactory	31%

Table 2. EMS/OHS legal support in schools

Item	Response	Percentage
Evaluation of EMS/OHS legal support in schools	Satisfactory	7%
	Average	45%
	Not satisfactory	48%

Table 3 summarizes the survey results of the existing Measure for OHSAS 18001 and ISO 140001 management systems.

Table 3. Measure for OHSAS 18001 and ISO 140001 management systems

Item	Response	Percentage
Measure for OHSAS 18001 and ISO 140001 management systems	Systematic	5%
	Not systematic	32%
	No	62%

Since implementation of energy management system would impose extra costs on the expenditure of ongoing activities; many schools don't have enough incentive for such measures. Thus, in the present investigation the energy management is totally ignored. The results show that it is necessary to provide an integrated model for managing environment, health and safety in schools(Kwan et al., 2005). Integration is defined differently by researchers (Teddlie and Tashakkori, 2009). Garvin advert to integration as the degree of adjustment or harmony in an organization (Macharia, 2014). Mac Gregor colleague see integration as a single top level management ''core'' standard with optional modular supporting standards covering specific requirements (Kelly, 2011). In this procedure paying attention to the HSE culture ladder is so critical (Figure 6).

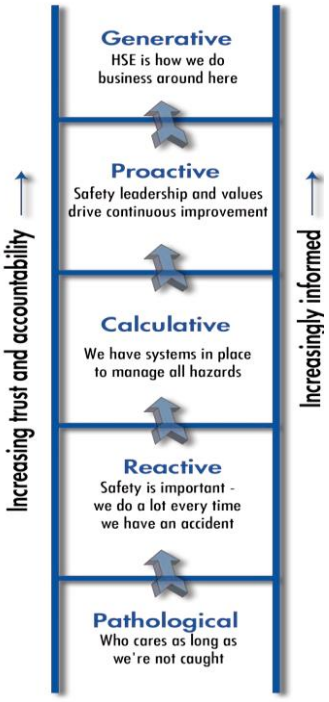

Figure 6. HSE culture ladder

In addition to the points mentioned above, it is vital to consider the future needs of schools. According to the surveys and analyzing the requirements of ISO 50001, ISO 14001, OHSAS 18001 (Rößler and Schlieter, 2015) and matching to the main HSE Standards (Kerr et al., 2009), this result has been proposed.

Following reviews carried out and matching of four main environmental components, health, safety and energy, the proposed resulting model includes the following main axes (Figure 7):

1. Leadership and commitment
2. EHSE Policy and strategic objectives
3. Organization, resources and documentation
4. EHSE Risk Evaluation and management
5. Planning
6. Implementation and monitoring
7. EHSE Auditing and reviewing

Figure 7. A proposed Model contains Environmental, Health, Safety and Energy part for schools

Conclusion

By definition EHSE, sustainable development will run by Health, and Safety (social), Energy (economic) and environmental needs. Green schools purposes and duty must be met in sustainable ways. However, schools have a good track record of finding sustainable solutions whilst balancing these purposes and duty in EHSE ways.
To provide and describe the characterization of EHSE Strategy, the full description of every stage has been provided step by step:

Leadership and commitment

It addresses Top-down commitment and company culture, essential to the success of the system: The Green schools Management should create and sustain an organization culture that supports the EHSMS, based on:

- Belief in the Green schools' desire to improve EHSE performance;
- Motivation to improve personal EHSE performance;
- Acceptance of individual responsibility and accountability for EHSE performance;
- Participation and involvement at all levels in EHSEMS development;
- Commitment to an effective EHSEMS

EHSE Policy and strategic objectives

It addresses corporate intentions, principles of action and aspirations with respect to environment, health & safety. The Green schools' management should define and document its EHSE policies and strategic objectives and ensure that they:

- are consistent with those of any parent company;
- are relevant to its activities, products and services, and their effects on EHS;
- are consistent with the Green schools' other policies;
- have equal importance with the Green schools' other policies and objectives;
- are implemented and maintained at all organizational levels; are publicly available;
- commit the company to meet or exceed all relevant regulatory and legislative requirements;

- apply responsible standards of its own where laws and regulations do not exist; commit the Green schools to reduce the impacts, risks and hazards to health, safety and the environment of its activities, products and services to levels which are as low as reasonably practicable;
- Provide for the setting of EHSE objectives that commit the Green schools to continuous efforts to improve EHSE performance.

Organization, resources and documentation

It addresses Organization of people, resources and documentation for sound EHSE performance.
The Green schools should define, document and communicate -with the aid of organizational diagrams where appropriate- the roles, responsibilities, authorities, accountabilities and interrelations necessary to implement the EHSE MS, including but not limited to:

- provision of resources and personnel for EHSE MS development and implementation;
- initiation of action to ensure compliance with EHSE policy;
- acquisition, interpretation and provision of information on EHSE matters;
- recording of corrective actions and opportunities to improve EHSE performance;
- recommendation, initiation or provision of mechanisms for improvement, and verification of their implementation;
- control of activities whilst corrective actions are being implemented;
- Control of emergency situations.

EHSE Risk Evaluation and management

Risk is present in all human endeavors. This section addresses the identification of EHSE hazards and evaluation of EHSE risks, for all activities, products and services, and development of measures to reduce these risks. The essential steps of hazard management:

1. Identify hazards and effects
2. Establish screening criteria
3. Document significant hazards and effects and applicable statutory requirements
4. Evaluate hazards and effects
5. Implement selected risk reduction measures
6. Set detailed objectives and performances criteria
7. Identify and evaluate risk reduction measures

Planning

This section addresses the firm planning of work activities, including the risk reduction measures (selected through the evaluation and risk management process).
This includes planning for existing operations, managing changes and developing emergency response measures.
The Green schools should maintain, within its overall work programmer, plans for achieving EHSE objectives and performance criteria. These plans should include:

- a clear ` requirements;
- time scales for implementation;
- motivating and encouraging personnel toward a suitable EHSE culture;
- mechanisms to provide feedback to personnel on EHSE performance;
- processes to recognize good personal and team EHSE performance
- Mechanism for evaluation and follow-up.

Implementation and monitoring

This section addresses how activities are to be performed and monitored, and how corrective action is to be taken when necessary.
Activities and tasks should be conducted according to procedures and work instructions developed at the planning stage—or earlier, in accordance with EHSE policy:

- At senior management level, the development of strategic objectives
- And high-level planning activities should be conducted with due regard for the EHSE policy.
- At supervisory and management level, written directions regarding activities (which typically involve many tasks) will normally take the form of plans and procedures.
- At the work-site level, written directions regarding tasks will normally be
- in the form of work instructions, issued in accordance with defined safe systems of work (e.g. permits to work, simultaneous operations procedures, lock-off procedures, manuals of permitted operations)

Management should ensure, and be responsible for, the conduct and verification of activities and tasks according to relevant procedures. This responsibility and commitment of management to the implementation of policies and plans includes, amongst other duties, ensuring that EHSE objectives are met and that performance criteria and control limits are not breached. Management should ensure the continuing adequacy of the EHSE performance of the Green schools through monitoring activities

EHSE Auditing and reviewing

This section addresses the periodic assessment of system performance effectiveness and inherent suitability
The Green schools should maintain procedures for audits to be carried out, as a normal part of business control, in order to determine:

- Whether or not EHSE management system elements and activities conform to planned arrangements, and are implemented effectively.
- The effective functioning of the EHSEMS in fulfilling the schools' EHSE policy, objectives and performance criteria.
- Compliance with relevant legislative requirements.
- Identification of areas for improvement, leading to progressively better EHSE management

And at the end, as the final conclusion, according to the proposed EHSE-MS model, it can improve environment, health, safety and energy performance resulting in pollution prevention, safer workplaces and fewer injuries in the schools. But even more than that, these systems are being used by organizations to gain a competitive edge. And as corporate social responsibility initiatives gain momentum, EHSE-MS takes on an even more critical role within the organization.
The main purpose of this model is to plan the EHSE model for other schools such as green schools, to show the established overarching strategic document and central to the future of the schools. It shows co-ordination and integration with other plans, strategies and actions in the schools where they affect the schools purposes and duty. It indicates how the schools purposes and associated duty will be delivered through sustainable development by improve EHSE performance resulting. In addition to, this is the first research that shows the intergradations of this for main subject in one model in the world.

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