

ORIGINAL RESEARCH PAPER

Development of new citizenship HSE model for schools and kindergartens of Tehran Metropolitan City

A.R. Karbassi^{1*}, M. Shahpasand², A.A. Rajabi³, H. Ghafari⁴

¹Graduate Faculty of Environment, University of Tehran, P.O.Box 14155-6135, Tehran, Iran

²Petro Imen Sharif Co., No.15, Fatemi Street, Tehran, Iran

³Department of the Environment, Center for Air and Climate Change, Hakim Highway, Tehran, Iran

⁴Municipality of Tehran, Shahr-e-Salem Company, Resalat Highway, Tehran, Iran

Received 20 October 2015; revised 11 November 2015; accepted 7 December 2015; available online 1 January 2016

ABSTRACT: Today many of wide scope and famous organizations design and develop HSE models to achieve a more suitable HSE management system for their own purposes. To implement such models some requirements should be considered in line with defined goals and missions. The present study was carried out in order to achieve the HSE management system for children and adolescents in education and training centers. This study was conducted in two phases, namely identification and assessment/ documentation. The study was carried out in districts one, four, six, seven and eight of Tehran municipality during eighteen months. The employer was Tehran Shahr-e-salem Company (Healthy City) and the contractor was the faculty of environment, University of Tehran. As the final result of study, based on initial data and by holding brainstorming meetings, the final citizenship HSE model was constructed in five panels: Management responsibility and commitment, Infrastructures and resources management and documentation, Planning, HSE operations management and Monitoring, analysis and improvement. This model was designed by consideration of existing capacities and with the goal of being responsive to all stakeholders (service provider, recipients of services and others).

KEYWORDS: *Adolescents, Children, Citizenship, Health, Safety and Environmental (HSE), Model, Schools*

INTRODUCTION

In the recent years, some researchers have paid some attention to various environmental aspects of urban areas in Iran (Karbassi *et al.*, 2007a; Karbassi *et al.*, 2007b; Abbaspour *et al.*, 2013; Alipour *et al.*, 2011). However such studies are mainly focused on pollution aspects of energy sector and therefore the other issues such as health and safety are ignored. For instance, energy sector in urban areas has received ample attention within the metropolitan of Tehran (Rashidi *et al.*, 2012; Tehrani *et al.*, 2010; Tehrani *et al.*, 2009;

Abbaspour *et al.*, 2006) Even agricultural sectors in the vicinity of large cities is well analyzed (Mohammadpour Roudposhti *et al.*, 2016; Ghaemi *et al.*, 2015). Though some studies such as Post-earthquake in Tehran under various earthquake scenarios (Askarizadeh *et al.*, 2016; Rafee *et al.*, 2008) may inherently contain Health, Safety and Environmental (HSE) aspects but they are not directly targeting human life. Safety culture has been used from the 1980s (Hoivik *et al.*, 2009), since then deployment of HSE systems has been considered in various organizations (Abbaspour *et al.*, 2010) and recently in

✉ *Corresponding Author Email: akarbasi@ut.ac.ir
Tel.: +9821 6111 3199; Fax: +9821 6111 3156

educational systems (Nouri *et al.*, 2011). Given that children are vulnerable members of society and also they will make the future of the countries, so paying attention to their health, safety and environment would be the priority of educational systems. School is deemed to be a reliable place for human training and plays a very constructive role in providing a healthy and bracing life for children (Amirzadeh and Tabatabaei, 2006). Students and children spend many hours of their day in schools and kindergartens. Despite greater formal supervisions, school hours have been estimated to be no safer than non-school hours (Sosnowska and Kostka, 2003). Health and safety in a school is about taking a sensible and proportionate approach to ensure the premises provide a healthy and safe place for all who use them, including the school workforce, visitors and students. Different studies have indicated that about 30 percent of what is happening to children in school age occurs at school (Sheps and Evans, 1987; Langley *et al.*, 1981; Soghrati Ghasbeh, 1996). Damages caused by the lack of safety not only in developing countries but also in developed countries occur frequently (Farsi *et al.*, 2006).

The events and the hazards which threaten children in schools and kindergartens can be divided in two categories: the individual events are the events that lead to personal injury and the collective events which may lead to irreversible consequences and damages. The most common individual hazards and events happening in schools and kindergartens can be cited as follows: Falling down, Clashes, slipping on slippery surfaces, falling from staircase and heights (Amirzadeh and Tabatabaei, 2006; Mani Kashani *et al.*, 2001). According to different studies, sport in schools is a major cause of injury among students (Lenaway *et al.*, 1992; Ghadimi Ilkhani *et al.*, 2010; Roderick, 2004). In this context, unsafe playing fields and non-standard and worn out sport equipment are the most important causes of damages. Some risks can have individual and also public aspects in schools such as poisoning, diseases caused by consumption of contaminated food or water and unsafe waste disposal, contagious and epidemic disease.

It is worth noting that natural disasters such as earthquakes, floods and storms are the important hazards which have group impacts. In order to develop prevention strategies it is important to analyze country-specific incidences and circumstances of such accidents (Wong *et al.*, 1999). Iran is a country prone

to earthquakes. Furthermore, because of the climatological status, many cities have the potential of occurring flood and storm, therefore equipping schools and kindergartens in order to minimize the damage caused by natural disasters is necessary in Iran.

One of the most reported serious incidents in schools is fire which lead to inflict irreversible damages on students and children. The events which happen in the schools and kindergartens, in addition to health threats, also impose financial losses, for example, in a study that was conducted in 2001, the financial costs of accidents in the schools of the United States was estimated about one billion two hundred million dollars (Phelan *et al.*, 2001).

An efficient HSE model should be designed and implemented in such a way to enable minimizing the risk of safety, health and environmental hazards and also to reduce the financial losses. Some effective measures are pointed as follows:

- Making the buildings and equipment safe: Paying attention to engineering principles in construction of schools and kindergarten buildings, continual control and timely repair of the equipment including power transmission lines, heating and cooling equipment, also equipping the sport yards, step ways and corridors.

- Being prepared for serious events (earthquake, fire and...): In order to reduce the damage caused by serious disasters in educational spaces and have safe schools, four interconnected phases of emergency management (Prevention and Mitigation, Preparedness, Response, and Recovery) should be considered.

- Risk assessment: assessing the risk of some disasters like fire should be a priority preventing acts in educational systems. The main aims of the fire risk assessment are; identifying the fire hazards, reducing the risk of those hazards causing harm to as low as reasonably practicable and Deciding what physical fire precautions and management arrangements are necessary to ensure the safety of people in the premises if a fire does start.

- Equipping the schools with safe water and standard toilets, collecting and disposing the wastes and sewage based on a sanitary system especially in rural schools. In this regard; over the past decade, the child-friendly schools (CFS) model has emerged as UNICEF's signature means to advocate for and promote quality education for every girl and boy. The CFS approach to education guarantees all children the right to have access to schools that are safe and protective, that

offer potable drinking water, hand-washing facilities and clean, safe toilets. In child-friendly schools, children learn about hygiene and how to protect themselves and their families from infectious diseases (UNICEF, 2012).

- Training the first aid techniques, the safe ways of playing, the hygiene practices to the students and staffs and also preparing acts against natural disasters. In this regard American academy of pediatrics had provided a guideline which focuses on: health/safety education as a core academic subject in schools and kindergartens.

According to the cases referred and the importance of establishing the HSE model in schools and kindergartens, present research was carried out in districts 1, 4, 6, 7 and 8 of Tehran municipality, Iran. The aim of this project was the implementation of research programs about health, safety and environment (HSE-MS¹) for children and adolescents.

MATERIALS AND METHODS

The present study about health, safety and environment of children and Adolescents was carried out in districts 1, 4, 6, 7 and 8 of Tehran municipality (Fig. 1) during 18 months (under 18 years old).

The district 1 of Tehran municipality is located in Tehran's highlands with an area about 210 Km² and includes 10 regions and 26 urban neighborhoods. In this district there are: 21 kindergartens, 86 primary schools (morning and noon shifts), 69 high schools (morning shift), 49 high schools (noon shift) and 6 Technical schools. The district 4 of Tehran municipality has an area about 950 Km² and includes 9 regions and 20 urban neighborhoods. In this district there are: 20 kindergartens, 143 primary schools (morning and noon shifts), 101 morning shift high schools, 96 noon shift high schools and 22 Technical schools. The district 6 of Tehran municipality has an area about 2144 Hectare and includes 6 regions and 18 urban neighborhoods.

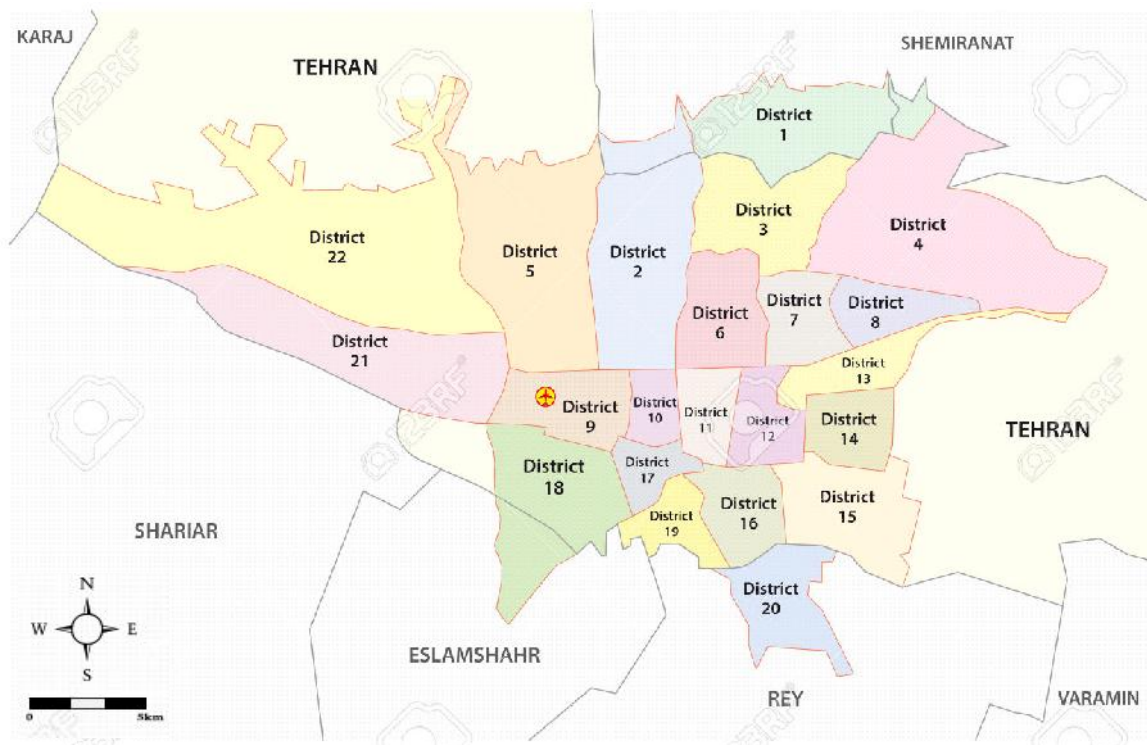


Fig. 1: Map showing study area within Tehran metropolitan city

In this district there are: 9 kindergartens, 58 primary schools (morning and noon shifts), 60 morning shift high schools, 64 noon shift high schools and 23 Technical schools. The district 7 of Tehran municipality has an area about 1540 Hectare and includes 5 regions and 17 urban neighborhoods. In this district there are: 13 kindergartens, 74 primary schools (morning and noon shifts), 42 morning shift high schools, 37 noon shift high schools and 18 Technical schools.

The district 8 of Tehran municipality is located in the east of Tehran with an area about 1322 Hectare and includes 3 regions and 20 urban neighborhoods. In this district there are: 13 kindergartens, 74 primary schools (morning and noon shifts), 42 morning shift high schools, 37 noon shift high schools and 18 Technical schools. Due to many limitations such as lack of cooperation by school officials, among all identified schools and kindergartens, 75 schools and 24 kindergartens were studied. This study was conducted in two phases. In the first phase, the Status quo of schools and kindergartens was identified, assessed and documented in districts 1, 4, 6, 7, 8 of Tehran municipality (Target point). In the second phase, the citizenship HSE management model for children and adolescents was designed. The first phase of study was performed in 7 steps as follow:

- In the first step by cooperation of intended administrative units, all existing schools and kindergartens in target districts were identified accurately (with consideration to name, the related neighborhood and the address). Then current problems and limitations against the project implementation were identified during desk studies and field investigations. Based on the reviews and studies which were carried out by social science and strategic management experts, it was concluded that the most important external variables (used to identify the challenges and problems) which required to study in children and adolescent issues were: political, economic, socio-cultural and technological issues. The abbreviation of the PEST analysis was created according to the first letters of these factors. To use this analysis for identification of the challenges and problems at a macro level, at first the preliminary studies were conducted.

- After getting acquainted with the method, as the second step brainstorming meetings were held with the presence of breeding assistants of mayors, the municipality's socio-cultural experts and HSE heads of schools. Furthermore, in-person visits of schools and

kindergarten were performed. Through these measures, political, economic, social and technological variables were identified. Afterwards, the challenges of citizenship HSE in the field of children were detected via variables analysis.

- In the third step, 127 rules and documents (with a view to their legislative references) were studied in the field of HSE regarding children and adolescents. After identifying the rules and requirements, it was needed to evaluate the adaptation of the schools and kindergarten status with legal requirements. For this regard, the evaluation form of achieving rates to legal requirements (as a check list) was provided and used. In order to supplement the checklists, a 25-member team (Who were selected by applying the test, interview and their resume) was dispatched for visiting the target districts. Finally, the scorecard (BSC) and 5-quantity Likert scale were used to identify the implementation rate of the rules and requirements.

- As the fourth step, the responsible institutions and organizations which related to the field of study were identified and visited, also their portals were studied. In order to analyze the importance and crisis rates of the selected organs, a series of meetings was held and the importance criteria (criteria for criminal liability, civil liability, social responsibility of the organizations, criteria for allocation of funds and the criteria of relationship between identified points and the related organs and agencies) were determined. Finally, the organizations were compared according to the criteria and based on pairwise comparisons.

- In the next step; mission, tasks, responsibilities, goals, structure, work processes and activities carried out by organizations, institutions, responsible institutions and organizations in the field of HSE (identified in the previous step) were studied and assessed. These data were gathered by using internet searches, searching the portals and websites of such agencies and visiting and communicating with the planning and development offices of the organizations.

- As the sixth step, statistics of health, safety and environmental risks, accidents and injuries related to the field of study were investigated. These statistics and data were obtained from some representative agencies such as: welfare Organization, ministry of Health and Medical Education, NAJA traffic police, organization of firefighting and safety services.

- In the last step of the first phase, the strengths and existing potentials were determined to improve the HSE level in the field of study.

In the second phase of the study, all organizations and institutions in the field of children's education which were detected in the first phase attended various meetings to review and remove barriers for project implementation.

As a result of these meetings, the HSE supreme council was formed in three levels; 1) The main supreme council (with legislative power and high supervision), 2) The middle supreme council (with a role in organizing and executive oversight in the entire metropolitan area), 3) Corresponding committees for the supreme council in the target district (with the executive and also reporting role about the performance quality of HSE supreme council). The purpose of establishing this supreme council was to create and to approve the HSE management system in the field of children and adolescent and also to keep supervision on the implementation, maintenance and continual improvement of it. The members of the council were selected from related organs and different duties were allocated to each one.

Finally, according to the reviewing and benchmarking of progressive internal and international organizations and using continual improvement models, the final HSE model for education centers was proposed.

RESULTS AND DISCUSSION

Nowadays many of wide scope and famous organizations design and develop HSE models to achieve a more suitable HSE management system for

their own purposes. For implementing such models they should use some requirements in line with their goals and missions. In order to achieve the HSE management system (for children and adolescents education and training centers) extensive efforts was made in this project. This model was designed by consideration to existing capacities and with the goal of being responsive to all stakeholders (service provider, recipients of services and others). In order to design the model according to common scientific methods, different samples of patterns and management systems were studied and criteria/sub-criteria of those patterns and systems were analyzed. Finally, the main aspects and components of a HSE management model for children and adolescents were determined. The process is shown in Fig. 2.

Some of remarkable organization's HSE models and patterns which were studied are as follows:

Occupational Health and Safety Assessment Series (OHSAS 18001, 2007), Environment management system (ISO 14001, 2004), Guidelines for the development and application of health safety and environmental management systems, (International Association of Oil & Gas producers: OGP), Guidelines on Managing Safety and Health in Post- Primary Schools, Comprehensive School Site Safety Plan, Ventura Adult & Continuing Education, Comprehensive Safety and Security Plan, Gloucester Country Vocational- Technical School District, G611 Health and Safety Management System Guidance for School Heat Teachers and Line Managers, Norfolk Country Council,

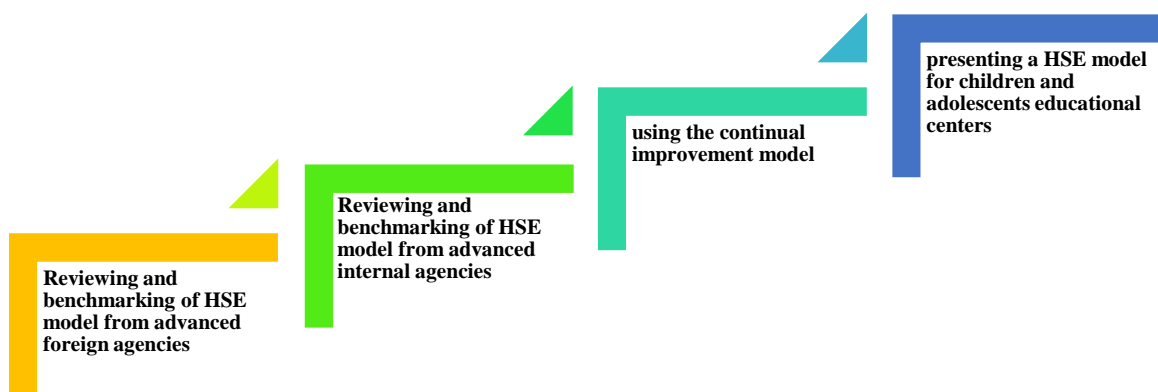


Fig. 2: Process of presenting an HSE model for children and adolescents in educational centers

safety management model of the University of Michigan, safety and health management model of the University of Edinburgh, The university of Saskatchewan : health, safety and environment management system (HSE-MS), The HSE manual of SATI, the Queensland HSE model, School Safety Planning Toolkit, Pennsylvania Safe Schools Advisory Committee, The NCPC (National Crime Prevention Council) pattern and School Safety & Security Plan and checklist of New Jersey.

Some of outstanding Iranian organization's HSE models and patterns which were studied are as follows: HSE management system of Tehran municipality, the HSE-MS guideline of the Ministry of Petroleum, the HSE management model of National Petrochemical Company (HSE-MS NPC) and Aviation Safety Integrated Management System (ISMS).

Reviewing of above mentioned templates was resulted in identifying 27 main topics and headings which presented in a comparative matrix (Table 1). In addition to grouping the related topics, the presented matrix provided the total instructions of the examined patterns. In the other words, it can be claimed that these 27 topics are the most important components of a HSE management system for children and adolescents in educational centers. The summary of studies and obtained results as different aspects of maintained HSE system is shown in Table 1.

It can be concluded that some components and headings are similar in different models, so they can be considered as constant components to design HSE management models. These titles are as follows:

Safety/ HSE policy, safety/ HSE objectives, safety/ HSE programs and strategies, organizational structure and job descriptions, communication, competence and qualification, identify and access to legal requirements and other requirements, documentation and control of documents, records management, training, safety, health and environmental risk assessment and management, Instructions and procedures, operations control, Emergency/ crisis management plan, non-conformance, corrective and preventive actions, Audit, monitoring and measurement and management review.

Also, the general survey of patterns and different models, show that:

- The management patterns and management systems were designed and developed in such a way that, except in certain cases, with some modifications can be used in different organizations, industries and companies.

- Having a systematic approach by grouping components in main headings, was a significant feature of the investigated model.

- In some models the process design and implementation seem more logical and appropriate. In this project, a systematic and logical sequence between the models elements was adhered.

During the models reviewing, two key issues were considered with a special attention:

- Using commonalities of evaluated patterns; means that if some issues were considered in more than half of the models, should be considered as common requirements in presented model of this study.

- Given that some models are specifically related to the field of children and adolescents, their special considerations was used as selected inputs.

In addition to the above-noted topics, obtained information about the target schools and kindergartens in first phase were used for providing the HSE model of this study. Some of the most important features and conditions of target educational spaces are as follows:

- The high density of population (children, Adolescents and staffs) in schools and kindergartens

- The high distribution of children population

- Children's lack of many mental and physical capabilities that adults have

- The presence of children in high-density closed spaces (classrooms and learning or playing spaces)

- Existence of laboratories especially chemistry labs in some schools

- Existence of technical workshops in some educational centers

- Existence of dorms in some educational centers

- There are areas with the potential for large fires in some schools (such as library and amphitheater)

- Health care needs indoor spaces (such as bathrooms, kitchens and restaurants and dorms in some centers)

- A relatively limited presence of students in various educational centers

In complicated systems, the responsibilities of members with a special schedule are defined and also the auditing process is implemented in order to reach continual improvement. In systematic approach of management models, modern management concepts are applied, whose base of concepts is Deming Cycle (PDCA: Plan, Do, Check and Act).

Table1: Checking the extracted headings in each studied model

Investigated models	Extracted headings																											
	Legal requirement and other requirements	Training	Competence and qualification	Communications	The participation of employees and others	Building Culture of HSE	Resources management	Accountability and	HSE strategies and programs	HSE safety goals	HSE safety policy	General guidance for	Reporting, investigation and	Performance assessment and management	Monitoring and measurement	Emergency / Crisis	Operations control	Change management	Integration of capital	Guidelines and procedures	Risk management and	Records, Management	Documentation and control of documents	The HSE of supplier and contractors	Management review	Audit	Detecting non-conformances, corrective and preventive	
OHSAS 18001:2007	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
ISO 14001:2004	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
HSE-MS (OGP)		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
The guidelines for the management of safety, health and welfare in primary schools		✓			✓		✓	✓	✓	✓	✓		✓	✓	✓	✓				✓	✓		✓	✓	✓	✓	✓	✓
Comprehensive school safety plan of Ventura, California	✓			✓			✓	✓	✓	✓	✓			✓	✓	✓							✓	✓				
Master Plan for the safety and security of schools Gloucester	✓	✓	✓				✓	✓	✓	✓	✓				✓	✓												
Norfolk City Council logo				✓	✓		✓	✓			✓				✓		✓	✓				✓		✓				
Ireland's green schools		✓		✓	✓	✓	✓							✓	✓					✓						✓		
Framework of Health and Safety for New Zealand schools	✓				✓		✓				✓																	
University of Michigan	✓		✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓		✓	✓				
University of Edinburgh			✓	✓	✓		✓								✓	✓	✓		✓									
HSE-MS University of Saskatchewan			✓		✓		✓	✓							✓		✓		✓		✓						✓	
Queensland experience	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓
Health and safety management systems manual SATI	✓	✓	✓	✓	✓		✓	✓				✓	✓	✓	✓	✓	✓			✓	✓							
Comprehensive school safety plan, Pennsylvania	✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓			✓	✓		✓		✓	✓	✓
NCPC pattern				✓	✓	✓	✓	✓	✓																			
The pattern of New Jersey (the safety and security of schools)													✓	✓						✓	✓				✓			

Before creation of HSE management systems, the PDCA approach have been used in some management systems (such as ISO 9001, ISO TS 29001, environmental management systems, OHSAS 18001 and ...) and its success and efficiency had been proven. In the proposed HSE model of this study, the PDCA cycle was considered. Also according to the investigations it was concluded that some of the management systems such as ISO 14001, OHSAS 18001, HSE-MS (OGP) and the HSE management system of Tehran municipality are very comprehensive, so the basis of the model in this project based on above mentioned systems.

In the present study, while taking advantage of these systems some limitations were resolved and also the expectations of educational centers were taken into consideration. As a result, the components of children and adolescents HSE model was divided in four groups; Plan, Do, Check and Act (PDCA cycle).

According to the carried out analysis, the requirements of safety, health and environmental management system for children's educational centers (schools and kindergartens) are as follows:

0- Scope

1- HSE Policy and mission of schools, kindergarten and game homes

2- Risk assessment and management

3- Planning: 3-1- Identifying and complying with laws and regulations 3-2- The objectives of occupational health, safety and environment 3-3- Programs of occupational health, safety and environment

4- Establishment and implementation:

4-1- Resources management (4-1-1- The financial resources of HSE 4-1-2- Human resources (4-1-2-1- Responsibilities and authority 4-1-2-2- Employment and utilization of human resources 4-1-2-3- Training and awareness 4-1-2-4- Building Culture) 4-1-3- Infrastructure (4-1-3-1- Spaces 4-1-3-2- Equipment (specially playing equipment)) 4-1-4- Information and Communication Management (4-1-4-1- documentation 4-1-4-2- Control of documents 4-1-4-3- Control of records 4-1-4-4- Participation, consultation 4-1-4-5- Communication with stakeholders)

4-2- The HSE operations management (4-2-1- Control of risks and aspects and consequences of risks 4-2-3- Safety of services 4-2-4- Contractors management 4-2-5- Emergency management 4-2-6- Liability and accident insurance 4-2-7- Energy management 4-2-8- Waste management 4-2-9- Places safety and health management)

5- Check and supervision: 5-1- Monitoring and measurement 5-2- HSE inspection 5-3- Job examination

5-4- Record, analyze and learn from Events 5-5- Internal audit 5-6- Management review

6- Corrective and preventive actions

CONCLUSION

Based on the noted results and by holding brainstorming meetings, the final citizenship HSE model was constructed with 5 panels (Fig. 3). The goal of providing this guidance was; presenting the requirements for creation, establishment, assessment and continual improvement of a citizenship HSE management system for schools and kindergartens. The proposed model was designed in such a way which integrated four issues of safety, health, environment and citizenship in a model.

Fig. 3 shows the schematic form of citizenship HSE system and its sequence of steps. The levels and sub-levels of model are explained as follows:

1- Management responsibility and commitment

1-1- Top management's commitment to create, maintain and continual improve of the HSE system at all levels and issues related to citizenship HSE

1-2- Top management's social responsibility

1-3- Providing the HSE policies and missions by top management of the system

2- Infrastructures and resources management and documentation

2-1- Infrastructure management: means that responsible organization should determine, provide and sustain the needed infrastructure to achieve the goals of safety, health and environment management systems.

2-2- Resource management: in this level the financial and human resources should be provided for establishment, maintenance and continual improvement of HSE systems also to identify and satisfy the requirements and needs of the citizenship HSE system.

2-3- Defining the roles, responsibilities, accountabilities and authorities by forming an office of health, safety and environment

2-3-1- Executive Cabinet

2-3-1-1- Supreme Council of citizenship which can form sub-committee to do specialized reviews and ultimately participating in decision-makings of expert committee. 2-3-1-2- Institution of evaluation and issuing the certificate: This institution have the duty of doing the ISO 19011 standard requirements auditing process after receiving the request of evaluation and

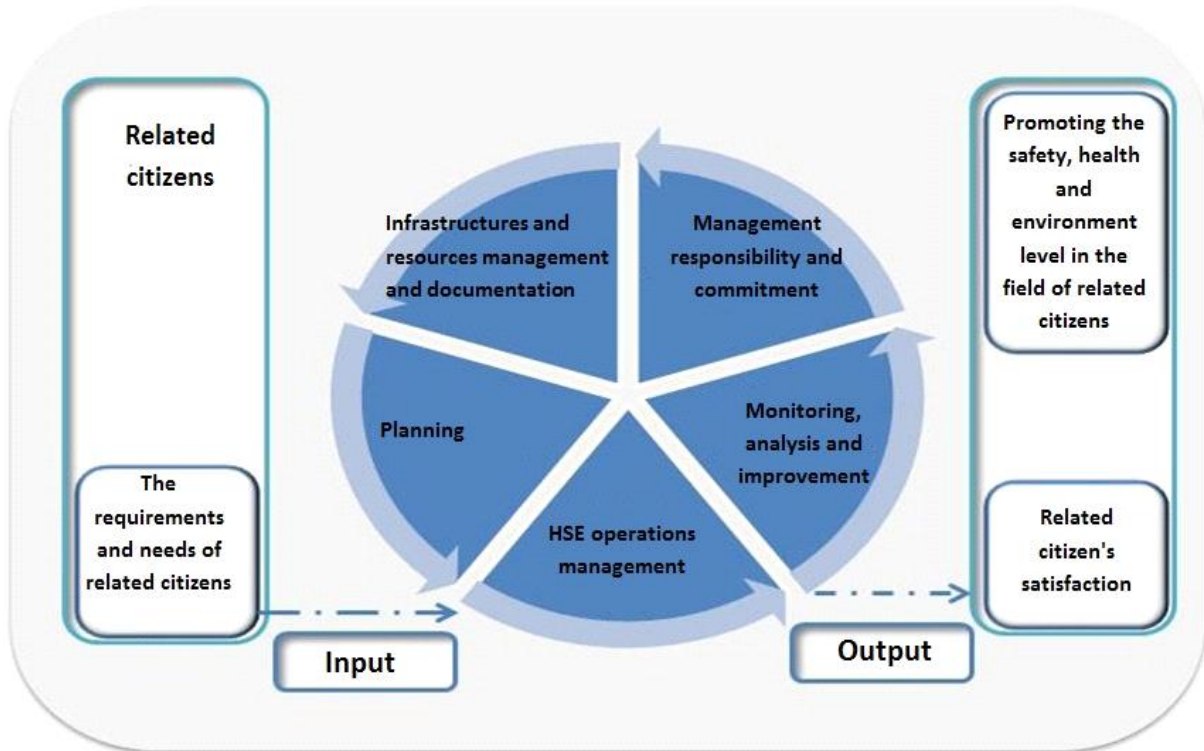


Fig. 3: The model of citizenship HSE system

issuing the certificate from responsible organizations. This institute also should report the results to the citizenship HSE supreme Council. 2-3-1-3- Management representative as the director of HSE office that have some defined responsibilities and authorization such as: receiving the citizenship HSE performance reports from enforcement agencies, reviewing the current processes of responsible organizations, ensuring the understanding of the needs and requirements of citizenship HSE. 2-3-1-4- Safety officer which is a qualified person in related matters to HSE; Safety officer is a responsible member for doing some acts like doing risk assessments and reporting the results to HSE office, following-up the programs and eliminating the non-compliance of citizenship HSE, providing regular reports to the HSE office of responsible organization.

2-3-2- Competence, training and awareness: The organization should identify the training requirements associated with risks and aspects of safety, health and

environment related to citizens, and also should provide these trainings.

2-3-3- Communication, participation and consultants:

2-3-3-1- Communications in three levels: A- Internal communications between different levels and departments of organization. B- Communication with subcontractors who provide services to citizens in the field safety, health and environment. C- Ongoing relationship with related citizens and involving their opinions.

2-3-3-2- Participation and consultants: Participation of citizens and the responsible members of the related organization about HSE matters and consultation with contractors.

2-4- Documentation

2-4-1- Control of documents: The documents that have been required by HSE system should be controlled.

2-5- Contractors, suppliers and beneficiaries by authorized organizations

3- Planning

3-1- Legal requirements: The organization needs to develop procedure and to maintain it in order to identify, acquire and implement the legal requirements of applicable health, safety and environment.

3-2- Risk assessment and management

3-3- Objectives and programs:

3-3-1- health, safety and environmental objectives: Top management must make sure that the objectives of health, safety and the environment at all levels of the organization and different parts of the executive body, has been developed.

3-3-2- Health, safety and environmental program: The organization should develop programs to achieve health, safety and environmental goals. Also the responsibilities and methods for achieving the objectives at different levels should be allocated and be determined. The organization should supply the resources (financial, infrastructure, human resources and information) and must provide the mechanisms to assess, track and provide feedback related to citizens.

4- HSE operations management

4-1- HSE operations management is designed in order to cover four main purposes at the level of organization: ensuring that all related components of the HSE management system are involved, implementation of all procedures and guidelines, the realization of continual improvement and commitment to constant review.

4-2- Emergency response and crisis management: In order to detect possible emergencies the organization should develop the procedure/procedures through analysis and systematic review. For an effective implementation of procedure/procedures, it is necessary for organizations to prepare guidelines for planning and emergency response action, given their type of work.

5- Monitoring, analysis and improvement

5-1- Monitoring and analysis

5-1-1- Monitoring and measurement: This tool is evaluating the rate of HSE target's implementation and risk control and should provide a feedback from HSE performance and the needed information to identify risks. It should also include passive and active surveillance measures. 5-1-2- Compliance assessment: The organizations should make, implement and maintain some arrangements for periodic evaluations of compliance with legal requirements, also should keep records of the results of periodic evaluations.

5-1-3- Reporting and investigating the HSE events

5-1-3-1- Reporting of events: The organization should record and report the effective events on HSE performance in order to use the resulting experiences in special situations.

5-1-3-2- Investigation of events: The organization should supply preparation acts for investigating the emergency and events with high probability, severity and potential. Root causes of these events should be detected by the competent members and the results should be shared with relevant citizens.

5-1-4- Control of results: In order to detect the compliance rate of HSE management system with determined targets and legal requirements, the organization should identify, archive and store, protect, recover and maintain the records.

5-1-5- Data analysis: In order to prove the suitability and adequacy of Citizenship HSE Management System and also to assess the fields which need the continual improvement, the organization should determine, collect and analyze the appropriate data. These data should be obtained from measurements, monitoring and other related resources.

5-1-5- Internal audit: The internal auditing of HSE management system should be done periodically and must comply with planned arrangements. It should also be implemented and maintained appropriately. The audits should be effective in achieving the policies and goals of the organization. Finally, the results of the audit and any corrective action plans should be documented.

5-1-7- Management review: Top management must review the HSE management system and its performance at regular intervals scheduled to ensure suitability, adequacy and continual effectiveness of the system. Reviews should include; examine and evaluate opportunities for improvement and changes such as policies and objectives.

5-2- Improvement: Improvement is an indicator in order to audit and assess the performance of systems. The obtained information from measurements, monitoring, evaluations and inspections are used to improve the system's performance.

5-2-1-Non-conformances, corrective and preventive actions: To deal with non-compliance(s) and actual/potential corrective and preventive actions, organization should create, run and maintain different method(s) of procedures. These procedures should provide various requirements to identify and correct the Non-conformances, determine the causes and

propose different actions to prevent their recurrence. Also it should present various corrective and preventive actions and review the effectiveness of the actions.

ACKNOWLEDGMENT

Authors would like to thank for the funds granted to the Graduate Faculty of Environment (University of Tehran) from Shahr-e-Salem Co. (affiliated to the municipality of Tehran) through contract No. 1052077. We also thank the authorities of University of Tehran for providing suitable facilities to carry out the project. The help receive from Mr. Sherafatinezhad, M. is greatly acknowledged. We also thank Mansouri, A., Ghazali, M. and Mohammadi, S. for their field as well as other assistance throughout execution of present investigation. Successful execution of the project would not be possible without the great efforts of Petro Imen Sharif Co.

CONFLICT OF INTEREST

The authors declare that there are no conflicts of interests regarding the publication of this manuscript.

REFERENCES

- Abbaspour, M.; Karbassi, A. R.; Khadivi, S., (2006). Implementation of green management concepts in sport complexes. *Int. J. Environ. Sci. Technol.*, 3(3): 213-219 (7 pages).
- Abbaspour, M.; Karbassi, A. R.; Khalaji Asadi, M.; Moharamnejad, N.; Khadivi, S.; Moradi, M. A., (2013). Energy Demand Model of the Household Sector and Its Application in Developing Metropolitan Cities (Case Study: Tehran). *Pol. J. Environ. Stud.*, 22(2): 319-329 (11 pages).
- Abbaspour M.; Lotfi F.H.; Karbassi A. R.; Roayaei E.; Nikoomaram H., (2010). Development of a model to assess environmental performance, concerning HSE-MS principles. *Environ. Monit. Assess.*, 165(1-4): 517-528 (12 pages).
- Alipour, S.; Karbassi, A. R.; Abbaspour, M.; Saffarzadeh, M.; Moharamnejad, N., (2011). Energy and Environmental Issues in Transport Sector. *Int. J. Environ. Res.*, 5(1): 213-224 (11 pages).
- Amirzadeh F.; Tabatabaei S.H.R., (2006). Investigating the incidence and causes of accidents in students of secondary schools in Shiraz. *J. Kerman U. Med. Sci.*, 14(1): 55-60 (6 pages). [in Persian]
- Askarizadeh, L.; Karbassi, A. R.; Ghalibaf, M. B.; Nouri, J., (2016). Management of post-earthquake construction debris in Tehran Metropolitan. *Int. J. Environ. Sci. Technol.*, 13(2): 639-648 (10 pages).
- Farsi A.; Helalizadeh M.; Sayah M.; Rasekh N.; Darabi H., (2006). Investigating the safety of sport yards in Iran schools. *J. Res. sport manag.*, 16: 40-54 (15 pages).
- Ghadimi Ilkhanlar H.; Baluchi R.; Niknejad M.R., (2010). Investigating the opinions of physical education teachers about the causes of injuries during sport. *J. Sport. Med.*, 4: 91-101(11 pages).
- Ghaemi, Z.; Karbassi, A. R.; Moattar, F.; Hassani, A. H.; Khorasani, N., (2015). Evaluating soil metallic pollution and consequent human health hazards in the vicinity of an industrialized zone, case study of Mubarekeh steel complex, Iran. *J. Environ. Health Sci. Eng.*, 13(75): 1-9(9 pages).
- Hoivik D.; Moen B.E.; Mearns K.; Haukelid K., (2009). An explorative study of health, safety and environment culture in a Norwegian petroleum company. *Safety Sci.*, 47:992-1001(10 pages).
- Karbassi, A. R.; Abduli, M. A.; Mahin Abdollahzadeh, E., (2007a). Sustainability of energy production and use in Iran. *Energ. Policy*, 35(10): 5171-5180 (10 pages).
- Karbassi, A. R., Abduli, M. A. and Neshastehriz, S. (2007b). Energy saving in Tehran international flower exhibition's building. *Int. J. Environ. Res.*, 2(1): 75-86 (12 pages).
- Langley J. D.; Silva P. A.; Williams S. M., (1981). Primary school accidents. *N. Z. Med.*, 94: 33-45 (13 pages).
- Lenaway D. D.; Ambler A. G.; Beaudoin D. E., (1992). The epidemiology of school-related injuries: new perspective. *Am. J. Prev. Med.*, 8(3):193-198 (6 pages).
- Mani Kashani K. H.; Saba M. S.; Azimian M. H., (2001). Investigating the incidence of accidents in primary school students of Hamedan city in year 1997-1998. *Sci. J. Hamedan U. Med. Sci.*, 8(2):69- 73 (5 pages). [in Persian].
- Mohammadpour Roudposhti, Gh.; Karbassi, A. R.; Baghvan, A., (2016). A Pollution Index for Agricultural Soils. *Arch. Agron. Soil Sci.*, (in press). DOI: 10.1080/03650340.2016.1154542
- Nouri J.; Mansouri N.; Abbaspour M.; Karbassi A. R.; Omidvari, M., (2011). Designing a developed model for assessing the disaster induced vulnerability value in educational centers. *Safety sci.*, 49(5): 679-685 (7 pages).
- Phelan K. J.; Khoury J.; Kalkwarf H. J.; Lanphear B. P., (2001). Trends and patterns of playground injuries in United States children and adolescents. *Ambul. Pediatr.*, 1(4): 227-233 (7 pages).
- Rafee, N.; Karbassi, A. R.; Nouri, J.; Safari, E.; Mehrdadi, N., (2008). Strategic management of municipal debris aftermath of an earthquake. *Int. J. Environ. Res.*, 2(2): 205-214 (10 pages).
- Rashidi, Zh.; Karbassi, A. R.; Ataei, A.; Ifaei, P.; Samiee-Zafarghandi, R.; Mohammadzadeh, M. J., (2012). Power plant design using gas produced by waste leachate treatment plant. *Int. J. Environ. Res.*, 6(4): 875-882 (8 pages).
- Roderick L. M., (2004). The ergonomic of children in playground equipment safety. *J. Safety Res.*, 35(3): 249-254 (6 pages).
- Sheps S. B.; Evans G D., (1987). Epidemiology of school injuries: a two year experience in a municipal health department. *Pediatr.*, 79(1): 69-75 (7 pages).
- Soghрати Ghasbeh V., (1996). Investigating the incidence rate among students of Shiraz public school. MS Thesis in nursing, Shiraz U. Med. Sci.
- Sosnowska S.; Kostka T., (2003). Epidemiology of school accident during a six school-year period in one region in Poland. *European J. Epidemiol.*, 18(10): 977-982 (6 pages).
- Tehrani, S. M.; Karbassi, A. R.; Monavari, S. M.; Mirbagheri S. A., (2010). Role of E-shopping management strategy in urban environment. *Int. J. Environ. Res.*, 4(4): 681-690 (10 pages).

Educational HSE Model

Tehrani, S. M.; Karbassi, A. R.; Monavari, S. M.; Mirbagheri S. A., (2009). Prediction of energy consumption and urban air pollution reduction in e-shopping adoption. *J. Food, Agri. Environ.* 7 (3-4): 898-903 (**6 pages**).

UNICEF., (2012). Water, Sanitation and Hygiene (WASH) in Schools (A companion to the Child Friendly Schools Manual).

Published by United Nations Children's Fund, Division of Communication, 3 United Nations Plaza, New York, NY 10017, USA.

Wong D. L., (1999). *Whaley and Wong Nursing Care of Infant and Children*. 6th ed. St louis: Mosby Company; USA.