Evaluating and Developing the Sustainable Procurement system of Materials in Construction Industry in Iraq

Afrah M. H. Kashkool[1], Sawsan Rasheed Mohammed[2]

[1]Lecturer, University of Technology
Baghdad, Iraq
Email : afrahkashkool {at} yahoo.com

[2]Assistant Professor, University of Baghdad
Baghdad, Iraq

ABSTRACT--- ***The construction industry in Iraq and especially the procurement of the goods and services in that sector is suffering from several problems; the key problems are lack of understanding of procedure of procurement process, lack of knowledge in sustainability principles, lack of right procurement policies. This paper studies the principles of sustainable procurement and proposes a program in PHP language for evaluation the sustainable procurement and suggests the correction actions in the construction companies in Iraq. The research concluded some points as the industry need for local specification and the need for strategic plans and government support presented by laws and instructions.***

Keywords--- sustainable procurement, procurement, SPMAT, construction management

1. INTRODUCTION

Construction is considered the biggest business on the planet and accounts for some 70% of all materials flows. The construction industry impacts on the wider environment in a number of ways. (Harrison -2007) The costs of materials represent above 50% of the cost profile of the construction projects. (Mc Caffer &harris-2007) This research work describes the potential of materials and particularly materials in the built environment to deliver not only greater sequestration but conversion of many wastes to resources. All materials are ultimately derived from the bio-geo-sphere. They are everything between the take and waste and are the key to sustainability. The choice of materials for construction controls whole of life cycle impacts such as emissions, gross take, properties of wastes returned to the bio-geo-sphere, use of recycled wastes and their own recyclability.

Materials also strongly influence lifetime energies, user comfort and durability of the construction

2. THE RESEARCH OBJECTIVE

The research objective is to evaluate and develop the current situation of the procurement system in the construction companies in iraq

3. PROCUREMNT PROCESS

3.1 The concept of Procurement

Procurement could be defined as (is the process of acquiring goods, works and services from suppliers (internal or external). The procurement process spans the whole cycle from identification of needs through to the end of a services contract or the end of the life of an asset, including disposal) (BS 8903:2010)

The procurement process is considered one of the important stages in the project life cycle; Procurement is the process which creates, manages and fulfils contracts. Procurement activities commence once the need for procurement is identified and end when the transaction is completed. The procurement system should be built: (ISO 10845-part 1-2010)

a) In a manner which is fair, equitable, transparent, competitive and cost-effective and which may, subject to the policies of an employer and any prevailing legislation, include the promotion of other objectives, in accordance with the requirements of Table (1).

b) Around a process which commences once the need for procurement is identified, ends when the transaction is completed and includes the attainment of procedural milestones which enable the system to be controlled and managed. There are six principal activities associated with the procurement process, namely :(ISO10845 part 1-2010)

1. Establish what is to be procured and clarify it.
2. Decide on procurement strategies in terms of packaging, contracting, pricing and targeting strategy and procurement procedure;
3. Solicit tender offers; in terms of a set of procedures
4. Evaluate tender offers; in terms of undertakings and parameters established in procurement documents.
5. Award contract; enter into the contract with the successful tenderer
6. Administer contracts and confirm compliance with requirements.

3.2 The procurement activities.

The project objective is to deliver a construction or building in conformance with the management triangle principles (cost, quality, delivery time).

Each stage in the construction project should have its processes and plan; the steps of procurement cycle are shown in Fig (1)

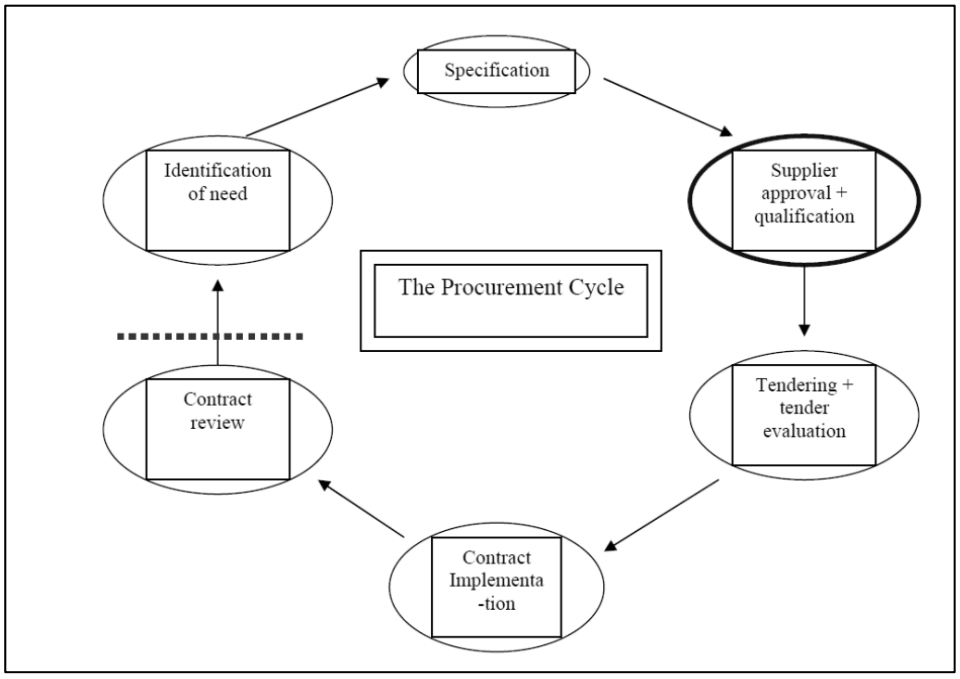

Figure (1) The steps taken through the procurement cycle (WRAP-2003)

The procurement stage comprises the following processes: (ISO10845-2010)

1. Needs identification

There is no substitute for proper research. If the delivered project is a building or includes a plant, state the importance of whole life cost (energy, maintenance, operation and carbon) and how this will factor into the assessment of best value.

The identification of a need might arise in a number of ways :(BS-8903)

a. Most commonly a requirement for goods, works or services emerges. This typically originates from internal stakeholders, e.g. technical staff or other budget holders who do not sit within the purchasing department.
b. Resolution of a business issue or business risk might require a change in what is bought, or whom goods, works or services are bought from, for example, a security of supply risk or changes in regulatory requirements.
c. In pursuit of strategy objectives, for example, meeting cost saving, supplier rationalization or carbon reduction targets.

It is essential that procurement become involved as early as possible, ideally at the design stage, because the ability to influence cost, performance and sustainability declines

According to MOP instructions No (1) the pre-contract requirements are (A17-2008):

a. Prepare a detailed study and feasibility study for the project
b. The project approval from ministry of planning

c. Allocate the finance
d. The project documents should be prepared accurately (plans, specifications, bill of quantities...)

2. Document the brief

The main causes of procurement failures are the result of inadequate briefs, ill-conceived briefs or an absence of a brief.
A brief is a written description of the completed project or service. It sets out what the expected outcome should be what role the contractor will play and the constraints and difficulties in delivering the project. In essence it is the means of communicating the whole expected outcome to the people involved and, as such, should explain the facilities or services to be procured, how they are to be used in future, what role they will play in meeting community or user needs, how they will fit into their environment, the further stages of the procurement process and how the facilities or services are to be delivered. (ISO10845-2010)
The brief is an output specification. It describes the end result and clarifies how the intended procurement combines with other activities to help achieve the client's overall goals.
It is essential to consult others on the content of the brief to ensure that requirements are accurately and comprehensively set down, so as to meet defined expectations from all end users.

3. Check the facts

The second most frequent cause of problems between clients and contractors is things that existed at the outset but had not been identified.
Full surveys should be undertaken and documented describing the existing situations.
The information should be collated and made available to tenderers. Contractors should make their own judgments from the information and collect whatever additional information they consider necessary.

4. Secure the finance

Business planning has often been ignored, leading to lack of proper planning and consequent problems at a later stage in the process. Business plans should be prepared to obtain finance. Financial forecasts should include the following:

1. The total expenditure on the procurement itself and when the expenditure will occur.
2. The total costs of incomes (or savings) accruing from the new service or facility and when these can be expected to accrue.
3. The cost and timing of ongoing maintenance and renewals.
4. The cost of any advice (professional services) that will be needed.

5. Understand the construction procurement regime

Compliance with the legislative framework for procurement is essential. Non-compliance will cause delays in the procurement process as a result of a lack of clarity in processes and procedures, the lodging of complaints, and court challenges.
The designated procurement manager should be familiar with legislative framework and requirements for procurement. Such a person should also be familiar with development and social objectives that may be promoted through the project.
The risk of procurements that not complying with system requirements (fair, equitable, transparent, competitive and cost-effective, and promotion of objectives associated with a procurement policy) should be managed cost-effectively.

6. Allocate risk

The higher the risk taken, the greater the financial provision should the worst happen. Consequently, the higher the risk a contractor assumes, the greater will be the tender value and hence cost borne by the client, even if the risk does not materialize.
Those tendering for a contract should know the degree of risk that they are expected to take.
Whereas the careful checking of the facts about the existing circumstances will help to reduce the total risk, there will always be elements of uncertainty outside the control of all the parties to a contract. All the parties need to know the risks for which they are responsible so that they can make suitable financial provision, either by adding to the cost of the proposal or budget or by spreading the risk by such means as acquiring insurance. The business plan and the contract documents are the mechanisms for allocating risk.

7. Identification of procurement methods and techniques

The particular characteristics of procurement should be analyzed, so as to choose the most suitable and appropriate options.

Optimization of these options will lead to obtaining the best value from the procurement process.
Best-value outcomes are obtained from selecting options for (OGC-2007):
a) Contracting and pricing strategies,
b) Procurement procedures,
c) Procedures for addressing quality in procurement,
d) Mechanisms for promoting and developing targeted contractors and labor,
e) Methods for evaluating offers
f) Forms of contract.
.

8. Monitor impacts

Contractors will apply their own expertise to the contract. The client should employ its own experts to monitor the progress of the contractor.
Any dispute, unless resolved at an early stage, is likely to be costly and disruptive to the project.
Reasons for monitoring include the following (DTP-2011):

a. Mistakes can be made. Whilst the contractor is responsible for his errors, resultant problems might be avoided if a contractor is advised of an error at an early stage.
b. Payment of a contractor is invariably based on his achievements.
c. The amount due to a contractor should be independently verified.
d. Best value demands continuous improvements. How these are achieved and the consequent sharing of financial benefits should be agreed between the contractor and client.
e. Each contract should be coordinated with other activities to ensure
f. That the client can achieve best value for the project provision as a whole.
g. Both the employer and the contractor should designate individuals to be the key contact between the two bodies.
h. Differences in opinion or even disputes are bound to arise between the employer and contractor. The contract should set out the means for resolving these disputes.

9. Review the process

Procurement is a lengthy and complex process. There should always be room for improvement. (CE-2004)
Clients should undertake regular reviews of the following:

a. Whether the contract has met its original service objectives.
b. Whether needs and expectations have changed such that the contract should be modified.
c. Whether the procurement process could be improved for the next round of procurement.
d. How external factors have changed.
e. The reviews should provide the necessary feedback so that better informed procurement strategies, techniques and choices can be made in striving for best value.

2.3 Sustainable procurement

Sustainable procurement is good procurement. Good procurement practice is crucially important to reduce the overall cost of projects, to improve the economic efficiency of the construction industry and to ensure that projects, when complete, are fit for purpose, thereby securing whole life value (Jordan-2008).it also aims to reduce the adverse environmental, social and economic impacts of purchased products and services throughout their life. When integrating sustainability into the procurement process, four key aims should be addressed: - (BS893-2010)

- Minimizing demand for resources (e.g. by reducing purchases, using resource efficient products, considering end of life, etc.);
- Minimizing any negative impacts of goods, works or services across their life cycle and through the supply chain (e.g. impacts on health, air quality, etc.);
- Ensuring that fair contract prices and terms are applied and respected and that minimum ethical, human rights and employment standards are met;
- Providing opportunities for small and medium businesses, the voluntary sector organizations and also supporting jobs, diversity, training and skills development. Fig (2) illustrates the sustainable procurement and the steps followed to achieve it.

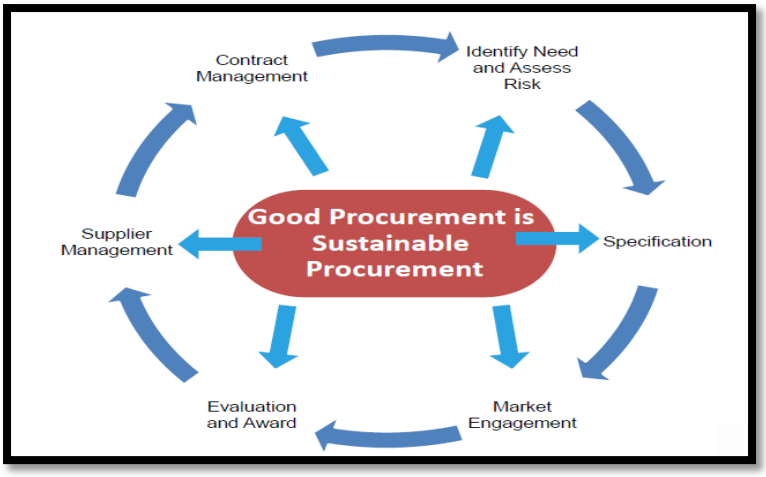

Figure (2): The sustainable procurement process (NSPPP-2010)

4. DESIGN AND DEVELOPMENT OF SPMAT SOFTWARE

The final part of this research work involves the design and development of a prototype web based software (**S**ustainable **P**rocurement of **M**aterials **A**ssessment **T**ool – **SPMAT**)

4.1 The software requirements

The gathering of the system requirements involves an informal discussion and interviews with two software developers and two human-computer interaction experts with vast experience in developing software applications. The system is a web based tool, which collects, stores, retrieves and analyses data to generate report for the user. This involves interaction between the web server and web database. Fig (3) illustrates the functional decomposition of the software.

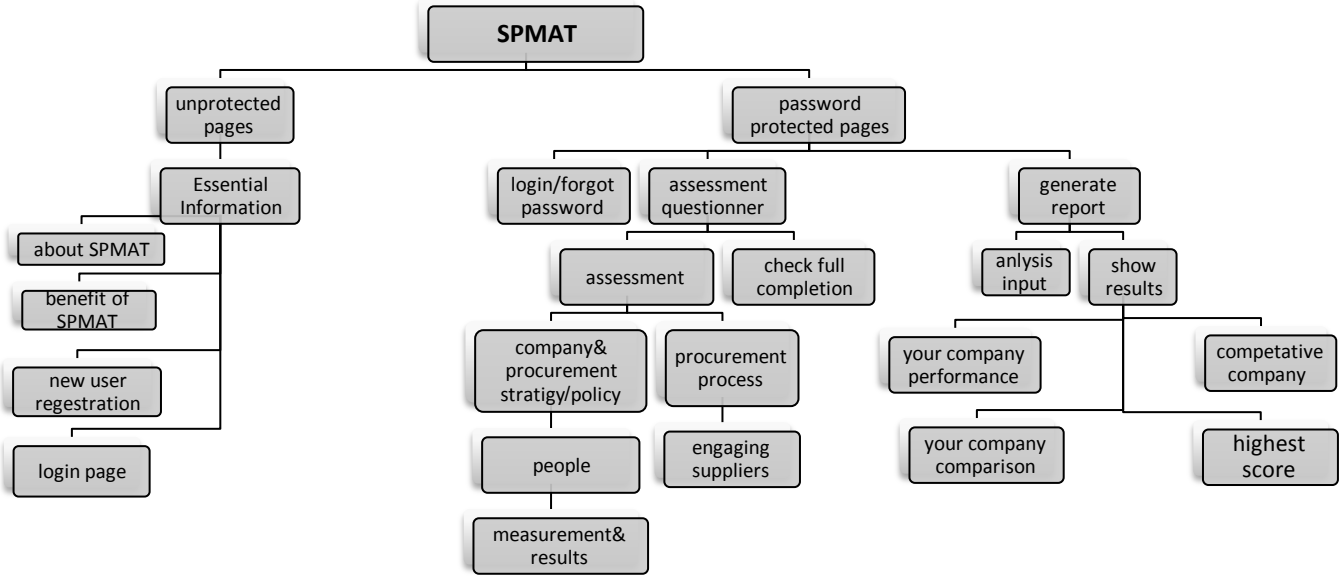

Figure (3) Functional decomposition diagram

The software was built using PHP and MySQL:

a. PHP5: PHP is an open-source, server-side, HTML-embedded Web-scripting language that is compatible with all the major Web servers. PHP enables user to embed code fragments in normal HTML pages—code that is interpreted as your pages are served up to users. PHP also serves as a "glue" language, making it easy to connect your Web pages to server-side databases. (Converse -2004)

b. MySQL is one of the easiest databases to administer on all platforms; and because it's so lightweight, it can run on even low powered PCs. Thus, PHP developers have long found it convenient to throw a copy of MySQL on client machines- even on laptops -for a complete local Web development environment. (Converse -2004)
c. API goggle PHP for graphics.

4.2 The program architecture and operations

The program architecture was created around a three-tier application as illustrated in Fig. (4) below .The first tier is the presentation tier, which involves the client browser software. The second level is the middle tier that contains the application logic. The web server, the scripting engine and scripts reside in this tier. The web server is a piece of software that manages forward and backward data communication between the client and database tiers.
The third tier consists of a MySQL database for managing and storing created, modified data and retrieved data for the end user via FTP[1].

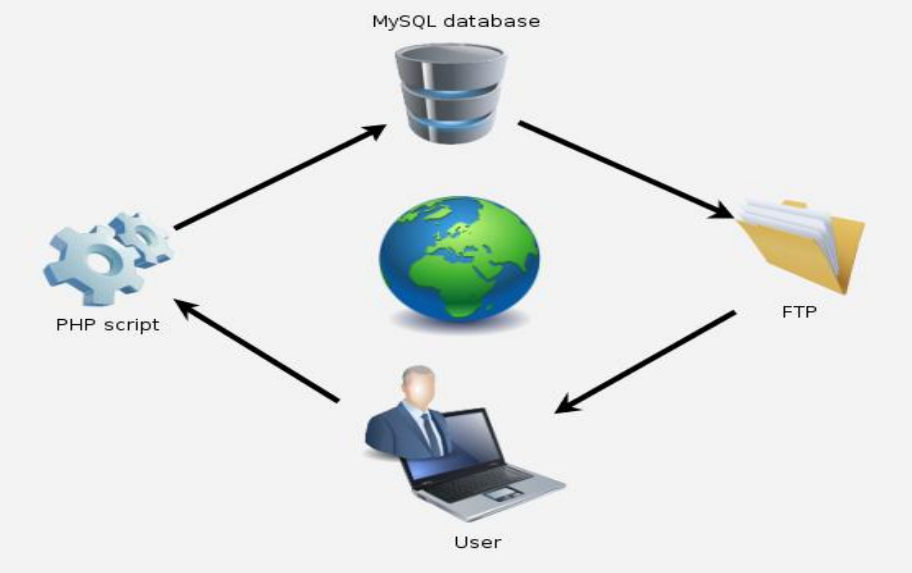

Figure (4): Architecture and operation overview of the software (Ruiker- 2004).

4.3 SPMAT program features and working

The program consists of three elements:
1. Home page : which explores the components of the program
2. Unprotected pages: This contains three pages of explanation about SPMAT as shown in Fig (5) and the new user registration and login page Fig (6).
3. Protected pages which contain the login page and the questions pages which the respondent will answer and the report of final assessment.

The questionnaire assessment pages are password protected and on successful login, the system checks the database and populates the assessment questionnaire pages with the user's previous data. However, if no data exists, then the pages are left blank for the user to start the assessment. The system

[1]FTP (File Transfer Protocol) is a mechanism to upload files to server

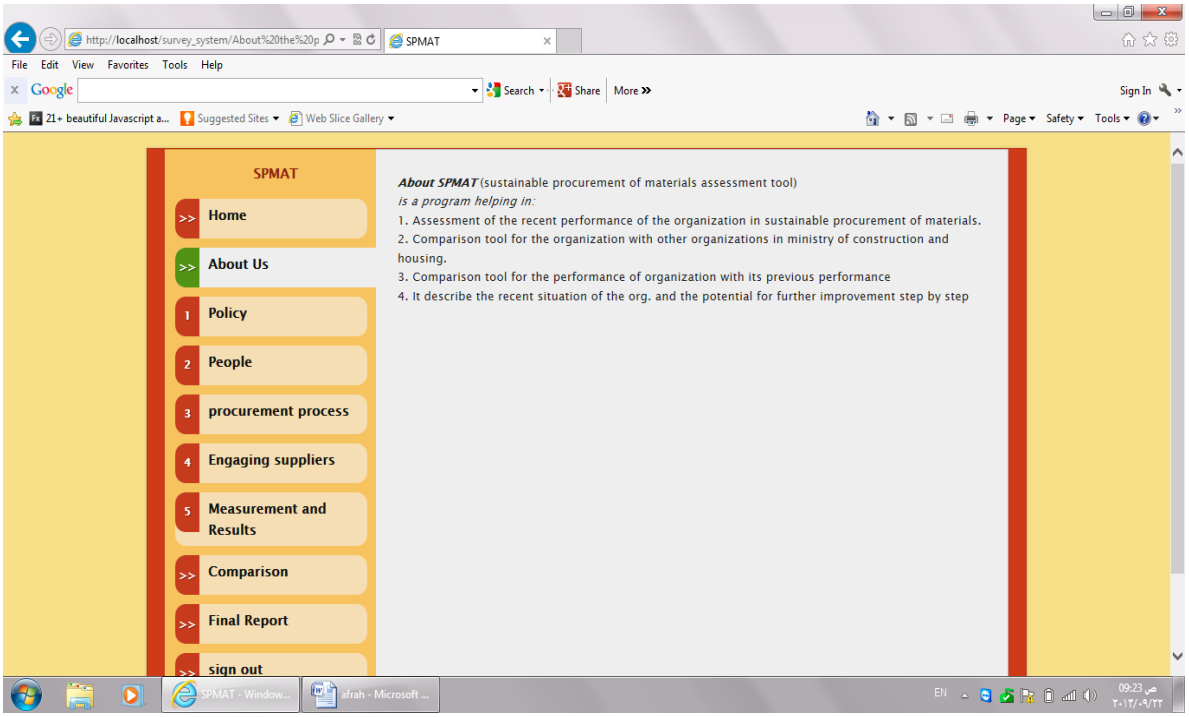

Figure (5) :Explanation about the program

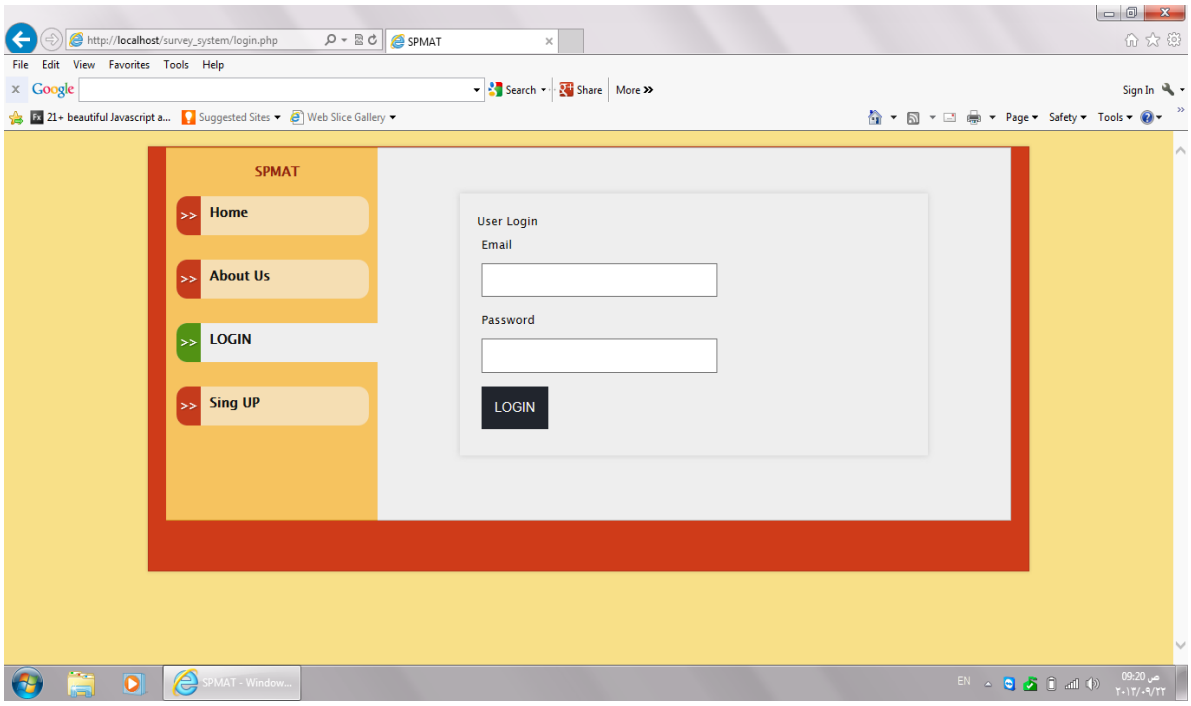

Figure (6): The login page

facilitates creating, storing, modifying and retrieving data; hence the assessment can be completed in several sittings. The assessment consists of five categories, which are:

1. Company policy and procurement policy
2. People assessment
3. Procurement process
4. Engaging suppliers
5. Measurements and results

The users rate their organization performance on each statement against a five-point Likert scale previously explained in chapter four. Table (2) illustrates the questions in each category in the program. A 'Mouse Over' function on both the

'Rating scale' (at the top of the page) and each corresponding 'Radio Button' provides the interpretation of the five-point scale to guide the users. The highest score is 5 while the lowest is 1.
Fig (5-14) and (5-15) show parts of the assessment pages for the policy and the engaging suppliers.

It should be ensured that all questions are completed before the report can be generated. Therefore, when clicking the (Score and corrective actions) link, the system checks the database to ascertain that all the questions have been completed and then generates the total of the number of questions for each category. If all the questions are completed, then users get their report. If not, then the program shall highlights the questions which need to be completed and instructs the users to complete the missing questions. On completion of the assessment the system calculates the mean score of each category and users are automatically presented with a report of their performance and interpretation of their results and some corrective actions. The performance assessment score lies in five levels level five is the highest, table (3) illustrates the category and the actions of each level with a suggested actions for more improvement.

Table (2) :The questions in each category in SPMAT program

	Category	**questions**
A.	**Strategy and policy**	1. Is there a defined written, strategy for the organization 2. If any, is that strategy well known, communicated to all staff, stakeholders ,clients, suppliers 3. The strategy should reflect sustainable development issues throughout the organization at all levels. 4. The organization system is constructed on a scientific basis and it's good for making and implementing decisions. 5. The organization is analyzing and updating the factors that affecting the organization system (organization structure, data base, decision making techniques, resource allocation). 6. The policy endorsed by the senior management. 7. The international and local instructions and lows are listed and defined to be taken into account in preparing the design and specification and procurement. 8. The organization adopts a special system to manage and update the instructions, lows and agreements related to contracts. 9. The organization works according a clear definition of sustainable construction. 10. The organization has a detailed plan to control the essential environmental issues (reduction of emissions, reduction of energy consumption, resources reduction…) 11. The organization has a detailed plan to control the essential economic issues (risk management, costs reduction, increasing value of the products…) 12. The organization has a detailed plan to control the essential societal issues (health and safety for the work staff and buildings users, equity, transparency, workers and suppliers rights). 13. The organization policy emphasis on celebrating the champions. 14. The organization policy reviewed and developed periodically. 15. There is a department for procurement process in the organization. 16. The sustainable procurement strategy reflects the organizational values scope and business. 17. The sustainable procurement strategy is clear, concise, communicated widely to all staff, key suppliers, and other key stakeholders' at the most appropriate time. 18. The sustainable procurement strategy captures all the three pillars of sustainability (environmental, economical, and societal). 19. The sustainable procurement policy includes any commitment of the organization to climate change. 20. The sustainable procurement policy includes any commitment of the organization to stop sending west to land fill. 21. The sustainable procurement policy includes any commitment of the organization to ensure that the key raw materials come from the most sustainable source available. 22. The sustainable procurement policy include any commitment of the organization to improve and sustain the health and safety of the staff, workmanship and the end users 23. The sustainable procurement policy must implicate fair partnership through commitment to improve the lives of thousands of peoples within its supply chain and local community.

B	**People**	1. There is a fair incentive system for the performance appraisal system. 2. The procurement department staff has a good field experience. 3. The design staff has a good experience in preparing specification. 4. The procurement staffs are aware of the relationship between the material procurement and the sustainable development. 5. Continues training and development are done in the field of sustainable development and sustainable procurement. 6. The suppliers ensure that they develop skills in sustainable development. 7. The organization develops a job description on which the staff is appointed and movements of workers between departments are done.
C	**Procurement process**	1. The identification of needs comes from early stages of the project. 2. The needs are assessed and reduced as possible. 3. The products or materials are recycled as possible. 4. The specifications of materials are well defined. 5. The sustainability considerations communicated to all design staff and quantity surveyors. 6. The design process is reviewed and verified and approved by professional people. 7. The tender and quantities are calculated accurately. 8. The buildings are rehabilitating instead of demolition. 9. The environmental impacts are specified and well defined at early stages. 10. The economic impacts are specified and well defined at early stages. 11. The societal impacts are specified and well defined at early stages. 12. Local materials are preferred instead of that exported in case of same quality. 13. Procurement of products as a service that the manufacturer is responsible for the maintenance, disposal, and recycling. 14. Quality indicators for the sustainable procurement must be specified to be compared with the actual performance. 15. The items with high costs must be identified with its responsible supplier 16. The recycling and treatment the waste resulting from the construction and demolition of the buildings. 17. The procurement documents prepared in a way resulting best value for the money spend on procurement of materials and products according to the desired specifications. 18. The contract with the supplier includes any commitment that is desired by the organization 19. The contract with the supplier includes the contractor commitment in implementing any local or international standards defined by the organization. 20. Risks and opportunities that the organization might be suffering as a result of its failure in implementing sustainability concept in advance, before the project starts. 21. There is a special team studies the risks and opportunities analysis, solve, and management. 22. The impacts of these risks on the organization (financial looses, reputation risk, legal risk) 23. Risks are listed and arranged according to its importance and impact on construction. 24. Causes of these risks must be defined. 25. Actions should be taken to adapt or eliminate these risks. 26. Risk and opportunity analysis reviewed periodically with adjustment actions.
D	**Engaging suppliers**	1. Organization strategy and policy should be defined and communicated to supplier, designers, financial department, quantity surveyors. 2. Documented communications with the teams above are done along the period of

		project. 3. A list of expected and qualified suppliers in each discipline should be prepared to be ready when demanded. 4. Suppliers are called in early stages of the project, after preparing the specification of materials, so that to collect information about the available material and which is potential to be available when request. 5. Selecting the supplier is done in a transparent, equitable way. 6. Suppliers are selected according to their adequate procedures in managing their projects and work. 7. Actions would be taken to ensure the ultimate benefit for the client as well as supplier (win win procedure). 8. Suppliers of items with a special importance or high risk or high cost must be selected and verified carefully. 9. Communication between the supplier and client should be documented, the documents should be maintained.
E	Measurement and Results	1. Procurement management system is evaluated according to the organization policy. 2. Procurement outputs are classified into categories with a number of indicators to measure the performance quality. 3. Organization performance measured by a specific indicators or benchmarking with the corresponding organizations 4. Corrective actions would be taken to adjust organization performance. 5. Continual improvement implemented to improve the performance of procurement department and the organization.

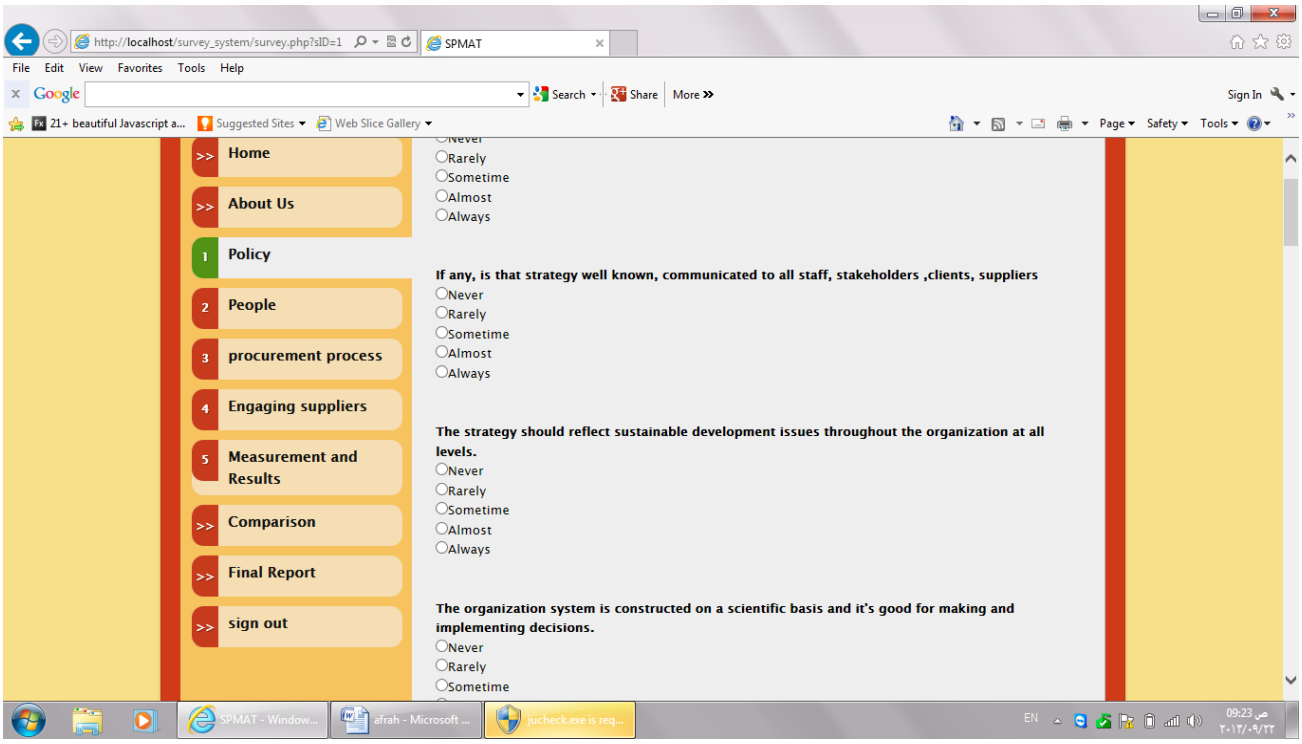

Fig (5-14) Policy assessment pages

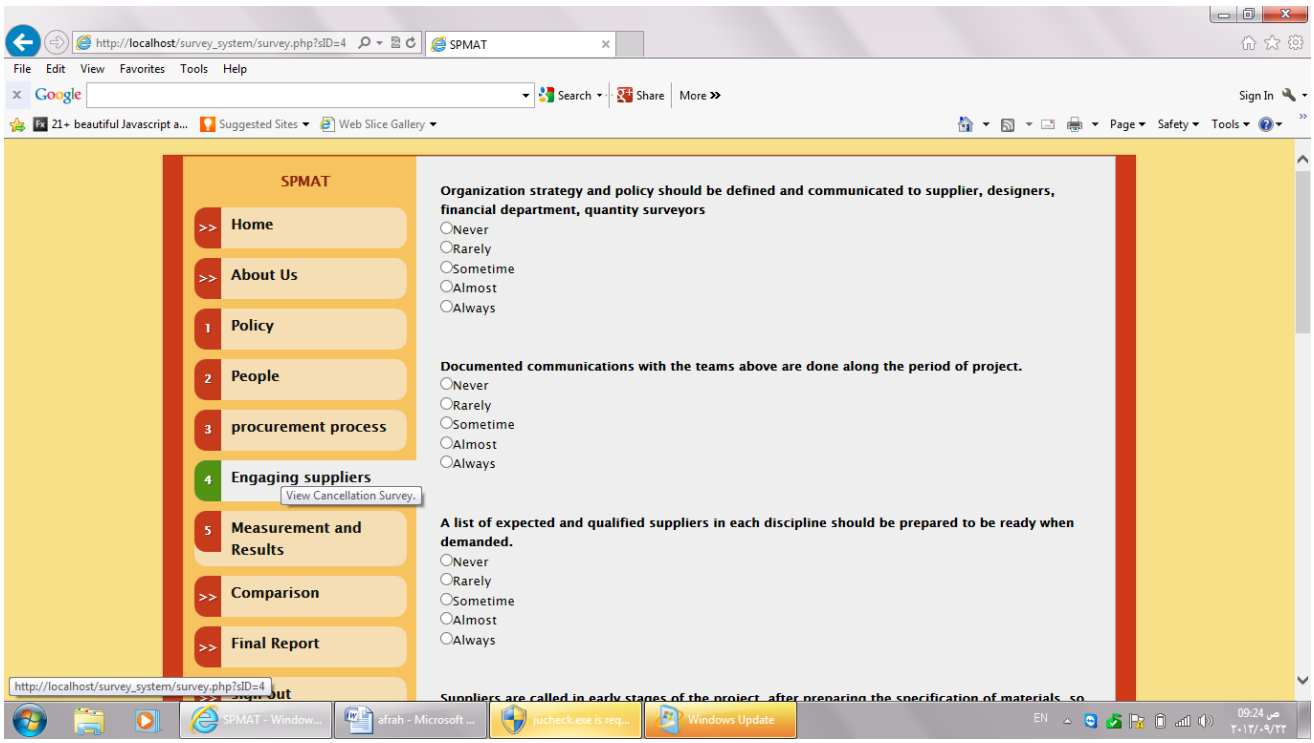

Fig (5-15) Engaging suppliers' assessment pages

Table (3): assessment level, actions and improvement actions

people		
level	**Action in the level**	**Actions for more improvement**
Level 1 **x = 1 to 1.9**	1. Establish overarching sustainability objectives for procurement. 2. Simple sustainable procurement policy in place endorsed by Chief Executive Officer 3. Communicate to staff and key suppliers.	To enhance your policy characteristics to deliver more effective sustainable procurement practices it's useful to do the following:- 1. Review and enhance sustainable Procurement policy, in particular considers supplier engagement. 2. Ensure it is part of a wider Sustainable Development strategy. 3. Communicate to staff, suppliers and key stakeholders.
Level 2 **X= 2 to 2.9**	1. Review and enhance sustainable Procurement policy, in particular considers supplier engagement. 2. Ensure it is part of a wider Sustainable Development strategy. 3. Communicate to staff, suppliers and key stakeholders	To enhance your policy characteristics to deliver more effective sustainable procurement practices it's useful to do the following:- 1. Augment the Sustainable Procurement policy into a strategy covering risk, process integration, supplier engagement, measurement and a review process 2. Strategy endorsed by CEO(Chief Executive Officer)
Level 3 **X=3 to 3.9**	1. Augment the Sustainable Procurement policy into a strategy covering risk, process integration, supplier engagement, measurement and a review process 2. Strategy endorsed by CEO(Chief Executive Officer)	To enhance your policy characteristics to deliver more effective sustainable procurement practices it's useful to do the following 1. Review and enhance the Sustainable Procurement strategy, in particular recognizing the potential of new technologies. 2. Try to link strategy to Environmental Management System and include in overall corporate strategy.
Level 4 **X=4 to 4.9**	1. Review and enhance the Sustainable Procurement strategy, in particular recognizing the potential of new technologies. 2. Try to link strategy to Environmental Management System and include in overall corporate strategy.	To enhance your policy characteristics to deliver more effective sustainable procurement practices it's useful to check the following:- 1. Strategy is reviewed regularly, externally scrutinized and directly linked to organization's EMS. 2. The Sustainable Procurement strategy recognized by political leaders is communicated widely. 3. A detailed review is undertaken to determine future priorities and a new strategy is produced beyond this framework.
Level 5 **X=5**	1. Strategy is reviewed regularly, externally scrutinized and directly linked to organization's EMS. 2. The Sustainable Procurement strategy recognized by political leaders is communicated widely. 3. A detailed review is undertaken to determine future priorities and a new strategy is produced beyond this framework	Now your procurement policy is seem to be perfect in sustainable procurement practices, you could choose what you see is suitable for more improvement. Good luck

people		
Level 1 x = 1 to 1.9	1. Identify Sustainable Procurement champion. 2. The staff should receive training in sustainability in as much depth as is appropriate 3. Key procurement staff must receive basic training in Sustainable Procurement principles. 4. Sustainable Procurement must be included as part of a key employee induction program. 5. Should aim to include an evaluation and monitoring process.	To improve your staff performance to deliver more sustainable procurement practices it's useful to do the following:- 1. All procurement staff must receive basic training in sustainable procurement principles. 2. Key staff must receive advanced training on sustainable procurement principles
Level 2 X= 2 to 2.9	1. All procurement staff must receive basic training in sustainable procurement principles. 2. Key staff must receive advanced training on sustainable procurement principles	To improve your staff performance to deliver more sustainable procurement practices it's useful to do the following:- 1. Targeted refresher training on latest Sustainable Procurement principles 2. Performance objectives and appraisal include Sustainable Procurement factors. 3. Simple incentive program in place.
Level 3 X=3 to 3.9	1. Targeted refresher training on latest Sustainable Procurement principles 2. Performance objectives and appraisal include Sustainable Procurement factors. 3. Simple incentive program in place.	To improve your staff performance to deliver more sustainable procurement practices it's useful to do the following:- 1. Sustainable Procurement included in competencies and selection criteria. 2. Sustainable Procurement is included as part of employee induction program
Level 4 X=4 to 4.9	1. Sustainable Procurement included in competencies and selection criteria. 2. Sustainable Procurement is included as part of employee induction program	Now your Achievements are publicized and used to attract procurement professionals. To deliver more sustainable procurement practices it's useful to do the following:- 1. Internal and external awards are useful to be received for achievements. 2. Focus is on benefits should be achieved. 3. Good practice shared with other organizations.
Level 5 X=5	1. Achievements are publicized and used to attract procurement professionals. 2. Internal and external awards are received for achievements. 3. Focus is on benefits achieved. 4. Good practice shared with other organizations	Now your organization staff is considered to be pioneer in sustainable procurement practices, you could choose what you see is suitable for more improvement. Good luck

Procurement process		
Level 1 **x = 1 to 1.9**	1. Expenditure analysis undertaken and key Sustainability impacts identified. 2. Key contracts start to include general Sustainability criteria. 3. Contracts awarded on the basis of value-for-money, not lowest price. 4. Procurers adopt Government Buying Standards.	To enhance your procurement process characteristics to deliver more effective sustainable procurement practices it's useful to check the following:- 1. Detailed expenditure analysis undertaken, key Sustainability risks assessed and used for prioritization. 2. Sustainability is considered at an early stage in the procurement process of most contracts. 3. Whole Life Costing analysis adopted.
Level 2 **X= 2 to 2.9**	1. Detailed expenditure analysis undertaken, key Sustainability risks assessed and used for prioritization. 2. Sustainability is considered at an early stage in the procurement process of most contracts. 3. Whole Life Costing analysis adopted.	To enhance your procurement process characteristics to deliver more effective sustainable procurement practices it's useful to check the following:- 1. All contracts are assessed for general Sustainability risks and management actions identified. 2. Risks managed throughout all stages of the procurement process. 3. Targets to improve Sustainability are agreed with key suppliers.
Level 3 **X=3 to 3.9**	1. All contracts are assessed for general Sustainability risks and management actions identified. 2. Risks managed throughout all stages of the procurement process. 3. Targets to improve Sustainability are agreed with key suppliers.	To enhance your procurement process characteristics to deliver more effective sustainable procurement practices it's useful to check the following:- 1. Detailed Sustainability risks assessed for high impact contracts. 2. Project/contract Sustainability governance is in place. 3. A Life-Cycle approach to cost/impact assessment is applied
Level 4 **X=4 to 4.9**	1. Detailed Sustainability risks assessed for high impact contracts. 2. Project/contract Sustainability governance is in place. 3. A Life-Cycle approach to cost/impact assessment is applied	To enhance your procurement process characteristics to deliver more effective sustainable procurement practices it's useful to check the following:- 1. Life Cycle analysis has been undertaken for key commodity areas. 2. Sustainability Key Performance Indicators agreed with key suppliers. 3. Progress is rewarded or penalized based on performance relevant to the contract. 4. Barriers to Sustainable Procurement have been removed. 5. Best practice shared with other organizations.
Level 5 **X=5**	1. Life Cycle analysis has been undertaken for key commodity areas. 2. Sustainability Key Performance Indicators agreed with key suppliers. 3. Progress is rewarded or penalized based on performance relevant to the contract.	Now your procurement process is seem to be perfect in sustainable procurement practices, you could choose what you see is suitable for more improvement. Good luck

	4. Barriers to Sustainable Procurement have been removed.	

4. Engaging suppliers		
Level 1 **x = 1 to 1.9**	1. Key suppliers spend analysis undertaken and high sustainability impact suppliers identified. 2. Key suppliers targeted for engagement and views on procurement policy sought.	To enhance supplier engagement process to deliver more effective sustainable procurement practices it's useful to check the following:- 1. Detailed suppliers spend analysis undertaken. General program of supplier engagement initiated, with senior manager involvement
Level 2 **X= 2 to 2.9**	1. Detailed suppliers spend analysis undertaken. 2. General program of supplier engagement initiated, with senior manager involvement	To enhance supplier engagement process to deliver more effective sustainable procurement practices it's useful to check the following:- 1. Targeted supplier engagement program in place, promoting continual Sustainability improvement. 2. Two-way communication between procurer and supplier exists with incentives. 3. Supply chains for key spend areas have been mapped
Level 3 **X=3 to 3.9**	1. Targeted supplier engagement program in place, promoting continual Sustainability improvement. 2. Two-way communication between procurer and supplier exists with incentives. 3. Supply chains for key spend areas have been mapped.	To enhance supplier engagement process to deliver more effective sustainable procurement practices it's useful to check the following:- 1. Key suppliers targeted for intensive development. 2. Sustainability audits and supply chain improvement programs in place. 3. Achievements are formally recorded. 4. CEO involved in the supplier engagement program.
Level 4 **X=4 to 4.9**	To enhance supplier engagement process to deliver more effective sustainable procurement practices it's useful to check the following:- 1. Key suppliers targeted for intensive development. 2. Sustainability audits and supply chain improvement programs in place. 3. Achievements are formally recorded. 4. CEO involved in the supplier engagement program.	To enhance supplier engagement process to deliver more effective sustainable procurement practices it's useful to check the following:- 1. Suppliers recognized as essential to delivery of organization's sustainable procurement strategy. 2. CEO engages with suppliers. 3. Best practice shared with other/peer organizations. 4. Suppliers recognize they must continually improve their Sustainability profile to keep the client's business.
Level 5 **X=5**	1. Suppliers recognized as essential to delivery of organization's sustainable procurement strategy. 2. CEO engages with suppliers. 3. Best practice shared with other/peer organizations. 4. Suppliers recognize they must continually improve their	This category seems to be perfect congratulations

	Sustainability profile to keep the client's business.	

Measurements and results		
Level 1 x = 1 to 1.9	1. Key Sustainability impacts of procurement activity have been identified. 2. Simple measures based on achieving all aspects of the Foundation level of the other categories are put in place and delivered	If your organization is complying with the requirement of this level, further improvement in assessing the procurement performance in the organization might be done as following:- 1. Detailed appraisal of the Sustainability impacts of the procurement activity has been undertaken. 2. Measures implemented to manage the identified high risk impact areas.
Level 2 X= 2 to 2.9	If your organization is complying with the requirement of this level, further improvement in assessing the procurement performance in the organization might be done as following:- 1. Detailed appraisal of the Sustainability impacts of the procurement activity has been undertaken. 2. Measures implemented to manage the identified high risk impact areas.	If your organization is complying with the requirement of this level, further improvement in assessing the procurement performance in the organization might be done as following:- 1. Sustainability measures refined from general Departmental measures to include individual procurers and are linked to development objectives. 2. Simple measures based on achieving all aspects of the Practicing level of your system are put in place and delivered.
Level 3 X=3 to 3.9	If your organization is complying with the requirement of this level, further improvement in assessing the procurement performance in the organization might be done as following:- 1. Sustainability measures refined from general Departmental measures to include individual procurers and are linked to development objectives. 2. Simple measures based on achieving all aspects of the Practicing level of	If your organization is complying with the requirement of this level, further improvement in assessing the procurement performance in the organization might be done as following:- 1. Measures are integrated into a balanced score card approach reflecting both input and output. 2. Comparison is made with peer organizations. 3. Benefit statements have been produced.
Level 4 X=4 to 4.9	If your organization is complying with the requirement of this level, further improvement in assessing the procurement performance in the organization might be done as following:- 1. Measures are integrated into a balanced score card approach reflecting both input and output. 2. Comparison is made with peer organizations. 3. Benefit statements have been produced. 4. Simple measures based on achieving all aspects of the Enhancing level of	If your organization is complying with the requirement of this level, further improvement in assessing the procurement performance in the organization might be done as following:- 1. Measures used to drive organizational sustainable development strategy direction. 2. Progress formally benchmarked with peer organizations. 3. Benefits from Sustainable Procurement are clearly evidenced. 4. Independent audit reports available in the public domain. Simple measures based on achieving all aspects of the Leading level of the organization
Level 5 X=5	If your organization is complying with the requirement of this level, further improvement in assessing the procurement performance in the organization might be done as following:- 1. Measures used to drive organizational sustainable development strategy direction. 2. Progress formally benchmarked with peer organizations. 3. Benefits from Sustainable Procurement are clearly evidenced. 4. Independent audit reports available in the public domain.	Congratulations, your system is excellent your organization has a high level in conformance on sustainable procurement requirements. Your organization is considered one of the pioneers in sustainable procurement, for further improvement you could choose what you think is suitable for your organization. Good luck.

	5. Simple measures based on achieving all aspects of the Leading level of the organization procurement system are put in place and delivered	

5. CONCLUSIONS

Through reviewing literatures on procurement and sustainable development and through studying the Iraqi construction industry in the field of materials procurement, some major issues are concluded:

1. Construction industry suffers from lack of studies in the field of procurement in general and sustainable procurement in particular.
2. The construction waste is difficult to be resolved so the waste means:
   a) The landfill fullness in short time
   b) Extra costs for removal , transport and setting in landfill
   c) Less value for the construction.
   d) Adverse impact on environment and people health.
3. There are some people working in the construction companies try to move the construction work in their companies toward sustainability, but that is not enough, it should be accompanied by management will and political will.
4. In Iraq there are no obligating legislations and laws on sustainable development
5. The efforts seem to be random and need to be regulated towards the sustainable development principles.
6. Procurement of materials in Iraq is related to the available materials in the market, in few cases suppliers tends to provide the materials that clients desire.
7. The public sector is restricted in some laws and regulation that make the development of that sector slow and difficult.

6. RECOMMENDATIONS

According to the study of the situation of construction industry in Iraq, the following recommendations are put forward:

1. A road map for sustainable development implementation effectively in Iraqshould be implemented .
2. Encourage establishment of a NGOs that concerns sustainability issues, to identify efficient ways to manage sustainable materials. And encourage Voluntary measures to increase environmental and social reporting
3. Adoption of national standard for sustainable buildings with specifications and rating system consistence with the local environment and resources.
4. Imposing taxes on waste, energy and natural resources use to encourage prudent use of materials and encourage solutions for waste generation and recycling.
5. It is necessary to undertake the procurement responsibility by a professional people and to specifying the suitable training to the staff periodically or when needed.
6. Establish and improve databases to promote materials management comprising sustainable materials, and document quantities of materials used to calculate the actual quantities and costs
7. Support and reward local companies with high scores of materials management and encourage collaboration with them.

7. REFERENCES

1. **(A1-2007)** **تعليمات تنفيذ العقود الحكومية رقم (1) لسنة 2008 – وزارة التخطيط والتعاون الانمائي- جريدة الوقائع العراقية العدد 4075-2008**

2. BS 8903, *Principles and Framework for Procuring Sustainably – Guide*, BSI, 2010.
3. CE (Construction Excellence), *Procurement, Innovation- Best Practice-Productivity*, www.constructingexcellence.org.uk,2004
4. Converse, T., et al, *PHP5 and MYSQL Bible*, Wiley Publishing, Inc., Indianapolis, Indiana, 2004.
5. DTP(development through partnership), *Construction Procurement Strategy*, http://www.cidb.org.za/_layouts/Toolkit/data/ai_docs/IDM-Toolkit-DMG-6-PG2-ConstructionProcurementStrategy-V11-2011-04-20.pdf, 2011
6. Harrison, John , *The Role of Materials in Sustainable Construction*, Industry Report on Sustainability,2007
7. ISO 10845 , *Construction Procurement- parts 1to 8*,1st edition, Switzerland, International Organization for Standardization, 2011.

8. Maccaffer R. &Harris F., *Modern Construction Management* ,Blackwell publishing, sixth edition ,2007.

9. NSPPP, *National Sustainable Public Procurement program* ,UK, 2010, Available at WRAP http://www.wrap.org.uk/retail/
10. OGC (office of government commence) , *Achieving Excellence in Construction Procurement Guide-11 Sustainability*, Office of Government Commerce, London, 2007
11. Ruiker, K., *Business Process Implications of E-commerce in Construction Organisations*, EngD Thesis ,CICE, Loughborough University,UK, October 2004
12. WRAP, (Waste and Resources Action Alan) , *Sustainable Procurement –Making it Happen* , www.wrap.org.uk ,2003.