

Benchmarking Projects' "Lessons Learned" through Knowledge Management Systems: Case of an Oil Company

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Abstract

This paper aims to benchmark the Lessons Learned (LL) and Knowledge Management (KM) systems at X Oil Company. In order to do so, interviews were conducted with project managers from the company in order to assess their understanding of LL and KM use and applications and their current existing system. This information served as the input and guidance for the required research to be done. The paper covers a comprehensive literature review which discusses in detail the steps to be taken, the requirements, key success factors and arising challenges for successful implementation of the LL system. Finally, the paper provides suggestions and recommendations such as application of web 2.0 technologies and methods for improvement and maintenance of high-quality lessons learned in addition to ease of retrieval. Following the steps and recommendations would help X Oil Company and other organizations achieve KM excellence.

Keywords

Knowledge Management, Lessons Learned, Benchmarking, Oil Company

1. Introduction

Most project managers know the consequence and the importance of capturing lessons learned; it is good for the team, organization and existing and future projects. Lessons learned are the documented information that illustrates both the negative and positive experience of a project and discovers both strengths and weaknesses. They demonstrate the organization's commitment to project management excellence and the project managers' opportunity to learn from

actual experience of others.

However, there are different ways of utilizing lessons learned, some organizations do not routinely capture lessons learned because there are no defined lessons learned process in such a place while others capture lessons learned at the end of a project. Capturing lessons learned should be an ongoing process throughout the life of the project and not by learning from previous projects we are doomed to repeat similar failure situations. Moreover, essential reasons for repeating mistakes are difficulty in retrieving data as well as not appreciating lessons learned practices (Dolfing, 2019).

Given the company's request, the company name will not be shared and instead will be referred to as X Oil Company. This paper shows the procedures applied worldwide regarding capturing lessons learned in term of utilizing information and compares it with X Oil Company's procedures as well as proposing recommendation based on best practices worldwide that would improve lessons learned in X Oil Company's future projects.

The main motivation of this paper is to provide X Oil Company with the information necessary in order to achieve excellency in the ways of applying and managing an efficient Lessons Learned system from which they could avoid repeating mistakes, be more prepared to mitigate projects mishaps and repeat things that went well. This paper also aims to serve as guidance for organizations looking to implement their own LL system and become a learning organization.

In this paper, the first section will outline project objective, scope and limitations based on the motivation and allotted time and resources. The second section of this paper consists of a comprehensive literature review containing the steps required for an effective LL system followed by the requirements from the company and the key success factors to launch and maintain a successful LL and KM system. Finally, based on examples from global best practices, the paper provides a recommendations section with specific suggestions such as implementation of web 2.0 technologies and reasoning to each suggestion tailored for the X Oil Company based on the input provided through interviews with project managers from the company.

2. Projects Lessons Learned Definition

“Project Management Institute (2013) defines LL as the knowledge gained during a project which shows how project events were addressed or should be addressed in the future with the purpose of improving further performance.” (Chaves & Veronese, 2014)

A lesson learned is knowledge or understanding gained by experience. The experience may be positive, as in a successful test or mission, or negative, as in a mishap or failure.

A Lesson Learned is a recommendation being raised during any project phases based on experience and/or observations from which it can result to an improvement in action that can be implemented:

Research conducted by Jugdev (2012) has established that Lesson Learned can be as follows:

- Knowledge established from an experience that causes an organization to improve a process or activity to work safer, more efficient, or with higher quality;
- Outcome of a specific course of action that is important enough to be communicated/retained in the Company records for future use.

3. Objective of the Study

- 1) Discusses the project's lessons learned and knowledge management;
- 2) Discusses the processes of lessons learned management system;
- 3) Demonstrate Knowledge management system's best practices;
- 4) Benchmark X Oil Company projects' knowledge management;
- 5) Provide X Oil Company's project function with recommendation.

4. Scope of the Study

- To assess the current lessons learned and knowledge management system;
- This study will assist X Oil Company for further research on lessons learned;
- This study will help to make managerial changes.

5. Limitation of the Study

- Short term span for this research therefore the scope could not be widened;
- Limited sources regarding the study of lessons learned as somewhere not accessible by X Oil Company;
- No generalized lessons learned procedures.

6. Literature Review

6.1. Worldwide Procedures of Capturing Lessons Learned

Lesson learned process communicates acquired knowledge effectively and ensures that beneficial data is factored into planning, work process and activities. Karagoz et al. (2016) stated in his research that no guiding principle, method, or practice was established during the conducted lessons learned.

The processes used to collect, share and disseminate lessons learned may vary, but in general such a process is comprised of five main elements: defining and collecting information, documenting, analyzing and verifying, storing, retrieving as being highlighted by capturing lesson learned in PMBok (Rowe & Sikes, 2006).

According to an article published in Harvard Business Review by Garvin (2014), for an organization to be qualified as a "Learning Organization" meaning it continuously keeps track of not only its progress but also what went right and what went wrong, the company should maintain a good knowledge management system. This has been proved through a study carried out by Boeing in which the company commissioned a high-level employee group, called Project Homework

and assigned them the task of accumulating all the knowledge gained from carrying out activities in the project. 3 years after the assigned task, the group had their own booklet containing thousands of recommendations and after the team has been dissolved and sent to the newer 757 and 767 models, Boeing has recorded the most successful, error-free launches in Boeing's history.

6.1.1. Collect

Collecting information is the first step to lessons learned and the person who is in charge should prepare a lessons learned session in advance. In preparation for the lessons learned session, the facilitator should have the participants complete a project survey. This will make participants have a better understanding of the project and help them be more prepared before attending the session. Project survey should be organized by category. This will ensure key information is not missed and will help to focus on certain situations in future projects. Suggested categories include project management, resources, technical, communication, business process and design and build requirement etc. Moreover, these categories can be subdivided into more detailed ones such as: initiating, planning, executing, monitoring and controlling and closing. Additionally, planning can then be divided again into risk analysis and project schedule and what went right or wrong and ways of improving the project. There are many ways to collect such data using forms, surveys, or interviews but the most common practice used nowadays is a Web 2.0 model where social media takes place of distributing web surveys to many participants (simple size) which would make the result obtained more accurate and easier to get results back and store it.

6.1.2. Document

Documenting is where lesson learned is documented and reported to stakeholders and different types of reports can be produced based on the audience's interest. After that, the facilitator should collect all data that has been obtained and distribute the detailed lessons learned report to all participants to respond to the accuracy of the report before finalizing the documents. After the report is confirmed, the entire project team should receive a copy even if they didn't contribute to the lessons learned session. Web 2.0 technologies such as exchanger as e-mails and aggregator as social media network are efficient platforms to be used for distributing the finalized documents since not only do they allow information to be receive through the web but they also give all members with certain the ability access to contribute, edit and create new content.

6.1.3. Analyze

Analyzing lessons learned should be performed and valued by experts who have a lot of experience in the field. For analyzing procedures, first the team should decide what can be done with lessons learned, then the information is shared with other teams during organizational meeting. Finally, project management process improvements or training needs are often identified as a result of lessons learned recommendations.

6.1.4. Store

Store lessons learned is simply saving reports for future use. Lessons learned documents are stored with other project documents, normally on a share drive or in form of project library where there would be difficulty in retrieving the data. This technique is the most commonly used lessons learned storing system which is in share drive with project name folder. This technique consumes a lot of time, however, new methods of capturing lessons learned have surfaced such as the Ballistic 2.0 which heavily integrates web 2.0 tools into the process.

6.1.5. Retrieve

Retrieve lessons learned is basically finding or extracting the needed information of certain practices in the project life cycle. Retrieving is the most important and rarely used step, the reason of not being used is that lessons learned reports are stored on a shared drive without keyword and search engine which makes it difficult to get the required information. This retrieval step being the most crucial and also the most difficult task which is what causes companies to often overlook the benefits of utilizing lessons learned.

6.2. Detailed LL Management System Process

As stated in the previous section, there are 5 main elements to the Lessons Learned collection process, the following section will elaborate in detail how these 5 elements should be implemented in X oil and gas company along with what the LL system adapted is to be capable of in order to best fit their company requirements.

The LL management system process involves various steps that provide focused lesson management and knowledge transfer for the business. X Oil Company should adopt a lesson learned system which will become a key component of knowledge management. The system will become a major driver for the entity's continuous performance improvement due to numerous benefits acquired through the correct utilization of lessons learned. Correct utilization of lessons learned leaves no room for mistake repetition while simultaneously enforcing the repetition of best practices to optimize the overall project management. The major limitation of implementing the lessons learned system is the failure of employees to use the system despite its existence in the company. The proposed Lesson Learned Management Systems should involve five main sections.

6.2.1. Capture

The first section is the capture section where users capture the lessons learned during and after an action review. The system provides an opportunity for the users to capture lessons at the end of projects or when conducting their daily activities. The system should make it easy to capture all types of lessons using configurable sections. The systems should have various automated functions including add, rename and remove options that make it easy and effective for the user to capture relevant data and information. There are numerous types of in-

formation that should be captured through the system including flexible categorization based on the specific needs of the entity and tracking information including dates and authors. The system should also capture attached documents and images and configure a risk matrix.

6.2.2. Validation

The second platform that should be incorporated into the system is validation and share platform. The Lesson Learned management system should validate lessons to ensure that the lessons provided are of high quality (Pearce, 2020). The system can analyze and validate the captured lessons based on the Subject Matter Expert (SME) or ensure that the preferred lessons are appropriately categorized.

6.2.3. Report and Analyze

After validating the lessons, the next step should be to report and analyze the lessons. The proposed system should have a set of standard and customizable reports of the expected results. The reports should show the search terms used and identify learning gaps after analyzing usage. The reports produced after analyzing the lessons should be configured based on the categories specified by the users. The system should have reliable graphical presentations.

6.2.4. Ease to Access and Search

The system adopted by X Oil Company should ensure that lessons are easily accessible across various devices. The system should allow users to use various categories that may include teams, locations, functionality, and operation. The system should have a search process which is intuitive and comprehensive to ensure that users identify the most relevant lessons easily and in a timely manner.

6.2.5. Incorporate

The main reason for the adoption of the system is to ensure that lessons that were learnt previously are applied when making future decisions concerning the business entity under consideration. The most appropriate and effective solutions and lessons learned from previous experiences are adopted by the management. The appropriate lessons should be in-line with the visions and objectives of the company. A paper published by Hattenrath (2018) recommends that an LL document could be as simple as a summary level matrix in which the reader can quickly assess whether it is actually relevant to current project and if any information could be of use.

6.3. LL Management System Requirement

Like any other project or new system implementation, preparation is required. Before X oil and gas company goes through with the implementation, the below requirements are to be met.

6.3.1. Requirements Planning

The company should first perform a walkthrough of various technical and arc-

hitectural requirements. Consequently, the company should then obtain all the relevant documentation from the preferred vendor to have an idea of the system requirements for the proposed LL management system. The requirement planning phase requires the company to conduct systems architecture. The company should develop a system design/technical requirements document that includes various attributes like the preferred system architecture, environmental impact if any, IPs, ports, disk space and file allocation, preferable software version and any licenses that are required. The documentation can be prepared in close consultation with the vendor. The document will be essential in ensuring that all the necessary requirements during setup and configuration are available hence reducing the time required for setting up the system. The document should also highlight policy issues which may adversely affect the implementation process of the system.

6.3.2. Resource Planning

Resource planning is also an integral part of system requirements. The proposed LL system should be utilized by all employees of the company. However, not all the employees have the necessary technology skills to utilize a complex computer system and, therefore, the system should have an elaborate manual that explains how it should be used. The system should be user friendly to ensure that users can be able to utilize the system after a short period of training. The system should, therefore, detail the required training requirements. The company should also prepare a Program Plan that clearly shows the amount of time required for training and the important aspects of the system that should be the highlighted during the training. The plan should, therefore, summarize the time and resources estimates from previous experience and changes expected in future upgrades if available.

6.3.3. Technology

The company should have a clear image of the expected lessons learnt from the technology. Consequently, the entity should also prepare a schedule showing the vital aspects of the proposed technology. Firstly, the company should consider the features of the technology. The company should also ensure that the features of the proposed system meet the needs and specific requirements of the entity. Secondly, the company should consider whether the proposed LL system is user friendly. A user-friendly system should be easy to adopt, use and upgrade. Thirdly, the company should consider the security features of the proposed system. A secure system should have effective features that ensure that company's data and information is free from hackers, viruses and other forms of insecurity. The system should, therefore, support effective and reputable security features such as an anti-virus. Thirdly, the proposed system should be flexible. The system should allow users to input data and read results through various technological devices including mobile phones and tablets. Fourthly, the proposed system should have a high interoperability. The technology should easily communicate

with other technologies to ensure data flow from the tool to other tools.

Additionally, the system should adopt enhanced innovation. The company should consider the number of releases the technology has per year and the additional innovations added to subsequent releases. The company should also consider the ecosystem of the proposed system. An effective LL system should be supported by numerous users and partners to ensure that users can get solutions easily when faced with challenges. The proposed LL system should also be cheaper as compared to competing systems. The company should consider various costs required to design, configure and rollout the system. The company will also consider the license costs and costs of upgrading to future releases. Lastly, X Oil Company will consider the maintenance costs. The company will adopt an LL system which has low maintenance costs to ensure that the budgeted amount is similar or higher than the actual cost.

6.4. LL Management Success Factors

As Lessons learned falls under knowledge management, it is safe to assume that their factors that contribute to a successful implementation are the same. **Figure 1** below shows the Knowledge management success factors as presented in a research by **Karami et al. (2015)** followed by our own adaption of how X oil and gas company can ensure the presence of each of these factors.

- Prior to adoption and implementation of LL management system in X Oil Company, the below factors are essential to be present for a successful and smoother integration process: Objective and scope of LL management system shall be derived from X Oil Company strategy, goals, and policy.
- An approved LL process shall be developed by X Oil Company.

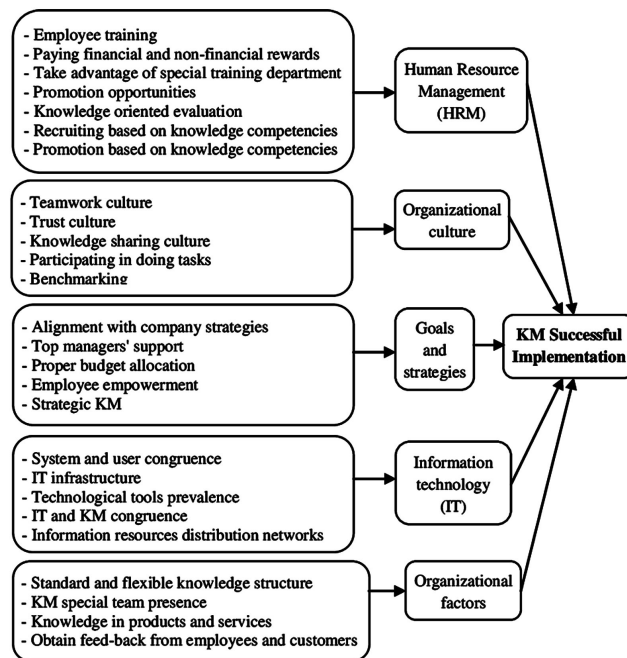


Figure 1. Knowledge management success factors.

- A well-defined business plan for implementing LL management system.
- Shall be well publicized and tied to both organizational and individual performance objectives.
- Introducing an official software tool and removing all redundant system.
- A user-friendly system interfaces.
- Cloud hosted or deployed to X Oil Company network.
- An easily accessible system where project-specific decisions are available to other projects, including timely feedback to those already in service.
- A closed-loop process that ensures corrective actions is implemented, so that underlying sources of problems are corrected system wide.
- Performance metrics used to measure how much the system is being used, either for successful implementations of lessons or how they were acted on differently.
- Centralizing LL document format, or centralized portal/starting point.
- Quality assurance and validation process of entries.
- An automated process must be established for repository uploading, statistical processing and reporting, and notification and dissemination activities.
- A rapid search and filter capability are important to minimize user time and workload.
- Ongoing communication/training/marketing about the process and the system, leveraging existing opportunities whenever possible.
- Establish reward and recognition plans.

6.5. LL Management System Challenges

The list of common challenges observed in the success of LL management system was concluded from the qualitative research conducted along with research carried out by [Goffin et al. \(2010\)](#):

- Properly configuring the LLMS and migrating the data from one system to another required considerable time and expertise.
- Continuous monitoring and maintenance are required.
- Lack of willingness and engagement from participants.
- Lack of management involvement and support.
- Capturing all types of knowledge.
- Software obsolescence.
- Liability or security concerns that inhibit the sharing of knowledge.
- Resource Allocation/Lack of System Integration

6.6. LL Worldwide Best Practices

Below are numerous examples from a research by [Azam et al. \(2016\)](#) on LL best practices worldwide in which companies have established robust knowledge management systems of different natures in order to create a competitive edge, some in the form of internal chat rooms while others simply created their own databases with search engines.

6.6.1. NASA

NASA LL system is a database of lessons learned from all contributors across NASA as well as other organizations. It includes the official and reviewed learned lessons from NASA projects and programs. Its wide-ranging contents multitudes of disciplines including:

- Science;
- Engineering;
- Education;
- Manufacturing;
- Project Management.

NASA Lessons Learned Steering Committee (LLSC) which consists of members from all NASA's Centers is managing the content of the system. A chairperson is assigned on top of this committee to hold the operational responsibilities for the system.

NASA Lessons Learned system is a growing database. Each approved lesson learned is first indexed. It allows quick retrieval by all search criteria either simple or complex search. A Push Technology is established as well, so all pre-registered users will be notified for new lessons learned which matches their interests.

Moreover, public access is being permitted to search the NASA Lessons Learned database. Following link will let you search the NASA Lessons Learned System.

+ [Search the NASA Lessons Learned System](#)

6.6.2. Siemens

Siemens recognized that the Technology is an enabler of knowledge management through the organization. Hence Communities of Practices (CoPs) system was created as a virtual learning organization. It enables collaboration and knowledge sharing by helping employees to “connect people to people”.

Siemens an internal website supported by chat rooms, databases and search engine and called it “**ShareNet**”. This system enables the employees to share expertise and information with their colleagues around the world.

6.6.3. BP Group

BP Group is consisting of four main areas, Upstream, Downstream, Gas & Power and Chemicals business units. BP Group demonstrated the importance of promoting the knowledge sharing culture throughout the organization. An active discussion board “e-Clips” was established to enable knowledge sharing by a best practice database. “Our philosophy should be fairly simple: every time we do something again, we should do it better than the last”—stated by Sir John Browne, BP's CEO.

Mid-level leadership track the e-Clips discussion threads and crystallize the collected knowledge by:

- Extract the know-how from the discussion;
- Enrich with a best practice response.

Therefore, BP's virtual Team is one of the creative and efficient units through the sharing of best practices and knowledge.

BP's knowledge management technologies include:

- Custom web-based portal;
- SQL server database for portal sites;
- e-Clips through MS Outlook and Web.

6.6.4. World Bank

World Bank rolled out their knowledge management in stages:

- 1) Making knowledge easily accessible to all staff;
- 2) Expand the knowledge distribution to external clients and partners;
- 3) Incorporate the knowledge into a system for sustainable development knowledge.

World Bank leverages lessons learned and experience from successful early projects and initiatives to effectively gather and integrate information.

Education Knowledge Management System (**E-knowledge management-S**) rolled out to facilitate knowledge synthesis through an internal web site.

Toward knowledge sharing culture, World Bank added knowledge sharing practice and behavior to the personnel evaluation system.

6.6.5. Nexgen

Nexgen built an extraordinarily structured **knowledge management (KM) system**. This system consolidates all the applicable data and information and indexes them to be simply searchable. KM system was built through the certain development models to end up with a single point search function enables resulting knowledge and information in multiple formats. It is one-stop-shop to find all relevant information and research. KM system results are:

- Systematic, very minimum administration;
- Automated, introduce targeted reports based on relevant triggers and events;
- A single-point-search, unified interface for all information;
- Organized knowledge based on business logic.

6.6.6. WTIA

Washington Technology Industry Association (WTIA), managed to move from the document storage system to a robust knowledge management system that enable the users to access the information easily through a well stored data, indexed and searched. **"MS SharePoint" via SQL server** is being used by WTIA as an integrated location to access information, user friendly discovery tool and provides a robust capability in documentation management. WTIA employees can access the relevant resources and information much faster than the previous documents sharing system.

6.6.7. Atkins

In Dubai-UAE, Atkins is a Construction Engineering & Consultancy Organization which aims to build and knowledge-based organization. "MS SharePoint" web portal is being developed to manage their enterprise content and use it as a robust platform for sharing knowledge. The following benefits were recognized:

- Advanced storage and enterprise data & contents management;
- Enhance sharing of knowledge;
- Improved employees' productivity and collaboration;
- Ensured the consistency of business processes and document management.

6.6.8. Apple Inc.

Apple built their Knowledge management strategy based on the following four phases:

- 1) Infrastructure evaluation;
- 2) Knowledge Management System, Design, and development;
- 3) Deployment;
- 4) Evaluation.

Apple recognized that without knowledge management, its innovation will not be relevant since the information could get out before the product itself. Therefore, Apple Inc established a robust KM system, team, and experts. The tools used by apple are:

- **Data warehouse.** Consist of Multiple-Petabyte, Teradata;
- **Apple Intranet** which enables employees to easily retrieve data and knowledge;
- **Expert Systems** such as Siri and voice controlled intelligent agent to get fast and instant answers.

7. Research Methodology

Qualitative method to collect the required data has been used. The research data has been collected by interviewing project managers from different X Oil Company companies and various projects nature. The interview's questions were focusing on the following:

- Project Managers understanding on the importance of project lessons learned;
- Project Managers belief on the benefit of the lessons learned;
- How often project managers are referring to the previous collected lessons learned;
- The technologies and techniques are being used to manage the lessons learned;
- The effectiveness of the current organization's lessons learned process.

The collected data from the interviews will be discussed in detail. Then the research will compare the current X Oil Company practice in lessons learned with the best practices globally.

8. Data Collection and Results

X Oil Company project managers had been interviewed in order to collect the research data. The research aimed to reach various X Oil Company companies with different projects nature and fields. This section will introduce the conducted interviews with X Oil Company project manages and reflect their point of view in this matter. [Refer to Appendix for interviews]

X Oil Company project managers from various companies and natures have

been interviewed. The data gathered enabled the research to evaluate the current practice, the level of understanding and maturity of X Oil Company projects' lessons learned system. It has been observed that X Oil Company Project Managers have a high level of understanding the importance of project's lessons learned. All of the interviewed Project Managers are believing that well utilization of lessons learned will eliminate the previous project mistakes and short-falls. Especially when the new project is a continues of an old project, the lessons learned is much valid and fruitful. However, they agreed that if project is different, the lessons learned which had been archived in the company share folder will be ignored.

All the interviewed Project Managers confirmed that the current system is being managed manually making the overall process tedious. Excel file is being used to collect list of lessons learned. These lessons learned list may have action party and timeline if follow up is required such as modifying the company design general specification if contradiction is observed. This modification will have separate process through the technical authorities. Finally, as part of project dossiers and deliverables, Lessons learned file is being submitted by Project Manager and endorsed by his VP. Then these documents will be circulated and archived in a share folder.

Manual process of collecting, analyzing and archiving the lessons learned is being observed. Utilizing the previous lessons learned is depending on the project manager and his experience only which disregards any potentially useful input from others involved in the project. No systematic way to detect the lessons learned that could improve the current or future projects. X Oil Company Gas Processing is the only company in our research that established Project Lessons Learned Management System in 2014. PLMS is a computer web-based System that was established for recording and managing the projects Lessons Learned records from initiation till implementation, or rejection, and close out. However, it was not utilized as it should be and now a day the system is not alive anymore. Too many reasons behind that such as the unbelief of high-level management on the system vs. it's operating cost.

9. Discussion and Recommendations

9.1. Benchmarking X Oil Company

This research cleared that the current project lessons learned process in X Oil Company is not up to the level that should be. Gaps have been observed in defining and collecting information, documenting, analyzing, verifying, storing and retrieving. Some project managers couldn't even remember when the last time they used or reviewed previous project lessons learned. It was found that the main causes of the lack of documentation of lessons learned on projects are time, motivation, discipline and skills. (Chaves & Veronese, 2014)

The same was concluded by Karagoz et al. (2016), the lack of time available for capturing lessons learned was the excuse of "dump and run" without consid-

eration the quality and its future utilization.

Therefore, [Rhodes and Dawson \(2013\)](#) discussed in their research (Lessons Learned from Lessons Learned) 10 recommendations for any organization to improve their lessons learned management.

- 1) Remove all “redundant systems”;
- 2) Introduce an “official software tool”;
- 3) Introduce an official “lessons learned process”;
- 4) Define “lessons learned intent”;
- 5) “Market” the chosen process;
- 6) “Overcome time barriers”;
- 7) “Highlight success stories”;
- 8) Motivate employees to “engage” with lessons learned;
- 9) Allocate employee “time to maintain the system”;
- 10) Incorporate into “training”.

Standardizing the practices of knowledge management is one of the subjects that X Oil Company should focus on by centralizing the lessons learned management system. Projects’ lessons learned management should be well defined and organized. A computer web-based system should be established to record and manage the projects Lessons Learned records from initiation till implementation, or rejection, and close out. X Oil Company Gas processing system (PLMS) is recommended to be studied/reviewed and enhanced. The fundamental of collecting, recording, sorting, verifying and implementing the lessons learned is in a comprehensive level. However, PLMS should be integrated with web 2.0 technologies to support knowledge management, fast application development, collaboration, communication and innovation ([Chaves & Veronese, 2014](#)).

The web 2.0 technologies are innovative in the knowledge management allowing the project team share information easily and collaborate. A wiki platform is recommended to be used as a centralized databank of lessons learned collected during the project lifecycle. Moreover, in order to facilitate information retrieval, Lessons learned can be shared through posts in microblogs using hashtags.

9.2. Recommendation for X Oil Company Projects Function

Based on our research including our literature review on key concepts of Lessons learned and conducted interviews with project managers from X Oil Company, our recommendation to X Oil Company is to design a system that should help all involved parties to manage the following actions:

- Get the Projects Management & Leadership buy-in.
- Invest toward KM culture change.
- Utilize the latest Technologies that suit the organization needs:
 - Centralizing Projects Lessons Learned Management System rather than simultaneously using PLMS and Excel sheets which may create redundancy and make project managers less motivated to review the archives;

- Computer web-based system integrated with web 2.0 technologies for easier and more efficient capturing of lessons learned and faster and less tedious retrieval, increasing the rate at which LL folders are reviewed and incorporated into future projects.
- To collect/record Lessons Learned from various projects' stages, provide and implement the mitigation measures for the current projects and utilization for future projects:
- Implement a system in which all relevant and related lessons learned from previous projects may be retrieved quickly upon request.
- To search & sort Lessons Learned according to following categories for effective retrieval:
 - Technical;
 - Project Implementation;
 - Finance/Procurement;
 - Project Management and Contract.
- To define the responsibilities of verifying and controlling the quality of entries:
- Allowing contribution of all project participants may result in a more comprehensive and fruitful lessons learned report, however, it also runs the risk of creating redundant reports or entries of low-quality entry, therefore, validation should be carried out rather than limiting the access to the VP and project manager.
- To follow up on the Lesson Learned implementation of recommended actions for current or new projects scope:
- It may be necessary to assemble new or existing members to represent the Lessons Learned team that would stress on the importance of Lessons Learned incorporation into new projects (Thomas, 2014).

We are confident that integrating Web 2.0 technologies in the project lessons learned system will provide the required high level of projects knowledge management. It has a significant impact on the duration, cost, and scope of a project. We believe that web 2.0 technologies will provide an affordable solution to manage X Oil Company projects lessons learned instead of spending thousands of dollars in commercial applications.

10. Conclusion

To conclude, the present literature on project lessons learned has helped enhance our understanding and knowledge of lessons learned. Best practices were identified and enriched the research discussion and data analysis. This research focused on project lesson learned in term of capturing and utilizing knowledge from the worldwide best practices and compared it with X Oil Company procedures. Five interviews were conducted with project managers from different X Oil Company group companies. Results have been analyzed to appraise the current system and compare it with the best practices world widely. Finally, recommendations have being proposed to improve lessons learned Management

System in X Oil Company by establishing a computer web-based system integrated with web 2.0 technologies to manage to define/collect information, documenting, analyzing/verifying, storing, and retrieving projects lessons learned. Standardizing the system among all X Oil Company group companies by centralizing the lessons learned management system. Such approach will ensure maximizing the benefit to all X Oil Company projects management teams.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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