IOSR Journal of Environmental Science, Toxicology and Food Technology (IOSR-JESTFT)
e-ISSN: 2319-2402,p- ISSN: 2319-2399.Volume 10, Issue 12 Ver. III (Dec. 2016), PP 12-20
www.iosrjournals.org

Investigating Corporate Memory Implementation in Organisations: A Case Study of ELP, Nigeria

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Abstract: *Corporate memory systems improve quality & efficiency and support dynamic & opportunistic management and coordination of the organisational processes which include environmental activities. A lot of authors have analysed how corporate memory impact on organisations productivity but this study takes a different perspective. It examines how corporate memory can contribute to environmental sustainability judging from the implementation, strengths and weaknesses from multiple source data and using ELP as a case study. Linkages between corporate memory and environmental sustainability were explored and lessons learnt highlighted. Stratified and purposive sampling was used followed by snowballing to gather reliable data used for the analysis. A SWOT analysis produced areas of strengths and weaknesses; pointing to a robust system with several applications with major weaknesses in network capacity and inadequate integration.*
Keywords: *Corporate Memory, Environmental Sustainability, Corporate Governance, Knowledge, Learning, Data Management, Environmental Performance, Repository*

I. Introduction

Corporate memory is defined as a system used by organisations to collect, analyse, store and re-use knowledge within the organisation. It is invariably the organisational knowledge repository which enables knowledge sharing. (Nagendra & Enric, 1996). Organisations survive by the continuous development of new knowledge which is based on creative ideas, analysis of failures, daily experiences and Research & Development.

The case study organisation, ELP of Nigeria is a petroleum mining company and undertakes exploration, drilling, production, export and/or refining. While petroleum mining is a major income earner, its activities have a high potential to cause large scale environmental impact ranging from biodiversity loss, solid waste, wastewater (produced water and effluent water), air emissions, radiation, to use of natural resource, etc.

Introduction of new technology nowadays, have shown some changes for instance, horizontal drilling as opposed to traditional vertical intersection has made it possible to recover oil and gas discovered in the reservoir with fewer wells (USEIA, 2004) thus reducing Land Take and contributing to sustainable development.

The concept of Sustainable development arose from the release of the Brundtland report 'Our Common Future' in August 1987; redefining the meaning of sustainable development as 'that which meets the needs of today without compromising the needs of the future.' (UN, 1987). With the Brundtland report, it became apparent for governments (through its institutions) and organisations to re-design their activities to ensure a balance between Economic Growth/Profits and Environmental Protection/Conservation. Policy change can better environmental performance if plans and strategic decisions resulting from such policy change are made from 'existing knowledge & lessons learnt'; both of which are strongly supported by a good corporate memory system. This study seeks to identify to what extent this is true in ELP.
This paper into four sections: Current discussions from literature review, Finding and Analysis, Methodology and Conclusions and Recommendations.

II. Current Discussion

Corporate Memory

The type and category of corporate memory in an organisation may differ for different organisations and depends on the type of activities an organisation is involved in, its size & structure and the motivation for the corporate memory. (Dieng et al, 1998). According to Van der Spek et al, (1996) the initial stages of computerisation started with a very individualistic perspective and thus leading to duplication of overlapping information that results in errors and inconsistencies of data. Document and data sharing evolved with integration of records using computer networks. Use of large networks more recently have contributed to a systematic storing and re-use in knowledge creating the opportunity to transform an organisation into cross-functional team and stimulating learning through transfer of skills and experience. (Carlson, 2004).

To derive the benefits of corporate memory the infrastructure design of the corporate memory system must be suitably robust in semantics, have access flexibility, and be automated and efficient in change management and adaptable to the dynamic nature of the corporate memory. (Nagendra & Enric, 1996).

Depending on how and what knowledge is collected, analysed and re-used, corporate memory can be categorised into; *Professional Memory, Individual Memory, Company Memory, Project Memory or Technical Memory.*

Again considering the tools and application used for storing and retrieving data, different types of corporate memory systems can be described. They are; *non computational memory, Document Based Corporate Memory, Knowledge based Corporate Memory, Case Based Corporate Memory and Distributed Case Based Corporate Memory.* (Dieng et al, 1998).

A systematic approach to building a corporate memory is desirable as opposed to a purely reactive build up therefore an organisation has to careful develop a roadmap for the design and implementation. Various steps and issues should be considered during the design and these include; Detection, Building the memory, Maintenance and Evolution, Maintenance and Management & co-ordination. (Abecker et al, 1998).

Corporate Governance vs. Sustainable Development

The environment is sensitive, inter-connected and interrelated and therefore will respond to every action. The response is referred to as 'impact'. The scale of environmental impact varies. The effect will also vary according to the type of environment and the magnitude of the pollutant. Though development is desired, sustainable development as re-defined *Brundtland Report* is more beneficial.

It is evident that organisations need to adopt social change and develop new approach to global environmental challenges and this can be achieved only through corporate government. Corporate Governance hinges on voluntary performance evaluation and reporting.

Environmental performance monitoring involves the use of acceptable method to check the effect on human activities on the environment. Data collection is vital for environmental performance and review. A common recurring response to performance improvement has been in two fold; development & enhancement of an Environmental Management System (EMS) and development of tools for data collection or data quality improvement. One interesting fact here is that there is no clear link of corporate memory to environmental sustainability but several indirect links abound as shown in the schematic.

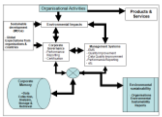

Figure 1- Environmental Sustainability & Corporate Memory Schematic

The Strength of good corporate memory system depends on various factors and these are used during the analysis later.

III. Methodology of Case Study

The aim of this study is to understand how utilisation of Corporate Memory in ELP, Nigeria Production Operations can contribute to environmental sustainability.

The Objectives of the Research are to:

- Understand how corporate memory is implemented in ELP;
- Evaluate the strength and weakness of the corporate memory system in ELP;
- To determine if the Corporate Memory System supports Sustainable Environmental Practices in the organisation; and
- Propose ways to strengthen identified weaknesses in the corporate memory structure

The methodology adopted for this research was to use multiples source of data to ensure validity and reliability. The sample size (about 5000 staff) was large and so questionnaires were considered as the most appropriate means to cover a reasonable number of staff. To ensure in-depth details in particular issues, semi structured interviews were also conducted for selected staff.

The sampling method for the semi structured interviews was a mix of stratified and purposive sampling (Kumar, 1999). The sample population was divided in to four strata, and then purposive sampling approach was adopted enabling the researcher to get directly to staff in the different strata that can and will be available to provide information necessary for the study. Finally, snowballing was then adopted to identify other staff that are in position to provide more information.

In the questionnaires, random sampling method was used and 350 questionnaires were distributed while 50 staff were planned to be interviewed. The percentage of questionnaires returned was 87.4% while 75% of planned interviews were conducted. The other source of data collection for this study was through Document and data review.

Triangulation was achieved in this study by comparing the responses from the groups during the interview and also comparison with the information from the document and data review. Two small focus groups of six field based staff were also conducted.

Limitation

Some key staff were not available for interview and some of the survey questions may have been misunderstood by some staff.

Study Organisation - ELP

ELP of Nigeria, part of the ELP Group, is the largest petroleum mining company in Nigeria, producing 43 per cent of Nigeria's total crude and therefore expected to contribute to economic growth and sustainable development.

'Production operations' is divided into to two divisions (east and west) with each division having three area teams. There are other teams which provide corporate support within ELP.

ELP has a corporate policy on sustainable development and has procedures and guidelines for the safe operation to ensure efficiency and to promote sustainability. Performance targets are in place for regular monitoring of its environmental activities. Its performance is clearly driven by the corporate governance in the organisation. This is also in line with its environmental policy. (ELP, 2006).

ELP General Business Principles and commitment to sustainable development

In 2005, to further show its seriousness to this sustainable development commitment, the ELP group general principles was reviewed to make the commitment to sustainable development a key priority.

As an organisation ELP's commitments to sustainable development is unambiguous and these are to protect the environment and to ensure sustainable community development. The Department of Petroleum Resources (DPR) is the main regulatory agency for petroleum mining activities in Nigeria. (DPR, 2004). The DPR guidelines (EGASPIN) revised in December 2002 and interestingly, for the first time in the history of petroleum regulation in Nigeria, it stipulates that an organisation shall have an Environmental Management System (EMS) in place. This has had significance impact on to environmental performance in the petroleum industry.

To further improve on its performance ELP commenced it EMS certification and the Data quality improvement programme. The strategies adopted by ELP under its Data Quality Improvement Programme (DQIP) are to improve reporting mechanism and document reviews and improved procedure for sampling and reporting.

IV. Findings and Analysis

Corporate memory system in ELP

The ELP corporate memory system consists of several applications and databases. There is no central system, rather there are several repositories, applications and databases stored in network and web based servers. Three of these were investigated during the study but only two will be described here. The last, Fountain is working well except for some staff concerns about if its effectiveness for environmental performance data will be as good as its predecessor Endams. Fountain is expected to replace Endams in future.

Live link – Electronic Data Management Repository in ELP

Live Link is a global system which was deployed to ELP in November 2000. It is provided to ELP using a Service Level Agreement (SLA) which details business scope, functional scope and technical scope. The SLA also describes in details service support, maintenance and responsibilities.

Live Link is one of the systems that make up the ELP corporate memory and it is a computer based memory system. Live Link keeps corporate document, routine documents and work in progress documents including records and reports (Osuobeni, 2006). It is designed to handle the work of very large organisations with thousands of people and vast amount of data. Users get work done by using their browsers from their desktop. It serves the purposes of information and Knowledge management; serving as a data repository and also used to manage access control, sharing, archiving, auditing of corporate data. All Business related documents are required to be stored in Live Link. The key function of Live Link is to:

- To publish and Share documents and other work in an organised, central location
- Work on projects as a team, whether your team members are across different geographical locations
- Manage and simplify business process by using tasks and workflows
- Communicate news and learning to a group or the entire organisation
- Create storage space for sub-sets of the organisation to enable them store business related document in accessible locations.

Live Link is a response to the need for ELP business continuity. ELP previously relied on staff keeping data in personal folders and on file servers. Sharing of document or information was through Exchange servers and this meant that data for sharing was in public domain. Several problems existed, besides, the volume of paper and hard copy documents in ELP was so much that space constraint existed and most offices were used as store for historical document. Deterioration of the documents set in due to lack of proper storage. Knowledge of what information is kept in which location became a major concern.

Live Link Design Architecture

Live Link is a three tier application or architecture with; web based front-end, server based application working at the back-end and the database. Live Link can be referred to as a web based system since staff interaction is through the use of browsers, it is systematically shared for use by every department and section of ELP and space is allocated at directorate levels and then further divided into the different teams. Retrieving information is either by opening a URL link provided by the document owner (this grants access to the staff irrespective of his profile though his access is restricted to only the data contained in the location linked to the URL) or by using the search facility on the homepage. It is similar to normal explorer search facility. It returns the search with a number of hits which are presented in other relevance in colours and percentage.

Endams

Endams is an application designed with modules to manage Compliance and Parameter Sampling, Spill Management, Waste Management and Environmental data. A brief description of the different modules is given below.

Spill Management Module (SPM): This module is used for keeping inventory and tackling spills in ELP. One unique feature of the SPM module is that it is linked to the GIS application which then provides a graphical display and interpretation of the data. (Azike, 2006).

Environmental Studies and Assessment Module (ESAM): This module is used for environmental studies and for environmental assessments and review. Only the Environmental assessment module is used and it consists of Hazard, Activity Plan, Assessment, Control & Recovery, Screening and Consultation modules. The report generator outputs to Microsoft word document so it allow for formatting. (Ezeani, 2006).

Waste Management Module (WMM): This module is used for tracking and inventorising waste for the purpose managing it from cradle to grave and also to facilitate effective management of waste accounting. It is a database of waste generated and it also holds information of the final treatment destination for the waste. Focal points in area teams can only enter data into WMM and they have access to query the database to get an overview. Only logistics Staff in logistics department have administrative access.

Compliance and Parameter Sampling Module (CPSM): CSPM is currently used for only Parameter sampling because the compliance sub module was halted during the design. Effluent from production operations discharged to land or swamp is required to meet set limits by DPR. Samples are taken from the various discharge points and analysed by third parties for compliance to the limits. CPSM supports bulk loading of historical data. Where a set limit is exceeded, CSPM highlights this value as requiring attention. (Azike, 2006).

Endams Design Architecture

Endams is a network application. Like most applications it has a backend design upon which the frontend output is displayed. The backend design is such that there is a general table which has data that is being accessed by all modules allowing the possibility of sharing common data. Each module store data in the form that is retrievable in a report format.

Endams Module	**Common table**	**Unique table (1)**	**Unique table (2)**
WMM	**Location**	Waste type	Quantity Generated
ESAM		Baseline data (Soil type)	Baseline Data (Dominant plant types)
CPSM		Oil & Grease content	Biological Oxygen Demand
SPM		Volume of Spill (Barrels)	Cause of Spill

Figure 2 – Endams Common and unique table design concept

Knowledge based systems – Virtual Learning Opportunities

ELP has knowledge based systems used for knowledge sharing and learning. The three key ones are the Health, Safety and Environment Global network (HSEGN), the Knowledge Sharing Global Network (KSGN) and the Information Technology Global Network (ITGN). The networks are available to all staff but they have to subscribe to it. It is the ELP global network where professionals subscribed to, provide and share information on best practice and learning from group companies. (ELP, 2006).

Practices worth Replicating

ELP has developed a system called, Practices Worth Replicating (PWR). PWR is a flexible process expected to be driven by people, supported by a technology tool designed to enhance staff ability to share new practices Locally, Regionally and Globally. The five key steps or processes for implementing PWR involving people in existing roles using a web-based system to; Implement, Improve, collect, approve and distribute lessons learnt and mistakes within ELP. (PWR, 2006)

Competence Assurance in ELP

Staff competence managed by ELP Competence Based Development (CBD) process. Various facilities exist for ELP learning opportunities including classroom training in Learning and Development centre (ELP, 2006).

Planned Improvement

- Migration of Endams to .NET framework. Endams currently runs in a network server, IT personnel have to give access to users when users move to a different location. This is cumbersome and is time wasting. With the .NET framework, computers running connect seamlessly through the use of software browsers eliminating the need for creating access on every computer.
- Correct the data interpretation error in Endams, a script has been developed (Ezeani, 2006)
- ELP is already trying to exploit the opportunities of increasing network capacity for all network applications (Osuobeni, 2006).

ELP Environmental Performance

ELP environmental performance has continued to improve over the years. Its verified compliance regulations have also increased from 74% in 2003 to 92% by the end of 2005.

On Environmental Sustainability, using the GRI indicators, it is possible to show a table *(Table 1)* of the different areas where ELP sustainability report have indicated contribution to the Sustainability (MDG Goal 7) and to also see if corporate memory has an input into this improvement based on the data collected from the field.

GOAL 7	**Ensure environmental sustainability**			
GRI – Environmental Sustainability Sub headings	**MDG Target No.**	**ELP Sustainability Report**	**Linked to Corporate Memory**	**GRI Indicators reported on**
Materials	Target 9 & 10	Not Reported		
Energy	Target 9	Reported in detail. Evidence data available in report and more in ELP CM applications.[1]	Use of CM applications in collection, analysis and planning of activities for improvements.	EN3 EN4 EN17 EN19
Water	Target 10	Reported in details, documentation exists in the repository and used for planning.		EN5 EN20 EN22
Biodiversity	Target 9	Reported in details. Details exist in ELP repository.		EN6, EN7 EN23 EN25 EN26 EN27 EN29
Emissions, Effluent and Waste	Target 9 Target 10	Reported in fine details. Significant improvement.	Improvement shows trend to extensive use of CM applications to monitor and report performance as well as make future plans.	EN8 EN9 EN10 EN11 EN12 EN13 EN30 EN31
Suppliers	In-direct link to Target 9 & 10	Reported partly		EN33
Product & Services	Target 9	Reported partly but clear considerations and analysis exist within ELP.	Extensive use of CM to maintain evidence data and regular update & re-use of information from new learning. Heavy reliance on Opportunistic learning from past incidents.	EN14
Compliance	Target 9 & 10	Reported in details. Evidence available and linked to CM systems		EN16
Transport	Target 9	Mentioned in sustainability report and linked to energy use.	Reliance on CM applications for planning, and use of opportunistic learning from past incidents.	EN34
Overall	Indirect link	ELP reports it total environmental Expenditure and there is evidence of increased commitment.	Extensive use of CM application for planning and budgeting for the organisations Management Improvement Programmes.	EN35

Table 1 – ELP Corporate memory linkages with environmental sustainability

ELP recognised limitations exist in the correctness of the data from HSE and SCD are due to variations in estimates, instrumentation accuracy and the need for professional judgement. (ELP, 2004)

SWOT Analysis

In order to determine the strength and weakness of the ELP corporate memory systems as planned from the objectives of this study, eight parameters were used in the questionnaires. The analysis from the questionnaires and interview enable the proper conduction of the SWOT analysis.

From the findings discussed above, the issues raised will be categorised under strengths, weakness, opportunities and threats (SWOT) in order to provide an overall analysis of the findings. The SWOT analysis is further sub divided into three class; Agent, Structure and Regulation and defined below where:

- 'Agent' relates to ELP or staff action or responsibility and all people related issues.
- 'Regulation' relates to procedures, standards and enforcing compliance to requirements.
- 'Structure' relates to hardware and software design, implementation and layout.

[1] *CM – Corporate Memory*

S/n	Strength	Weakness	Opportunity	Threat
1	Having various applications, databases & repositories making up the corporate memory system. ***(Structure)***	Low usage of LiveLink. ***(Regulation)***	Practices Worth Replicating (PWR) is a new drive to capture both reactive opportunistic and proactive innovative learning in the organisation. ***(Regulation)***	Organisational, tendencies to hide mistakes. ***(Agent)***
2	Use of Endams, Fountain & LiveLink for environmental data collection, analysis, storage & re-use. ***(Structure)***	Inability to update Endams for proper functionality. ***(Regulation)***	HSEGN & KSGN creates opportunity for implementation of best practice. ***(Structure)***	Inadequate Network capacity leading to downtime and organisation wide problems of corporate memory system. ***(Structure)***
3	Data quality improvement project (DQIP) in the organisation will ensure results from analysis and lessons learnt are reliable & reusable. ***(Regulation)***	Use of spreadsheet for manipulation and reporting due to functionality and access problems on Endams can lead to errors. ***(Structure)***	Globalisation of ELP processes. ***(Regulation)***	Poor evaluation of staff requirement for new applications. Change of 'ELP People' without evaluating the impact of this on other applications like Endams. ***(Agent)***
4	Having various methods for data collection encourage reporting. ***(Structure)***	Continued use of file servers by staff for storage and sharing of environmental data. ***(Agent)***	EMS certification programme is an opportunity to continually improve environmental performance ensuring regular maintenance of the corporate memory. ***(Regulation)***	Third party staffs potentially not covered in distribution of learning points are more than ELP staff and they are involved in high risks operations which border environmental sustainability. ***(Regulation)***
5	Use of Internet and Intranet application for distribution of learning points. ***e)***	Inadequate motivation for staff to report new lessons from individual experience which is where in most cases new knowledge originates. ***(Agent)***	Facilities and avenues for staff competence assurance like Learning and Development centre and virtual learning centre. ***(Agent)***	Poor integration of applications. For instance, Reports from all modules of Endams should be kept in LiveLink for re-use both staff generating these report use discretion to decide what to store. ***(Structure)***
6	Development of Knowledge based networks for HSE professionals to utilise when they encounter problems. ***(Structure)***	Continued utilisation of PEAK & PRISM for storage of environmental data may lead to errors from duplication. ***(Regulation & Agent)***	Data errors were identified in the WMM. This due to non adherence to the approved procedures. ***(Regulation & Agent)***	Change management ***(Agent)***
7	Regularly updated.	Poor analysis for new learning from environmental activities. ***(Agent)***		Inadequate re-use of available knowledge may lead to knowledge decay. ***(Agent)***
8		No proactive effort to develop innovative learning. ***(Agent)***		Cost of knowledge production and management not reported in environmental expenditure. ***(Agent)***

Table 2 – SWOT Analysis

V. Discussion of Findings

A robust corporate memory system is implemented in ELP with various applications, databases and repositories enabling ELP to utilise knowledge from different aspects of its business for continued improvement of both its product & services and its environmental performance as presented above. The combination of different systems for data collection, analysis and storage is a major strength in ELP corporate memory system. ELP's plans for continuous Improvement of documentation and data improvement are in line with current trends. Use of large networks and exploitation of internet technology allows ELP to learn from other group members and availability of the corporate memory systems within the organisation even at remote locations is really good. The strengths identified in ELP environmental performance and indeed show commitment to environmental sustainability. The use of the GRI reporting guidelines for reporting environmental performance which in line with ELP group globalisation drive adds credence to ELP commitment to sustainable development.

The numerous applications used in the corporate memory system reflect the diversity in ELP activities. However, as activities continue to increase and legislation becomes stricter, integrating these applications become pertinent to remain effective and efficient. ELP corporate memory is lacking in **integration** specifically

in applications for environmental data management. From the analysis, data transfer between applications is manual making it discretionary to staff.

Another major weakness is inadequate network capacity. This can result in a vicious cycle of:

- Under-utilisation of available knowledge from the repositories
- Discouraging of staff storing data in the system (why store if you cannot retrieve the data when you need it) and Data and Knowledge decay

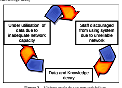

Figure 3 – Vicious cycle due to network failure

Over reliance on staff as the integrating link between systems applications is not advised. Locking out staff C- drive is currently used to address this but developing automated systems or applications could be more beneficial. Dynamism can bring about better improvement when carefully evaluated and strategically implemented but analysis reveals that in ELP though evaluation is carried out it is inadequate particularly when environmental data is considered. For instance, 'ELP People' was changed without evaluation of its impact on other applications linked to it and this lead to functionality problems in Endams (WMM).

VI. Conclusions and Recommendations

Conclusions

1. ELP corporate memory is system is robust in structure and has several applications, databases and repositories creating an opportunity to utilise knowledge from different aspects of its business.
2. Having several means of data collection, analysis and storage is a major strength in ELP corporate memory system.
3. Planned improvements if implemented will improve efficiency of the system.
4. The Knowledge based systems like the HSEGN is also a major strength because knowledge from a global team is utilised.
5. Use of globally acceptable standard for reporting environmental performance shows that ELP is in line with global trends.

Though ELP has achieved a lot in its corporate memory implementation weaknesses were identified and these are:

- Inadequate integration.
- Low usage of Live link after five years of launch
- Inadequate network capacity leading to degradation in performance and
- Over reliance on staff as the integrating link between system applications is a concern.
- Inadequate evaluation of change

  Finally, although not a weakness, costs of knowledge production and maintenance are not reported separately in sustainability report.

Lessons Learnt

The Lessons learnt from this study are that corporate memory is a system which comprises of various applications, databases and repositories including non-computational documentation use for data collection, analysis, storage and re-use within an organisation. It supports improve environmental performance which in

itself arises from the global expectation and pressure on organisations to show corporate social responsibility in sustainable development.

Recommendations for improvement

The following are proposed for ELP to improve on the weaknesses identified:

i.) Carry out detailed Investigation of the possibility of integrating key applications through the use of Artificial Intelligence.
ii.) Evaluate the impact of the use of Live Link to replace Endams and make necessary adjustment in Live Link performance to cover needs.
iii.) Improve on Regulation of the corporate memory system to ensure utilisation of applications.
iv.) Provide more flexible access to departmental who use Endams.
v.) Develop a strategy for staff motivation so as to enhance their response to reporting new initiative, share experience and use available knowledge proactively.
vi.) PWR should be reviewed and pursued more vigorously.
vii.) Increase network capacity to prevent the degraded performance.

Overall critique of this study

- Assumptions were made during the study, for instance asking all staff about the cause of failure of the applications implies that all staff have technical expertise to know the cause.
- Two questions from the questionnaire (No. 2 & 3) were not used for the analysis because respondents ticked almost every option. A pilot study may eliminate this type of situation in the future.
- Getting information on financial transactions in ELP was a challenge therefore no financial analysis other than the review of published environmental related cost.
- Overall, it was worthwhile conducting this study as it has led to very interesting findings which will provide a different perspective to corporate memory literature.

Future Research Interests

A similar study like this one conducted in another organisation operating in the petroleum mining sector will provide ample opportunity for proper comparison as well as show a different perspective to implementing corporate memory. Additionally an in-depth study of a specific application could enable proper comparison with available literature and will be an addition to current work in this area of knowledge management.

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