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Enterprise Performance Management and Flexibility: A case study of Indian upstream oil industry

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Introduction

Performance measurement is the process of assessing progress toward achieving predetermined goals. Performance management is building on that process, adding the relevant communication and action on the progress achieved against these predetermined goals.

Performance management is a set of processes that help businesses discover efficient use of their business units, financial, human and material resources. Its focus is on creating methodical and predictable ways to improve business results, or performance, across organizations.

Enterprise performance management helps organizations achieve their strategic goals. The objective of performance measurement has changed over the past few decades. Traditional performance measures based on financial or productivity are no longer appropriate in today's competitive global market. Alternative performance management systems have been proposed by many authors that incorporate variety of performance measures/ key performance indicators (KPI). These are sometimes called as Business Performance Management, Corporate Performance Management, Strategic Performance Management or Enterprise Performance Management but recently in generic term its being used as Enterprise Performance Management System (EPMS).

Review of various performance measurement system revealed that the limitations of traditional approaches to performance measurement have brought many emerging trends in performance management system development in order to produce world-class enterprise performance.

Many researchers tried to develop a model focusing a particular perspective and it could not give a comprehensive picture of business performance such as EVA, Activity Based Costing, Management Audit, Budgeting, TQM, Six Sigma, ISO, Skandia's intellectual capital navigator, Performance Benchmarking. Most of them lack in strategic perspective, comprehensiveness and integral view of the business performance.

Next generation of EPMS focused on strategic perspective and tried to incorporate comprehensive view of the business performance such as Balanced Scorecard(BSC) proposed by Kaplan and Norton(1992) and Performance Prism by Neely and Adams.

Globalisation and liberalisation has created competition, uncertainty and volatility which has put pressure on organizations to adapt rapidly and perform at higher level. The business environment is changing constantly and thus flexibility adoption has become imperative for enterprise to survive and perform. There are many types of flexibility such as strategic, organizational, functional, information system flexibility etc. In this case study, strategic and Information System (IS) flexibilities have been considered.

EPMS is a management tools for top management which incorporates many phases such as strategic planning, implementation, performance measurement, analysis and feedback, strategic and IS flexibilities and EPMS management.

Research Objective

Specific objective of the study are as under:

To assess the effectiveness of Enterprise Performance Management (EPM) in driving improvements in the organization. It has been studies to see that effectiveness of EPM is influenced by extent of strategic planning, effective strategy implementation, comprehensiveness of EPM system design, performance analysis and feedback mechanism, strategic flexibility, information system flexibility and EPMS management.

Review of Literature

Enterprise Performance Management

The traditional enterprise performance management were based on financial and cost parameters, which did not give true picture as to how enterprise business is moving and lack strategic focus. Hayes and Abernathy (1980) said that system designed for external reporting are heavily financially biased and not correctly used to manage enterprise. Skinner (1974) emphasized on strategic focus and competitive availability. Lynch and Cross (1991) proposed a structure of measures that permeate through the organization's hierarchy in order to integrate performance.

The other measures of quality, efficiency, productivity, market share, customer satisfaction, innovation, employee satisfaction known as leading indicators are more important which drive performance of enterprise. Many researchers have come out with various leading indicators to be considered in Performance management.

Chakravarthy BS (1986) said that traditional financial measures are inadequate for evaluating enterprise performance. He suggested two other measures such as stakeholder satisfaction and quality of enterprise transformation. Sink and Tuttle (1989) said that performance of an enterprise is a complex inter-related between seven criteria related to Effectiveness, Efficiency, Quality,

Productivity, Quality of Life, Innovation and profitability. They suggested four areas to focus on: Performance improvement planning, Measurement & Evaluation, Improvement & Control and cultural support system. As per Eccles RG (1992) leading indicators of business performance cannot be found in financial data alone. Quality, customer satisfaction, innovation, market share etc often reflect a company's economic condition and growth prospects better than its reported earnings do. Toni and Tonchia (2001) said that the traditional cost performances (the production costs and the productivity) are kept separate from the more innovative non-cost measures (quality, time and flexibility). To make effective, it should include financial and non-financial measure with greater consideration of human resources. Hayes TL, et el (2002) found a substantial relationship between unit-level employee satisfaction–engagement and these business-unit outcomes. Changes in management practices that increase employee satisfaction may increase business-unit outcomes, including profit.

Enterprise Performance Management methodology and tools have been suggested by various researchers. Dixon (1990) came out with Performance Measurement Questionnaire (PMQ) approach to find out strength an weaknesses of currently used in manufacturing performance measurement system. Performance measures used in PMQ were neither related to strategy of organization nor customers. SINTEF (1992): Another Performance Measurement system known as TOPP developed by SINTEF (1992) in which 4 methodologies are used: Self-Audit, Extended Audit (experts), Self Assessment and Benchmarking. It reviews performance along 3 dimensions: Effectiveness, Efficiency and changeability.

Kaplan & Norton (1992): Traditional financial measurements (e.g. ROI, EPS etc) provide misleading signals. They proposed a balanced set of measurement consisting of non-financial measures in addition to financial measures called Balanced Scorecard (**BSC)** where performance is measured along 4 dimensions: Financial, Customer, Internal Business Process and Innovation & Learning perspectives. It translates strategy into performance measures and targets and helps focus organisation what must be done to create break-though performance. Kaplan and Norton (2002): Building strategy focused organisation with BSC. To ensure strategy gets implemented, five principles of a strategy focused organisation to be followed: (i) Translate strategy to operational terms by strategy mapping and showing cause and effect linkage between measures. (ii) Align organisation to strategy: Strategy should align with resource, departments and business units. (iii) Make strategy everyone' everyday job: Its communication of organisation vision to everyone. It should be done by creating strategic awareness, align personal objective to and incentive compensation into organisation plan. (iv) Make strategy a continuous Process: Strategy to be ongoing and never ending process. The budgeting process to be linked with strategy. (v) Mobilise change through executive leadership: Senior executives through leadership to drive transformation. A survey result of 500 responses, only 15% showed breakthrough results as they have made BSC as integral part of strategic planning processes.

Neely & Adams(1998) conceptualized a Performance Prism framework which depicts the measurement as the process of gathering management intelligence. Performance Prism is a 3-dimensional model having 5 facets for delivering stakeholders value. Facets are: (i) Stakeholders Satisfaction: Who are stakeholders and their needs. (ii) Strategies: What strategy to be adopted to satisfy stakeholders needs? (iii) Processes: What are the required processes to execute these strategies? (iv) Capabilities: What capabilities needed to operate and enhance these processes.(v) Stakeholders Contribution: What stakeholders' contributions are required to develop and maintain these capabilities.

Some researchers have studied the effect of EPM implementation, causes of success and failures. Martinez and Kennerley (2005) studied EPM in Energy company in Europe and found that it has mix positive and negative effects of EPM. Eight positive effects of EPM are: Focus on important aspects, business improvement, improve customer satisfaction, increase productivity, alignment

of operation with strategy, improve employee satisfaction, continuous improvement culture and improve company reputation. On the other hand seven negative effects are: time consuming, considerable investment, bureaucratic, over-complicated measures, misleading prioritization, mechanistic and monotonous. Ittner CD and Larcker DF(2003) have studied more than 60 service and manufacturing companies and discovered that only few companies are able to achieve benefits of non-financial measures. The main reason are: Measures not linked to strategy, cause and effect relationship not validated, right performance target not set and measuring incorrectly i.e. statistical validity and reliability of metrics.

Strategic Flexibility

Bititci US, Turner T and Begemann C(2000) proposed a Dynamic performance measurement systems. External and internal environment of an enterprise is not static but is constantly changing. They suggested an external environment monitoring system, internal environment monitoring system, a review system to decide internal objectives and priorities and an internal deployment system to deploy the revised objectives and priorities to critical parts of the system. Sushil(2005) describes the flexible strategy framework to management continuity and change in the industry as large number of leading enterprises are facing tremendous turbulence. Continuity forces such as customer base, infrastructure, technology, core competence, culture etc and change forces such as globalization, competition, new opportunities, customer needs, new technology, merger & acquisition and government policies etc.

Information System Flexibility

Gebauer J and Schober F(2005) studied the information system flexibility and the performance of business processes at length. Presented a decision model to guide the investment in two types of information system flexibility(1) flexibility to use such as system functionality, data base, user interface and processing capacity and (2) flexibility to change such as technical staff availability, system integration, use and upgrade of the information system etc. Other business process characteristics of uncertainty, variability and time-criticality were also taken into consideration in the model objective to minimise overall investment and operational costs of the information system throughout the system lifetime.

Research Methodology

Enterprise Performance Measurement System (EPMS) should be integral part of Strategy Management cycle starting from Vision & Mission statement, Strategy definition to Review and final step refine Strategy based on Feedbacks. Two types of flexibilities such as Strategic and IS flexibility have also been incorporated.

Based on research objectives, research hypothesis have been designed. Accordingly, research questionnaire has been prepared and pilot tested. Primary data is collected through Questionnaire survey. Six-point scale (1 for strongly disagree to 6 for strongly agree) has been adopted in the questionnaire. The questionnaire has been distributed in paper format personally as well as through email to all respondents in oil industry in India and collected personally or through e-mail. More than 300 questionnaire have been distributed, but 115 have responded.

The Research Hypothesis Testing:

Effectiveness of Enterprise Performance Management is influenced by (1) Extent of Strategic Planning (2) Effective Strategy Implementation (3) Comprehensiveness of EPMS Design (4) Effective Performance Feedback Mechanism (5) Strategic Flexibility (6) Information System Flexibility (7) PMS Management Issues.

Data Analysis & Interpretation

The questionnaire data of 115 respondents received have been analysed in SPSS package for various analysis such as data validation, Univariate analysis, Factor analysis, Correlation and Regression analysis. 6-point scale was taken in the questionnaire and the results are tabulated below:

Univariate analysis for 70 independent variables and 37 dependent variables was done and its mean on 6-point scale ranged from 3.53 to 5.03 and standard deviation from 0.93 o 1.46, which gives enough confidence in mean value as indicative data.

Factor analysis has been carried out for EPMS independent variables and Effectiveness dependable variables. Factor loading of 0.5 has been taken. A total 22 Independent Factors and 8 dependent Effectiveness Factors have been derived from factor analysis, which are summarized below in Table-1 and Table-2 below.

Table-1: **Factor Analysis of EPMS Independent Variables:** **(*6-Point Lickerd scale)***

S.No	Independent Factors	EPMS Factor Description	Variable loaded on Factors	EPMS Factor Variance (%)	Mean	Std. Dev.
1	SPF1	Vision Mission definition	SSP1, SP2	47.42	4.90	0.87
2	SPF2	Strategic goal setting	SP4	32.71	3.95	1.22
3	SIF1	Strategic goals Objective definition	SI3, SI5	28.39	4.27	1.00
4	SIF2	Resources availability	SI8, SI9	25.98	4.28	1.06
5	SIF3	Vision Mission sharing	SI1	16.70	4.80	1.02
6	SIF4	Cost Time concern	SI10	11.90	4.32	1.09
7	SMF1	Measure/ KPI selection	SM10, SM11	27.37	3.72	1.12
8	SMF2	Domain selection	SM1, SM2, SM3	26.57	4.08	1.08
9	SMF3	Measure's importance weightage	SM14, SM15	22.13	4.00	1.18
10	SMF4	Customised EPMS	SM8	9.40	3.53	1.31

11	PAF	Analysis feedback	PA1 toA5	78.32	3.93	1.18
12	SFF1	Globalisation impact	SF5, SF6, SF7	26.91	4.71	0.98
13	SFF2	Inhouse resources strength	SF3, SF4	15.77	4.63	0.99
14	SFF3	Market forces	SF11, SF12	13.59	4.25	1.26
15	SFF4	Govt Policies	SF1	10.61	4.08	1.33
16	SFF5	e-business	SF10	10.58	4.57	1.04
17	SFF6	Govt support	SF13	7.75	4.75	1.01
18	IFF1	Computer based EPMS	IF1 to IF4	45.90	4.36	1.00
19	IFF2	Flexible IT for EPMS	IF6, F7	32.87	4.24	1.08
20	MIF1	Management Use of EPMS	MI1, MI2	22.34	3.90	1.13
21	MIF2	Dedicated implementation	MI10	22.14	3.71	1.33
22	MIF3	Direct reporting to CEO	MI11	16.65	3.87	1.36

Table-2: **Factor Analysis of EPMS Dependent Effectiveness Variables: (*6-Point Lickerd scale)***

S.No	**EPMS Dependent Effectiveness Factors**	**EPMS Factor Description**	**Variable loaded on Factors**	**EPMS Factor Variance (%)**	**Mean**	**Std. Dev.**
1	ESAF	Strategic Alignment	ESA1 to ESA4	88.77	3.94	1.15
2	ESMF	Strategic Performance reporting	ESM1 to ESM6	86.02	4.01	1.11
3	EOFF	Enhance financial growth	EOF1 to EOF5	82.12	4.32	1.17
4	EOCF	Value creation for customer	EOC1 to EOC5	85.67	4.18	1.42
5	EOBF1	Internal business process improvement	EOB1 to EOB4, EOB6	55.90	4.11	1.01
6	EOBF2	Effective reward incentives	EOB9 EOB10	25.88	3.79	1.20
7	EOLF1	Employee development	EOL to EOL4, EOL6	58.14	4.21	0.95
8	EOLF2	Employee satisfaction	EOB5	23.08	4.16	1.28

The EPMS dependent and Independent Effectiveness Factors' variance is high, which means that they are able to measure the underlying variables very effectively.

EPMS Effectiveness:

EPMS effectiveness has been studied from six perspectives:

- Strategic Alignment(**ESA**)
- Strategic Monitoring(**ESM)**
- Strategic Objective Attainment-Financial (**EOF**)
- Strategic Objective Attainment-Customer (**EOC**)
- Strategic Objective Attainment-Business Process (**EOB**)
- Strategic Objective Attainment-Learning and Growth (**EOL**)

Correlation analysis between 22 EPMS Independent Factors and 8 EPMS dependent Effectiveness Factors has been carried out to prove the hypotheses and the result are placed in Table-3.

Table-3: **Correlation between EPMS Independent Factors and EPMS dependent Effectiveness Factors**

	ESAF	**ESMF**	**EOFF**	**EOCF**	**EOBF1**	**EOBF2**	**EOLF1**	**EOLF2**
SPF1	0.424**	0.505**	0.332 **	0.258 **	0.374 **	0.216 *	0.403 **	0.046
SPF2	0.383**	0.366 **	0.376**	0.327**	0.374 **	0.344 **	0.378**	0.207*.
SIF1	0.551**	0.551**	0.429 **	0.349**	0.508 **	0.347 **	0.574**	0.302**
SIF2	0.435**	0.446 **	0.387 **	0.358**	0.363 **	0.277 **	0.563**	0.235*
SIF3	0.348**	0.333**	0.405 **	0.320**	0.277 **	0.213*	0.383**	0.179
SIF4	0.434**	0.414 **	0.444**	0.427 **	0.447 **	0.362 **	0.426**	0.210*
SMF1	0.748**	0.757**	0.539 **	0.480 **	0.655 **	0.489 **	0.647**	0.325**
SMF2	0.687**	0.722**	0.570**	0.449**	0.563**	0.422**	0.608**	0.298**
SMF3	0.657**	0.716**	0.531**	0.377**	0.556**	0.462**	0.593**	0.279**
SMF4	0.365**	0.385**	0.223*	0.269**	0.337**	0.397**	0.319**	0.094
PAF	0.761**	0.793**	0.617**	0.430**	0.689**	0.531**	0.601**	0.381**
SFF1	0.493**	0.536**	0.491**	0.260**	0.549**	0.323**	0.477**	0.297**

SFF2	0.404**	0.420**	0.408**	0.294**	0.526**	0.306**	0.502**	0.438**
SFF3	0.518**	0.531**	0.521**	0.587**	0.560**	0.379**	0.516**	0.283**
SFF4	0.304**	0.319**	0.369**	0.298**	0.406**	0.164	0.323**	0.300**
SFF5	0.409**	0.423**	0.302**	0.278**	0.307**	0.253**	0.480**	0.163
SFF6	0.375**	0.383**	0.446**	0.281**	0.449**	0.271**	0.453**	0.299**
IFF1	0.722**	0.816**	0.703**	0.580**	0.721**	0.522**	0.716**	0.526**
IFF2	0.381**	0.477**	0.434**	0.372**	0.467**	0.324**	0.452**	0.316**
MIF1	0.783**	0.806**	0.642**	0.392**	0.731**	0.609**	0.690**	0.452**
MIF2	0.714**	0.740**	0.664**	0.503**	0.662**	0.469**	0.634**	0.514**
MIF3	0.590**	0.613**	0.504**	0.299**	0.486**	0.408**	0.479**	0.270**

**** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed).**

Table-3 shows the strong correlation between EPMS Independent Factors and EPMS Dependent Effectiveness Factors where in most cases its two star (**).

Regression Analysis:

Stepwise regression using probability of F (entry level 0.05 and removal at 0.10, excluding cases listwise for missing values) for each EPMS dependent effectiveness factors with EPMS independent factors and summary statistics are placed below in table-4.

Table-4: Regression model summary

EPMS Dependent Effectiveness Factor	**R square**	**Std Error**	**F**	**Sig. of F**	**EPMS Const/ Indep. Factor (predictors)**	**B**	**T**	**Sig. of T**
ESAF	0.772	0.556	109.62	0.000	Const	0.113	0.510	0.611
					SMF1	0.495	6.573	0.000
					MIF2	0.233	3.993	0.000
					MIF1	0.277	3.331	0.001
ESMF	0.835	0.471	79.087	0.000	Const	-0.399	-1.299	0.197
					IFF1	0.288	3.180	0.002

					MIF1	0.260	3.651	0.000
					SMF1	0.273	3.790	0.000
					MIF2	0.185	3.267	0.002
					SPF1	0.244	3.220	0.002
					SIF3	-0.144	-2.418	0.018
EOFF	0.608	0.774	37.279	0.000	Const	-0.002	-0.005	0.996
					IFF1	0.385	3.102	0.003
					MIF2	0.275	3.025	0.003
					SFF3	0.177	3.544	0.013
					SIF4	0.200	2.391	0.019
EOCF	0.599	0.788	23.435	0.000	Const	-1.189	-2.189	0.031
					IFF1	0.581	5.836	0.000
					SFF3	0.219	3.047	0.003
					SPF2	0.315	3.829	0.000
					SFF6	0.280	3.158	0.002
					SIF1	0.388	-3.117	0.002
					SIF2	0.228	2.409	0.018
EOBF1	0.755	0.523	40.90	0.000	Const	0.320	0.925	0.358
					MIF1	0.292	3.803	0.000
					MIF2	0.173	2.661	0.009
					IFF1	0.275	2.894	0.005
					SFF6	0.157	2.804	0.006
					SFF5	-0.217	-3.494	0.001
					SMF4	0.125	2.754	0.007
					SFF2	0.136	2.116	0.037

EOBF2	0.448	0.915	39.833	0.000	Const	0.491	1.314	0.192
					MIF1	0.622	6.895	0.000
					SMF4	0.224	2.998	0.000
EOLF1	0.669	0.558	48.411	0.000	Const	0.335	1.149	0.253
					IFF1	0.286	3.074	0.003
					SFF3	0.111	2.063	0.042
					SIF2	0.243	3.905	0.000
					MIF1	0.278	3.234	0.002
EOLF2	0.443	1.000	15.130	0.000	Const	2.699	3.687	0.000
					MIF2	0.197	1.690	0.094
					SFF2	0.308	2.540	0.013
					SPF1	-0.443	3.341	0.001
					IFF1	0.592	3.340	0.001
					SFF5	-0.243	-2.122	0.036

From Table-4, R Square in most cases are above 0.60 i.e. 60 % of variation in dependent factors are explained by the independent factors except in case EOBF2 and EOLF2 where R Sq is 0.45. F-test indicate that Significance of F < 0.05, that is all the 8 models are overall good at confidence limit > 95%. T-test for the model indicate in above Table that Significance of T is < 0.05 (above 95% confidence level) i.e. all the independent factors are significant in the models. Equations between EPMS Effectiveness Dependent Factors and Independent Factor have been formed as given below:

ESAF = 0.11 + 0.5 SMF1 + 0.23 MIF2 + 0.27 MIF1.
ESMF = - 0.40 + 0.28 IFF1 + 0.26 MIF1 + 0.27 SMF1 + 0.19 MIF2+ 0.24 SPF1 – 0.14 SIF3.
EOFF = - 0.002 + 0.36 IFF1 + 0.28 MIF2 + 0.18 SFF3 + 0.2 SIF4.
EOCF = - 1.19 + 0.58 IFF1 + 0.22 SFF3 + 0.32 SPF2 + 0.28 SFF6 – 0.39 SIF1 + 0.23 SIF2.
EOBF1 = 0.32 + 0.29 MIF1 + 0.17 MIF2 + 0.28 IFF1 + 0.16 SFF6 – 0.22 SFF5 + 0.13 SMF4 + 0.14 SFF2.
EOBF2 = 0.49 + 0.62 MIF1+ 0.22 SMF4.
EOLF1 = 0.34 + 0.29 IFF1 + 0.11 SFF3 + 0.24 SIF2 + 0.28 MIF1.
EOLF2 = 2.70 + 0.20 MIF2 + 0.31 SFF2 - 0.44 SPF1 + 0.59 IFF1 - 0.24 SFF5.

EPM strategic alignment will increase if Measure/ KPI selection is appropriate, or if EPM is implemented with dedication, or if EPMS is used effectively by the Management.

EPM strategic performance reporting will increase if EPMS is computerized, or if EPMS is used effectively by the Management, or if Measure selection is appropriate, or if EPM is implemented with dedication, or if vision & mission is defined clearly, or decrease in vision & mission sharing.

EPM will lead to enhanced financial growth if EPMS is computerized, or if EPM is implemented with dedication, or if marker forces are favourable, or if Management is concerned with cost & time over-run.

EPM will lead to value creation for customers if EPMS is computerized, or if marker forces are favourable or if strategic goals setting by consensus, or if Govt. is supportive, or if resources availability is adequate, or decrease if strategic goals are defined clearly.

EPM will lead to business process improvement if EPMS is used effectively by the Management, or if EPM is implemented with dedication, or if EPMS is computerized, or if Govt is supportive or if customised EPMS is used, or if inhouse resources strength in increased, or decrease if e-business is implemented.

EPM alignment with reward and incentives if EPMS is used effectively by the Management, or if customised EPMS is used.

EPM will lead to employee development if EPMS is computerized, or if marker forces are favourable, or if resources availability is adequate, or if EPMS is used effectively by the Management.

EPM will lead to employee satisfaction if EPM is implemented with dedication, or if inhouse resources strength in increased, or if vision & mission is defined clearly, or if EPMS is computerized, or decrease if e-business is implemented.

Conclusion & Recommendations

The results shows very positive results on the expected lines. In the Indian upstream oil organisations under study, Strategy Planning, Strategy implementation, EPM System design, Strategic flexibility, Information system flexibility and EPMS Management issues are strongly correlated with EPMS Effectiveness in the six perspective under study while EPMS Performance analysis and feedback is not well integrated with EPMS effectiveness. Perfprmance feedback , Vision and Mission sharing, clear strategic goals setting and clarity and e-business enabling should be done to give better results of the EPMS to the organisations under study.

The study suggests that all the hypothesis are found to be true i.e. effectiveness of EPMS is dependent & strongly correlated to Extent of strategy planning, Effectiveness of strategy implementation, Comprehensiveness of PMS design, Performance analysis and effective feedback mechanism, Strategic flexibility, IS flexibility and PMS Management issues.

Limitations of the Research

The research is limited to 9 organisations. Many private oil companies did not respond. To get a clear and broader picture of EPMS in oil industry, the research should be extended to more oil companies. The benefits of EPMS implementation have not been analysed in detail.

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