Strategic performance management system in uncertain business environment

An empirical study of the Indian oil industry

Mohammad Akhtar
Faculty of Management Studies, University of Delhi, Delhi, India and Strategy, Corporate Performance Management and IT Consultancy, Delhi, India, and
Sushil
Indian Institute of Technology Delhi, Delhi, India

Received 1 May 2017
Revised 21 December 2017
Accepted 22 January 2018

Abstract

Purpose – Business performance management describes the processes, methodologies, metrics and systems needed to measure and manage the performance of an enterprise. Traditional performance management systems were based on financial and productivity measures but the alternate measures proposed in last more 25 years have strategic focus and incorporate variety of performance measures such as efficiency, effectiveness, productivity, quality, customer satisfaction, innovation and employee satisfaction in addition to financial. Globalization and modernization have created a business environment uncertain with associated risks which has necessitated the incorporation of various types of flexibilities such as strategic, technical, operational, information system (IS), etc. Critical success factors and implementation issues also need to be incorporated to succeed. The purpose of this paper is to present the strategic performance management system (SPMS) designed, incorporating flexibility and implementation issues, and its effectiveness empirically validated from Indian oil industry.

Design/methodology/approach – Based on literature review and gaps identified, a proposed model of enterprise performance management system incorporating flexibility, critical success factors and implementation issues was developed. Macro- and micro-level factors impacting the effectiveness of the model were identified, and hypotheses were developed and tested empirically from the survey study of Indian oil industry.

Findings – The finding met, by and large, most of the research objectives. In total, 7 macro- and 11 micro-level factors came out from the study. The strategy planning, strategy implementation, strategic flexibility (SF), SPMS design, information system flexibility (IF) flexibility, implementation issues and critical success factors, and performance feedback and learning are the macro-level factors impacting the SPMS effectiveness in measuring and managing performance of an enterprise. The SPMS implementation issues have proved to be major driver of effectiveness.

Research limitations/implications – The research like many such researches had limited resources, data availability and bias of respondents. However, the model was statistically validated for its reliability and hypothesis testing. The research has added to literature on SPMS as integrated model incorporated SF, information flexibility and critical success factors. However, the effect of other types of flexibilities such as organizational, operational, HR, marketing, etc., and other stakeholders should also be studied in future research to broaden the findings.

Practical implications – The validated SPMS has practical implications for academics and researchers. Strategic and IF, and critical success factors have been incorporated in the integrated model to take care of business uncertainties so that it is strategically aligned and facilitate in effective SPMS use and implementation.

Social implications – Though it has no direct social implication but, if adopted for social projects and not-for-profit organizations, it will have social benefits of efficient and effectiveness delivery of social projects and initiatives.

Originality/value – This is an original work carried out by the authors. The validated model along with interpretation is presented.

Keywords Performance measurement, Performance management system, Strategic performance management, Business performance improvement, Performance management effectiveness, Strategic and IS flexibility

Paper type Research paper

Business Process Management Journal
Vol. 24 No. 4, 2018
pp. 923-942

1463-7154
DOI 10.1108/BPMJ-05-2017-0102

1. Introduction

The strategic performance management (SPM) is the process of measurement and management of an enterprise performance which describes the processes, methodologies, metrics and systems needed to measure and manage performance of the organization. It has evolved over a period of time from simple to strategically aligned multidimensional performance management. It is also known as enterprise performance management (EPM), business performance management (BPM) and corporate performance management (CPM). The key performance indicators (KPIs) help to measure the progress of the companies, business units, projects or individuals compared to their strategic goals and objectives. Different frameworks and models of SPM have been developed in last three decades, incorporating a variety of performance measures such as efficiency, effectiveness, productivity, quality, customer satisfaction, innovation and employee satisfaction in addition to financial to produce world-class enterprise performance; Six Sigma (1985), activity -based costing (ABC) (1988), total quality management (TQM), EFQM excellence model (1991), Malcolm Baldrige National Quality Award (MBNQA) (1987), balanced scorecard (BSC) (Kaplan and Norton, 1992, 1996) and performance prism (Neely and Adams, 2001). These models are not free from implementation issues and failures like other management tools and frameworks. Few studies have brought out the reasons for unsuccessful implementations and failures of BPM.

The dynamic business environment due to globalization, liberalization and modernization is posing great business risks. The turbulence and uncertainty in business environment necessitate the incorporation of various types of flexibilities such as strategic, technical, operational, information system (IS), etc. (Sharma *et al.*, 2010; Sushil, 2012, 2015, 2016). The implementation issues and critical success factors also need to be taken care of in the model. Performance of oil industry is affected by global factors such as fluctuation in oil and natural gas price and consumption, capital investment and environmental concern. A comprehensive SPM model incorporating flexibility needs to be developed to measure the enterprise performance in oil industry in uncertain business environment. Such a model has been developed and empirically tested in the Indian oil sector which is presented in this paper.

2. Literature review

The performance management system (PMS) has been in use in many organizations for a long time. Traditional systems concentrated more on financial or productivity aspects. Latest generation of PMSs which came up in last 20 years are multi- dimensional and mainly focusing on strategic perspective. A strategic performance management system (SPMS) is a system having set of performance measures or KPIs to quantify the efficiency, productivity, quality and effectiveness of actions undertaken by the enterprise so as to monitor, control, manage and perform the activities. The information generated by the system must be accurate, relevant, timely and easily accessible for the persons who need them (Neely *et al.*, 1995; Bourne *et al.*, 2002, 2003). Alternate SPM models such as ABC (1988), TQM, Six Sigma (1985), MBNQA (1987), EFQM excellence model (1991), BSC (Kaplan and Norton, 1992, 1996) and performance prism (Neely and Adams, 2001) have been developed by various researchers and implemented across the world by hundreds of organizations from different industries and sectors. There are many success and many failed implementation across the globe. Few studies have been conducted to find out the reasons of success and failures, critical success factors and the effect of SPM implementation.

Business excellence model, developed by The European Foundation for Quality Management (EFQM, 1991), is a self- assessment framework consisting of nine criteria for measuring the strengths and areas for improvement of an organization. Five enablers are leadership, people, policy and strategy, partnership and resources, and processes, while four results criteria are people, customer, society and KPIs. BSC (Kaplan and Norton, 1992, 1996)

incorporates a balanced set of leading and lagging, financial and non-financial performance measures or indicators from four perspectives of financial, customer, business process, and learning and growth to drive performance improvement. Performance prism (Neely and Adams, 2001) is a three-dimensional model having five facets for delivering stakeholders value, and stakeholders' satisfaction, strategies, processes, capabilities and stakeholders contribution. Additional measures suggested are stakeholder satisfaction and quality of enterprise transformation (Chakravarthy, 1988), quality, time and flexibility (Toni and Tonchia, 2001). PMS has a positive benefit of effective communication (Malina and Selto, 2001). The effect of non-financial measures on firm performance is contingent on the firm's operational and competitive characteristics (Said *et al.*, 2003). The use of highly balanced PMS results in well-balanced decision making and business results (de Waal, 2003). Performance management ensures resources use including human resources to attain desired goals (Halachmi, 2005). A review of trends in performance management for last two decades is given by Yadav *et al.* (2013). Innovation and flexibility effects the survival, growth and performance of an organization (Bishwas, 2015). Srivastava (2014) suggested that the act approach, focusing on execution leadership, communication etc., significantly improves the strategy execution when supported by the adapt practices such as incorporation of reflection, adaptive culture, etc.

SPM implementation has found to have both positive and negative impacts in many studies. Performance management has a greater impact on the strategic planning processes in large organizations operating in a rapidly changing environment (Tapinos *et al.*, 2005). BSC implementation in Chinese manufacturing firms has been found to have linkage with performance (Fleming *et al.*, 2009). The synchronization of long-term planning, short-term planning and management reporting helps in realizing the benefit of the PMS (Thomas and William, 2005). A framework integrating five systems which include performance system, cost system, capability evaluation system, benchmarking system and planning system has been suggested for SPM success (Taticchi *et al.*, 2008, 2012). The data generation in respect of non-financial measures such as market share, quality, innovation, customer satisfaction and employee satisfaction is less often quarterly or annual, and rarely becomes part of regular reporting to managers. The flow of information at various levels in the organization affects the performance measurement and decision making (Eccles, 1991). Developing information architecture, aligning with incentive and led by CEO are important success factors of SPM (Eccles, 1991). The resistance to SPM implementation can be overcome by adopting a top to bottom measurement architecture, systematic review and integrated planning and budgeting processes (Meekings, 1995). SPM implementation issues are the lack of leadership and resistance to change (Hacker and Brotherton, 1998), problem of identifying true drivers (Schneiderman, 1999; Bierbusse and Siesfeld, 1997), large number of measures (Bierbusse and Siesfeld, 1997), metrics poorly defined (Schneiderman, 1999), difficulty in decomposing goals to lower level in the organization (Schneiderman, 1999), goals are negotiated (Schneiderman, 1999), flow of information (Eccles, 1991), need for a highly developed IS (Bierbusse and Siesfeld, 1997), time and expense (Lewy and Du Mee, 1998; Schneiderman, 1999), and striving for perfection (Lewy and Du Mee, 1998; Schneiderman, 1999) and non-financial measures rarely monitored (Eccles, 1991). 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 performance indicators, are reasons for not being able to achieve benefits of non-financial measures in SPM (Ittner and Larcker, 2003). The SPM implementation in European energy companies found a mix of positive (focus on important aspects, business improvement, improvement in customer satisfaction, increase in productivity, alignment of operations with strategy, improvement in employee satisfaction, continuous improvement culture, and improvement in company reputation) and negative (time consuming, considerable investment, bureaucratic, overcomplicated measures, misleading prioritization, mechanistic

and monotonous) effects (Martinez and Kennerley, 2005). The modern frameworks have not addressed the practicalities of measurement and to fulfill the unique measurement needs of a specific company, particularly at the operational level (Tangen, 2004). Four SPM implementation barriers are: action not linked to strategy, strategy not linked to department, team and individual goals, strategy not linked to resources allocation and feedback is not strategic (Kaplan and Norton, 1996). A poor design and the difficulty of implementation are reasons of SPM failure (Bourne *et al.*, 2002, 2003). The reasons of the failure of BSC implementation are not selecting right and critical measures, not aligned with strategy, lack of senior management commitment, not sharing and communicating in the organization, too long development process and used only for compensation (Kaplan and Norton, 2000); the lack of acceptance by the employees, which is due to inadequate communication by the management, leads to weak BSC implementation (Chen and Jones, 2009). SPM implementation issues and critical success factors are SPM use by the top management, right and adequate measures, use as strategic tool, quality of data, flow of data, good organizational acceptance, implementation by champions and aligned incentive scheme (Akhtar and Mittal, 2015).

Flexibility is the ability to precipitate intentional changes and adapt to environmental changes through continuous re-thinking of current strategies, asset deployment and investment strategies (Evans, 1991; Rahrami, 1992; Sanchez, 1995). A high degree of positive association between manufacturing flexibility, performance measurement and organizational performance has been found in manufacturing firms (Chenhall, 1996; Mishra *et al.*, 2014). A direct effect of strategy on flexibility and flexibility on performance has been studies in 175 Canadian SME manufacturing companies related to supply chain (Fantazy *et al.*, 2009). Integrating operations strategy and operations performance measurement system leads to consistent strategy implementation (SI) (Edson *et al.*, 2009). The strategic, financial, marketing and operational flexibilities are found to be the best predictors of competitiveness and affect various perspectives of performance (Sharma *et al.*, 2010). A flexible strategy game-card is developed to balance the dual perspectives, namely,. enterprise perspective and customer perspective (Sushil, 2010, Yadav, 2014). Flexibility has important consequences for the operational efficiency and long-term effectiveness of an enterprise system (Gebauer and Lee, 2008). SPM use by the top management is strongly associated with comprehensive strategic decisions, which affects corporate strategic change (Gimbert *et al.*, 2010). Information system flexibility (IF) has several dimensions such as compatibility, functionality, data transparency, connectivity, technical and functional skill and technology management. It is positively correlated with mass customization, market position and innovativeness of the organization (Byrd and Turner, 2000). User's internal flexibility, user participation and usage flexibility increases the IF (Palanisamy and Foshay, 2013).

3. Need for the study

SPM has grown from singular to multidimensional in recent years. Multiple dimensions and perspectives of thw measurement of financial, customer, vendor, employee, internal business process, strategic alignment (SA) and strategic monitoring have been incorporated. The implementation have resulted into organizational focus on improvement of business, customer satisfaction, productivity, employee satisfaction, culture, and company reputation, and alignment of operations with the strategy, but there are failures and implementation issues.

Globalization and liberalization have increased the turbulence in external business environment and consequently high degree of uncertainty and business risks. To manage these uncertainties, various types of flexibilities such as strategic, organizational, operational, functional, manufacturing, external, internal and IFs need to be incorporated to remain competitive in today's environment.

Context of the study

The oil industry is very risky and capital-intensive. The price of oil and natural gas fluctuates due to global factors that affects enterprise performance of oil companies. Hence, the adoption of SPM incorporating flexibilities is far more important for the oil industry. It has also been found from literature review that enough studies are not available on SPM of oil industry. Moreover, the available literature on SPM lacks in comprehensiveness, integrated approach covering complete cycle of performance management, including the effect of implementation issues and critical success factors on the SPM effectiveness in driving performance improvement in the organization.

The research gaps identified from the literature review are as follows:

- many studies highlighted different dimensions of measurement and linkages on EPM system but lacking in an integrated study covering strategy planning (SP), SI, PMS design, and performance feedback and learning to assess SPM effectiveness;
- some models included flexibility but strategic flexibility (SF) and IF as a core driver of PMS effectiveness is almost missing; and
- PMS implementation issues and their impact have been examined in some studies, but an integrated study incorporating the role of implementation issues and key success factors is lacking.

Research questions

The Indian upstream oil companies mostly have been using the traditional PMS. Few companies in recent years, have adopted newer and comprehensive SPM models focusing on strategic performance. Based on literature review and gaps identified, following research questions are undertaken in this study:

RQ1. What is the effect of extent of SP and its linkage on SPM effectiveness?

RQ2. What is the effect of SF incorporation on SPM effectiveness?

RQ3. What is the effect of SI linkage on SPM effectiveness?

RQ4. What is the effect of comprehensiveness of PMS design on SPM effectiveness?

RQ5. What is the effect of IF incorporation on SPM effectiveness?

RQ6. What is the effect of critical implementation issues on SPM effectiveness?

RQ7. What is the effect of performance feedback and learning on SPM effectiveness?

Research objectives

The objective is to design an strategic performance measurement and management system (SPMS) and test its effectiveness in driving performance improvement in Indian upstream oil industry through empirical validation and then to evolve a validated SPMS effectiveness model. The above research questions helped us in setting the following research objectives:

- to explore the status of SPM use in the Indian upstream oil industry;
- to assess SF and IF prevailing in the upstream oil industry;
- to identify the critical SPM implementation issues in the upstream oil industry; and
- to design an SPM model for measuring and managing performance of an enterprise.

4. Research methodology

The Indian oil sector is composed of both public (government-owned) and private companies. Private companies are new as they came up after the liberalization of oil sector in India allowing private sector participation. The unit of analysis is oil company and the sample is taken from the managers in the oil sector. The study is an empirical research based on survey method. The validated SPM model is presented with interpretation and implementation guidelines.

Survey method

Based on in-depth literature review, various aspects of SPM design, implementation and effectiveness issues have been identified, and a conceptual SPMS effectiveness framework has been formulated (Figure 1). The variables for investigation were identified (Tables I and II) that were used for data collection through a survey study.

Hypotheses

Based on the conceptual framework developed (Figure 1), a set of macro hypotheses has been formulated (Table III). Further, micro hypotheses are formulated for each micro variables that describe the macro variables. The hypotheses are statistically tested by conducting a questionnaire-based survey in Indian upstream oil companies.

Macro hypotheses. Macro null and alternate hypothesis are defined as follows:

H_0. Independent macro variables are not a predictor of SPMS effectiveness.

H_1. Independent macro variables are a predictor of SPMS effectiveness.

Micro hypotheses. Micro null hypothesis are defined as follows:

(1) H0FiEj ($i = 1, \ldots, 16, j = 1, \ldots, 6$): ith type of factor does not influence jth type of the effectiveness area.

(2) HFiEj ($i = 1, \ldots, 16, j = 1, \ldots, 6$): ith type of factor influences jth type of the effectiveness area.

The micro hypothesis H_{SP1SA} will mean that vision and mission clarity (SP1) influence SPMS SA. Similarly, other micro hypothesis can be explained.

5. Data collection and analysis

The Indian oil sector consists of 15 oil and gas companies including public and private. Since it was an issue of the performance of the organization, managers were not willing to share

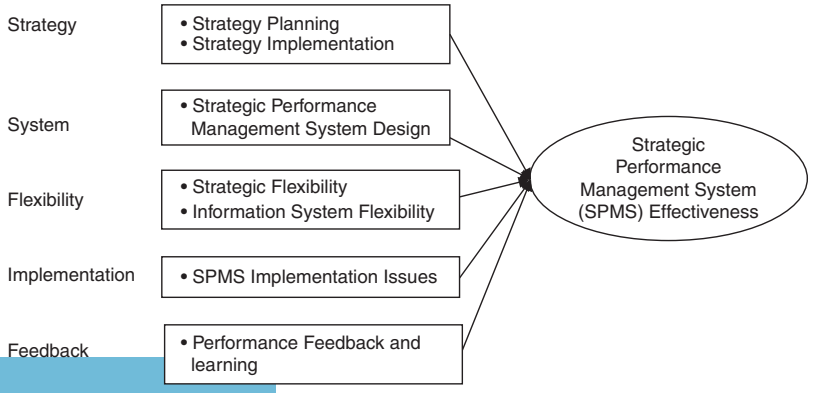

Figure 1.
Conceptual SPMS model of research

Macro variables of SPMS effectiveness	Micro variables influencing SPMS effectiveness	Author(s)
Strategy planning (SP)	Vision and mission clarity Setting of strategic goals	Kaplan and Norton (1992, 1996, 2000), Neely and Adams (2001), EFQM (1991), Meekings (1995), Thomas and William (2005), Ittner and Larcker (2003), Tapinos *et al.* (2005), Taticchi *et al.* (2008, 2012)
Strategic flexibility (SF)	Impact of globalization/ liberalization In-house capabilities External drivers E-business impact	Toni and Tonchia (2001, 2005), Fantazy *et al.* (2009), Chenhall (1996), Evans (1991), Sanchez (1995), Sharma *et al.* (2010), Bishwas (2015), Sushil (2015, 2016)
Strategy implementation (SI)	Alignment with operational goals Resources allocation Sensitivity to time and cost overruns	Kaplan and Norton (1992, 1996, 2000), Lynch and Cross (1991), Neely and Adams (2001), Edson *et al.* (2009), Taticchi *et al.* (2008, 2012), Srivastava (2014)
SPMS design (SM)	Selection of measures Weightages and reviews of Measures Customized SPMS	Kaplan and Norton (1992, 1996), EFQM (1991), Schneiderman (1999), Bierbusse and Siesfeld (1997), Neely and Adams (2001), Eccles (1991), Meekings (1995), Ittner and Larcker (2003), Bourne *et al.* (2002, 2003), Taticchi *et al.* (2008, 2012)
Information system flexibility (IF)	SPMS functionalities IT flexibility	Byrd and Turner (2000), Gebauer and Lee (2008), Sharma *et al.* (2010), Palanisamy and Foshay (2013)
SPMS implementation issues (MI)	Effective SPMS implementation Top management support Quality of data	Martinez and Kennerley (2005), Ittner and Larcker (2003), Eccles (1991), Hacker and Brotherton (1998), Lewy and Du Mee (1998), Schneiderman (1999), Kaplan and Norton (1996, 2000), Bourne *et al.* (2002, 2003), Tangen (2004), Chen and Jones (2009), Gimbert *et al.* (2010)
Performance feedback and learning (PL)	Performance reporting, feedback and learning	Kaplan and Norton (1992, 1996, 2000), Neely and Adams (2001), Meekings (1995), Meekings (1995), Thomas and William (2005)

Table I.
Independent variables of strategic performance management system

Micro variables of SPMS effectiveness	Author(s)
Strategic alignment (SA)	Kaplan and Norton (1992, 1996, 2004), Neely and Adams (2001), Skinner (1974), Sushil (2009)
Strategic monitoring (SM)	Kaplan and Norton (1992, 1996, 2004), Neely and Adams (2001), Sushil (2010)
Financial perspective (FP)	Kaplan and Norton (1992, 1996), Neely and Adams (2001), Fleming *et al.* (2009), Martinez and Kennerley (2005)
Customer perspective (CP)	Kaplan and Norton (1992, 1996), Neely and Adams (2001), EFQM (1991), Chakravarthy (1988), Eccles (1991), Martinez and Kennerley (2005), Sushil (2010)
Business process perspective (BP)	Kaplan and Norton (1992, 1996), Neely and Adams (2001), Chakravarthy (1988), Eccles (1991), Martinez and Kennerley (2005), Taticchi *et al.* (2008, 2012)
Learning and growth perspective (LP)	Kaplan and Norton (1992, 1996), Neely and Adams (2001), Chakravarthy (1988), Eccles (1991), Hayes and Clark (1986), Martinez and Kennerley (2005)

Table II.
Dependent variables measuring strategic performance

the data. Hence, opinions of the executives from oil companies were taken. The sample is taken from the managers in the oil sector while the unit of analysis is an oil company. The executives covered were senior, upper middle and lower middle managers from Indian oil companies. It was difficult to get a good questionnaire response from private sector oil

Independent macro variables	Hypotheses	Hypotheses code
Strategy planning (SP)	Extent of Strategy planning influences SPMS effectiveness positively	H_{SP}
Strategic flexibility (SF)	Strategic flexibility influences SPMS effectiveness positively	H_{SF}
Strategy implementation (SI)	Effective Strategy implementation influences SPMS effectiveness positively	H_{SI}
SPMS design (SM)	Comprehensiveness of SPMS design influences SPMS effectiveness positively	H_{SM}
Information system flexibility (IF)	Information system flexibility influences SPMS effectiveness positively	H_{IF}
SPMS implementation/ management issues (MI)	SPMS implementation issues influences SPMS effectiveness positively	H_{MI}
Performance feedback and learning (PL)	Performance reporting, feedback and learning influences SPMS effectiveness positively	H_{PL}

Table III.
The macro hypotheses for the research

company executives in comparison to public sector (government-owned companies) even after repeated follow-ups. The reason could be that private sector executives in India have less freedom in revealing the information and opinion. Overall, Indian oil industry executives have been found to be less cooperative to academia in giving data and opinion survey.

The questionnaire containing 107 questions on various dimensions of SPMS, on a six-point Likert scale (1-strongly disagree and 6-strongly agree), were distributed personally and by e-mail to 500 executives of 15 Indian oil companies involved in upstream business of oil and gas exploration and production. A total of 139 responses were received from senior and middle managers of 10 companies. The summary of response, company-wise, is provided in Table AI. The profile of the respondents is given in Table AII. The number of respondents from senior management, upper middle management and lower middle management were 45, 55 and 39, respectively, while the average experience in years were 29.4, 24.3 and 9.8, respectively.

As questions were large, factor analysis using principal component analysis with a loading factor of 0.7 as the cut-off point was carried out. The factors retained after varimax rotation are shown in Table AIII. As envisaged in the study, seven dependent macro variables have thus been selected for the construct. Thus, the confirmatory factor analysis of variables impacting EPM system effectiveness confirms the validity of the constructs.

Cronbach's α test for reliability assessment of the measuring instrument is found to be more than cut-off level 0.5 (Table AIV). The reliability range is 0.751-0.973, which implies that the instrument is highly reliable. The Kaiser-Meyer-Olkin test is performed to measure sampling adequacy.

The data collected was analyzed using descriptive statistics, correlation analysis and regression analysis to find the sample distribution, correlation between factors and relationship between independent and dependent variables of the model. Thus macro and micro hypotheses were tested by correlation and regression analysis using "SPSS Ver. 12" software. Based on the results of analyses and hypotheses testing, a validated SPMS model is presented which can effectively measure the enterprise performance.

6. Discussion and interpretation

The result of univariate analysis of independent/dependent macro variables of SPMS is presented in Table IV. The mean values, on the six-point scale, are in the range of 3.77-4.53, and standard deviation ranges from 0.80 to 1.18, which gives enough confidence in the mean values. Further, the univariate analysis of independent/dependent micro variables of SPMS

is portrayed in Table V. The mean values are in the range of 3.42-4.71 and standard deviations around 1.0, which shows that the mean values are reliable and contributing to SPMS effectiveness. It implies that among independent micro variables, more emphasis is placed on vision and mission clarity, alignment with operational goals, resource allocation, impact of globalization/liberalization, in-house capability, external drivers, e-business

S. No.	Macro variables	Mean	Median	SD
1	Strategy planning (SP)	4.53	4.50	0.80
2	Strategic flexibility (SF)	4.47	4.54	0.77
3	Strategy implementation (SI)	4.35	4.50	0.83
4	SPMS design (SM)	3.82	3.87	1.00
5	Information system flexibility (IF)	4.27	4.29	0.92
6	SPMS implementation issues (MI)	3.77	4.00	1.06
7	Performance feedback and learning (PL)	3.85	4.00	1.18
8	SPMS effectiveness (EFF)	4.06	4.24	0.90

Note: $n = 139$

Table IV.
Descriptive statistics – SPMS macro variables (six-point scale)

S. No.	Micro variables	Mean	Median	SD
Independent variables				
Strategy planning				
1	Vision and mission clarity (SP1)	4.71	4.67	0.82
2	Setting of strategic goals (SP2)	3.96	4.00	1.20
Strategic flexibility				
3	Impact of globalization/liberalization (SF1)	4.60	4.80	0.90
4	In-house capabilities (SF2)	4.50	4.67	0.98
5	External drivers (SF3)	4.32	4.33	1.01
6	e-Business impact (SF4)	4.54	5.00	1.09
Strategy implementation				
7	Alignment with operational goals (SI1)	4.34	4.57	0.87
8	Resources allocation (SI2)	4.35	4.67	0.93
SPMS design				
9	Selection of dimensions and measures (SM1)	3.85	4.00	1.03
10	Customized SPMS (SM2)	3.42	4.00	1.40
Information system flexibility				
11	SPMS functionalities (IF1)	4.27	4.40	0.97
12	IT flexibility (IF2)	4.26	4.50	1.05
SPMS implementation issues				
13	Effective SPMS implementation (MI1)	3.78	4.00	1.06
14	Top management support (MI2)	3.69	4.00	1.19
15	Quality of data flow (MI3)	4.09	4.00	1.21
Performance feedback				
16	Performance feedback and learning (PL1)	3.85	4.00	1.18
Dependent variables				
1	Strategic alignment (ESA)	3.92	4.00	1.12
2	Strategic monitoring (ESM)	4.02	4.33	1.09
3	Financial perspective (EFP)	4.26	4.40	1.13
4	Customer perspective (ECP)	4.19	4.40	1.33
5	Business process perspective (EBP)	3.98	4.10	0.96
6	Learning and growth perspective (ELP)	4.07	4.14	0.89

Note: $n = 139$

Table V.
Descriptive statistics – SPMS micro variables (six-point scale)

impact, SPMS functionality, IT flexibility and quality of data in the organization under study. All the six dependent micro variables are measuring SPMS effectiveness in the organization, though more emphasis is on financial and customer perspectives.

The bivariate analysis used to determine and verify the degree of association among the variables, as stated in the particular hypothesis and multivariate analysis, in terms of ANOVA analysis and step-wise regression analysis, used to determine the predictor relationships among the variables to validate the SPMS effectiveness model.

Pearson's correlation analysis was carried for macro and micro variables (Table VI). The independent macro variables are exhibiting strong correlation among the at 99 percent confidence level (two-tailed,**). The Highest correlation is between SPMS implementation issues (0.852) and lowest SP linkage (0.531). At the micro level, effective SPMS implementation (MI1), top management support (MI2), selection of dimensions and KPI (SM1) and SPMS functionality (IF1) are strongly correlated (99% confidence level) with all micro effectiveness variables.

Regression and ANOVA analysis was carried out to test the hypotheses of association between independent and dependent variables of SPMS effectiveness. Step-wise regression analysis using a probability of F (entry at 0.05 and removal at 0.10) for each dependent variable with independent is performed. The summary at the macro and micro levels is presented in Tables VII and IX.

At the macro level, for the F-test and t-test, the level of significance < 0.01 (99% confidence level) and hence, the null hypothesis is rejected. The value of R^2, 0.08, i.e. four variables, covers 80 percent variance. It is concluded that SPMS implementation issues (MI), SI, SF and IF are major predictors of SPMS effectiveness (EFF), while implementation issues being the most critical.

At the micro level, the regression analysis for ESA is presented in Table VIII and its validated model is presented in Figure 2. Similarly regression analysis done for the remaining five dependent micro variables and the summary is shown in Table IX. The F-test and t-test have the level of significance < 0.01 for all six dependent variables, and hence all six null hypotheses are rejected. The value of R^2 is in the range of 0.46-0.81. It can be seen that 11 out of 16 identified micro variables are influencing the SPMS effectiveness while effective SPMS implementation (MI1) is the most dominant predictor.

Table VI.
Correlation between independent and dependent macro variables of SPMS

	SP	SF	SI	SM	IF	MI	PL	EFF
SP	–							
SF	0.433**	–						
SI	0.814**	0.471**	–					
SM	0.593**	0.650**	0.643**	–				
IF	0.516**	0.679**	0.589**	0.714**	–			
MI	0.450**	0.682**	0.499**	0.802**	0.781**	–		
PL	0.543**	0.662**	0.536**	0.816**	0.680**	0.820**	–	
EFF	0.531**	0.725**	0.608**	0.787**	0.782**	0.852**	0.759**	–

Notes: Refer Table III for variable code.**Significant at the 0.01 level (two-tailed)

Table VII.
Regression summary – SPMS effectiveness as dependent macro variable

Dependent variable	Independent variables entered in the model	R^2	Hypotheses accepted
SPMS effectiveness (EFF)	MI, SI, SF, IF	0.800	H_{MI}, H_{SI}, H_{SF}, H_{IF}

Note: Refer Table III for hypotheses codes and variable codes

The regression between micro variables impacting SPM effectiveness, acting as independent variables, and the dimensions of SPMS effectiveness, acting as dependent variables, is presented in Table IX. It can be seen that 11 out of 16 identified micro variables are influencing the SPMS effectiveness, and effective SPMS implementation (MI1) is the most dominant predictor.

The synthesis of learning from bivariate and multivariate analysis at macro and micro levels is given in Table X. It is observed that four macro predictors of SPMS effectiveness, namely, SMPS implementation issues (MI), SI, SF and IF, came out from macro analysis, and three additional macro predictors, namely, SP, SPMS design (SM) and performance feedback and learning (PL) from micro analysis, but SPMS implementation issues, SF, and IF are more dominant. The validated SPMS model at the macro level is presented in Figure 3.

The interpretation of the validated SPM model at the macro level (Figure 3) exhibits following relationships:

(1) SP, SI (Kaplan and Norton, 1992; Neely and Adams, 2001; Tapinos *et al.*, 2005; Thomas and William, 2005; Meekings, 1995) and SF (Toni and Tonchia, 2001; Bishwas, 2015) should be tightly integrated with SPMS design and implementation.

Dependent micro variable	Independent micro variables entered in the model	R^2	Hypotheses accepted
SPMS strategic alignment (ESA)	MI1, SP1, PL1	0.710	H_{MI1SA}, H_{SP1SA}, H_{PL1SA}

Note: Refer Table III for variable codes and hypotheses codes

Table VIII. Result of hypothesis testing – taking SPMS strategic alignment as the dependent micro variable

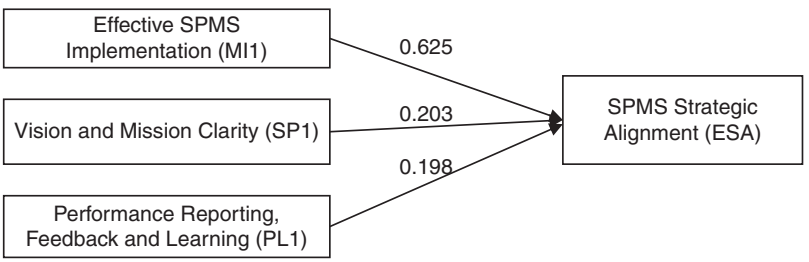

Figure 2. Validated model: predictor of SPMS strategic alignment

Dependent micro variable	Independent micro variables entered in the model	R^2	Hypotheses accepted
SPMS strategic alignment (ESA)	MI1, SP1, PL1	0.710	H_{MI1SA}, H_{SP1SA}, H_{PL1SA}
SPMS strategic monitoring (ESM)	MI1, SM1, IF1, SF1	0.808	H_{MI1SM}, H_{SM1SM}, H_{IF1SM}, H_{SF1SM}
Financial perspective (EFP)	MI1, IF1, MI3, SF3, IF2	0.577	H_{MI1FP}, H_{IF1FP}, H_{MI3FP}, H_{SF3FP}, H_{IF2FP}
Customer perspective (ECP)	SF3, IF1, SF1, SP2	0.459	H_{SF3CP}, H_{IF1CP}, H_{SF1CP}, H_{SP2CP}
Business process perspective (EBP)	MI1, SF1, IF1	0.669	H_{MI1BP}, H_{SF1BP}, H_{IF1BP}
Learning and growth perspective (ELP)	MI1, SI2, IF1	0.642	H_{MI1LP}, H_{SI2LP}, H_{IF1LP}

Note: Refer Table III for variable codes and hypotheses codes

Table IX. Summary of hypothesis testing – taking each dependent micro variable

Table X.
Syntheses of learning from bivariate and multivariate analysis

	Independent macro variables	Independent micro variables
SPMS effectiveness	Strategy planning (SP)	Vision and mission clarity (SP1)
		Setting strategic goals (SP2)
	Strategic flexibility (SF)	Impact of globalization and liberalization (SF1)
		External drivers (SF3)
	Strategy implementation (SI)	Resources allocation (SI2)
	SPMS design (SM)	Selection of dimensions and KPI (SM1)
	Information system flexibility (IF)	SPMS functionality (IF1)
		IT flexibility (IF2)
	SPMS implementation issues (MI)	Effective SPMS implementation (MI1)
		Quality of data flow (MI3)
	Performance feedback and learning (PL)	Performance reporting, feedback and learning (PL1)

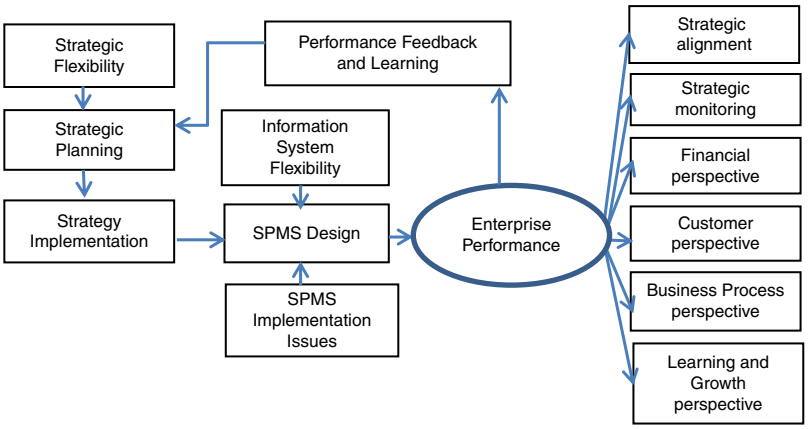

Figure 3.
SPMS model – macro level

(2) PMS design, performance feedback and learning mechanism contribute positively to the PMS effectiveness Kaplan and Norton, 1992; Malina and Selto, 2001; Meekings, 1995; Bierbusse and Siesfeld, 1997; Bourne *et al.*, 2002, 2003).

(3) IF provides added advantage for the deployment and use of SPMS (Eccles, 1991).

(4) SPMS implementation issues and critical success factors play a crucial role in success of SPMS implementation and its effectiveness (Eccles, 1991; Hacker and Brotherton, 1998; Bourne *et al.*, 2002, 2003; Akhtar and Mittal, 2015).

The interpretation of the validated SPM model at the micro level (Table X) displays following relationships:

(1) vision and mission clarity influences SA (Kaplan and Norton, 1996);

(2) strategic goals setting clearly provide strategic monitoring (Kaplan and Norton, 1992, 1996; Thomas and William, 2005; Tapinos *et al.*, 2005);

(3) impact of globalization and liberalization influences strategic monitoring, customer and business process perspectives (Fantazy *et al.* 2009; Sushil, 2012, 2015);

(4) in-house capability to design, implement and use of SPMS provides learning and growth opportunities;

(5) external drivers influence financial and customer perspectives (Sharma *et al.*, 2010);

(6) alignment with operational goals helps in SA (Schneiderman, 1999; Edson *et al.*, 2009);

(7) resources allocation influences business process and learning and growth perspective achievement (Kaplan and Norton, 1996);

(8) selection of KPIs and dimensions provides effective strategic monitoring (Bierbusse and Siesfeld, 1997; Schneiderman, 1999; Bourne *et al.*, 2002, 2003);

(9) customized SPMS helps in effective strategic monitoring (Tangen, 2004);

(10) SPMS functionality influences almost all aspects of SPMS outcome (Byrd and Turner, 2000);

(11) IT flexibility influences financial perspective (Byrd and Turner, 2000; Palanisamy and Foshay, 2013; Sharma *et al.*, 2010);

(12) affective SPMS implementation also influences almost all aspects of SPMS outcome (Ittner and Larcker, 2003; Martinez and Kennerley, 2005; Bourne *et al.*, 2002, 2003);

(13) top management support is crucial and influences all aspects of SPMS outcome (Eccles, 1991; Hacker and Brotherton, 1998; Chen and Jones, 2009; Gimbert *et al.*, 2010);

(14) quality of data flowing into SPMS influences financial perspective and strategic monitoring (Eccles, 1991); and

(15) performance feedback and learning provides SA (Meekings, 1995).

The model addresses the key relationships of the research variables and hypotheses.

The recommended SPMS model is a comprehensive SPM model incorporating linkage with strategic planning, SF, SI, performance measurement and management system design, IF, critical success factors and feedback and learning. SF adoption will take care of the uncertainty in a business environment, while IF, in terms functionality, software use and access, will improve the effectiveness of PMS.

7. Implications of the findings

The research findings led to the achievement of research objectives to a marked extent, and based on this, some important recommendations have been made. It has been brought out clearly through the validated SPM model that SPMS is an integrated model encompassing SP, SI, SF, SPMS design, performance feedback and learning, IS flexibility and SPMS implementation issues, and these have a direct influence on SPMS effectiveness in driving the performance improvement of an enterprise. SPMS effectiveness has been measured on six dimensions: SA, strategic monitoring, financial, customer, business process and learning and growth perspectives. SPMS implementation issues and critical success factors have come out as driving predictors of SPMS effectiveness, and therefore, it should be given top priority in SPMS implementation so as to successfully measure and manage the performance of an enterprise. Implementation guidelines emanated out from the study are enumerated as follows:

- SPMS should be designed as an integrated system and not a standalone tool;
- it should integrate with macro and micro predictors as recommended in the final SPMS effectiveness model;
- critical success factors/SPMS implementation issues such as effective implementation strategy, top management support and quality of data flowing into SPMS are major predictors and should be given high priority in SPMS implementation; and

- it should be considered as an improvement tool and the output should become input/feedback for various strategies to achieve performance improvement in the organization.

The study provides an important empirical step toward understanding the integrated SPM and its effectiveness under uncertain business environment. The study adds to the existing literature by identifying the roles of SPMS implementation issues, SF and IS flexibility on SPMS effectiveness and highlights importance for further research in these areas. The future research may include risk assessment, benchmarking, system and culture of organization influencing the effectiveness of SPMS.

The model developed in this study also provides practical implications for managers and practitioners. The model can be used to assess skill and training requirements, identify internal business process gap for adding/enhancing internal capabilities and capacities, to improve efficiency, to optimize cost and to design suitable incentive schemes. The model can also be used as an investigative tool for identifying whether the strategy is translated into strategic goals, organization is aligned with strategy, strategic awareness in the organization, budgetary processes are linked with strategy, resource allocation are linked with strategic goals, strategic monitoring, and affecting performance improvement in the organization.

8. Limitations of the study

Any research work would have limitations due to limited resources, data availability and biasness of respondents and researcher. Some of the limitations of this study are:

- The survey has been carried out from senior and middle management and in the process random sampling may not have been followed in a strict sense. The survey did not include operational managers. It was distributed to government-owned and private-owned companies, but only a few private oil companies responded.
- The study did not cover other stakeholders such as ministry of petroleum and natural gas, directorate general of hydrocarbons (the regulatory body), equipment manufacturers, vendors and service providers having interplay with each other.
- The role of SF and IF in SPMS effectiveness has been explored in the study. Other types of flexibility such as operational, marketing and HR flexibilities have not been covered.

9. Conclusion

In the face of globalization and liberalization, there is turbulence and uncertainty in business environment. The importance of an effective and integrated strategic performance measurement and management system has increased manifold. The study recommended a validated integrated and comprehensive model of strategic performance measurement and management system to effectively measure and monitor enterprise performance. It provides feedback to the management for taking actions that drive performance improvement in the underlying organization. It has emerged from the study that the macro factors contributing to SPMS effectiveness are SP, SF, SI, SPMS design, IF, SPMS implementation issues and critical success factors, and performance feedback and learning. SPMS implementation issues have come out to be major drivers for SPMS effectiveness. The dimensions of measurement of effectiveness are SA, strategic monitoring, financial, customer, business process, and learning and growth perspectives. The recommended SPMS model can be useful for commercial organizations and practitioners to drive a breakthrough performance.

References

Akhtar, M. and Mittal, R.K. (2015), "Implementation issues and their impact on strategic performance management system effectiveness: an empirical study of Indian oil industry", *Measuring Business Excellence*, Vol. 19 No. 2, pp. 71-82.

Bierbusse, P. and Siesfeld, T. (1997), "Measures that matter", *Journal of Strategic Performance Measurement*, Vol. 1 No. 2, pp. 6-11.

Bishwas, S.K. (2015), "Achieving organization vitality through innovation and flexibility: an empirical study", *Global Journal of Flexible Systems Management*, Vol. 16 No. 2, pp. 145-156.

Bourne, M., Neely, A., Mills, J. and Platts, K. (2003), "Implementing performance measurement systems: a literature review", *International Journal of Business Performance Management*, Vol. 5 No. 1, pp. 1-24.

Bourne, M., Neely, A., Platts, K. and Mills, J. (2002), "The success and failure of performance measurement initiatives", *International Journal of Operations and Production Management*, Vol. 22 No. 11, pp. 1288-1310.

Byrd, T.A. and Turner, D.E. (2000), "An exploratory examination of the relationship between flexible IT infrastructure and competitive advantage", *Information and Management*, Vol. 39 No. 1, pp. 41-52.

Chakravarthy, B.S. (1988), "Measuring strategic performance", *Strategic Management Journal*, Vol. 7 No. 5, pp. 110-118.

Chen, C.C. and Jones, K. (2009), "Are employees buying the balanced scorecard?", *Management Accounting quarterly*, Vol. 11 No. 1, pp. 36-44.

Chenhall, R.H. (1996), "Strategies of manufacturing flexibility, manufacturing performance measures and organizational performance: an empirical investigation", *Integrated Manufacturing Systems*, Vol. 7 No. 5, pp. 25-32.

de Waal, A.A. (2003), "Behavioral factors important for the successful implementation and use of performance management systems", *Management Decision*, Vol. 41 No. 8, pp. 688-697.

Fantazy, K.A., Kumar, V. and Kumar, U. (2009), "An empirical study of the relationship among strategy, flexibility and performance in the supply chain context", *Supply Chain Management*, Vol. 14 No. 3, pp. 177-188.

Eccles, R.G. (1991), "The performance measurement manifesto", *Harvard Business Review*, January-Febraury, p. 137.

Edson, P.L., Sergio, E.G.C. and Avides, R.F. (2009), "Taking operations strategy into practice: developing a process for defining priorities and performance measures", *International Journal of Production Economics*, Vol. 122 No. 1, pp. 403-418.

EFQM (1991), "European foundation for quality management's", *Business Excellence Model*, available at: www.efqm.org

Evans, J.S. (1991), "Strategic flexibility for high technology manoeuvres: a conceptual framework", *The Journal of Management Studies*, Vol. 28 No. 1, pp. 69-89.

Fleming, D.M., Chow, C.W. and Chen, G. (2009), "Strategy, performance measurement systems, and performance: a study of Chinese firms", *International Journal of Accounting*, Vol. 44 No. 3, pp. 256-278.

Gebauer, J. and Lee, F. (2008), "Enterprise system flexibility and implementation strategies: aligning theory with evidence from a case study", *Information Systems Management*, Vol. 25 No. 1, pp. 71-82.

Gimbert, X., Bisbe, J. and Mendoza, X. (2010), "The role of PMS in strategy formulation processes", *Long Range Planning*, Vol. 43 No. 4, pp. 477-497.

Hacker, M.E. and Brotherton, P.A. (1998), "Designing and installing effective performance measurement systems", *IIIE Solutions*, Vol. 30 No. 8, pp. 18-23.

Halachmi, A. (2005), "Performance measurement is only one way of managing performance", *International Journal of Productivity and Performance Management*, Vol. 54 No. 7, pp. 502-516.

Hayes, R.H. and Clark, K.B. (1986), "Why some factories are more productive than others", *Harvard Business Review*, September-October, pp. 66-73.

Ittner, C.D. and Larcker, D.F. (2003), "Coming up short on non-financial performance measurement", *Harvard Business Review*, November, pp. 88-95.

Kaplan, R.S. and Norton, D.P. (1992), "The balanced scorecard: measures that drive performance", *Harvard Business Review*, January-February, pp. 71-92.

Kaplan, R.S. and Norton, D.P. (1996), *The Balanced Scorecard: Translating Strategy Into Action*, Harvard Business School Press, Boston, MA.

Kaplan, R.S. and Norton, D.P. (2000), *The Strategy Focused Organization – How Balanced Scorecard Companies Thrive in the New Business Environment*, Harvard Business School Press, Boston, MA.

Lewy, C. and Du Mee, L. (1998), "The ten commandments of balanced scorecard implementation", *Management Control and Accounting*, April, pp. 34-36.

Lynch, R.L. and Cross, K.F. (1991), "Measure up ± the essential guide to measuring business performance", Mandarin, London.

Malina, M.A. and Selto, F.H. (2001), "Communicating and controlling strategy: an empirical study of the effectiveness of the balanced scorecard", *Journal of Management Accounting Research*, Vol. 13 No. 1, pp. 47-90.

Martinez, V. and Kennerley, M. (2005), "Impact of performance management reviews: evidence from an energy supplier", *Conference Proceedings EUROMA Operations and Global Competitiveness, Budapest, June*, pp. 19-22.

Meekings, A. (1995), "Unlocking the potential of performance measurement: a guide to practical implementation", *Public Money and Management*, Vol. 15 No. 4, pp. 5-12.

Mishra, R., Pundir, A.K. and Ganapathy, L. (2014), "Manufacturing flexibility research: a review of literature and agenda for future research", *Global Journal of Flexible Systems Management*, Vol. 15 No. 2, pp. 101-112.

Neely, A.D. and Adams, C. (2001), "Perspectives on performance: the performance prism", *Journal of Cost Management*, Vol. 15 No. 1, pp. 7-15.

Neely, A., Gregory, M. and Platts, K. (1995), "Performance measurement system design: a literature review and research agenda", *International Journal of Operations & Production Management*, Vol. 15 No. 4, pp. 80-116.

Palanisamy, R. and Foshay, N. (2013), "Impact of user's internal flexibility and participation on usage and information systems flexibility", *Global Journal of Flexible Systems Management*, Vol. 14 No. 4, pp. 195-209.

Rahrami, H. (1992), "The emerging flexible organization: perspective from Silicon Valley", *California Management Review*, Vol. 34 No. 4, pp. 33-52.

Said, A.A., Hassab Elnaby, H.R. and Wier, B. (2003), "An empirical investigation of the performance consequences of non-financial measures", *Journal of Management Accounting Research*, Vol. 15 No. 1, pp. 193-223.

Sanchez, R. (1995), "Strategic flexibility in product competition", *Strategic Management Journal*, Vol. 16 No. S1, pp. 135-159.

Schneiderman, A.M. (1999), "Why balanced scorecards fail", *Journal of Strategic Performance Measurement*, Special Edition, January, pp. 6-11.

Sharma, M.K., Sushil and Jain, P.K. (2010), "Revisiting flexibility in organization: exploring its impact on performance", *Global Journal of Flexible Systems Management*, Vol. 11 No. 3, pp. 51-68.

Skinner, W. (1974), "The decline, fall and renewal of manufacturing", *Industrial Engineering*, October, pp. 32-38.

Srivastava, A.K. (2014), "Act for effective strategy execution: mediating role of adapt", *Global Journal of Flexible Systems Management*, Vol. 15 No. 4, pp. 305-312.

Sushil (2009), "Execution excellence", *Global Journal of Flexible Systems Management*, Vol. 10 No. 2, p. iii.

Sushil (2010), "Flexible strategy game-card", *Global Journal of Flexible Systems Management*, Vol. 11 No. 1, pp. 1-2.

Sushil (2012), "Making flowing stream strategy work", *Global Journal of Flexible Systems Management*, Vol. 13 No. 1, pp. 25-40.

Sushil (2015), "Strategic flexibility: the evolving paradigm of strategic management", *Global Journal of Flexible Systems Management*, Vol. 16 No. 2, pp. 113-114.

Sushil (2016), "Strategic flexibility in ecosystem", *Global Journal of Flexible Systems Management*, Vol. 17 No. 3, pp. 247-248.

Tangen, S. (2004), "Performance measurement: from philosophy to practice", *International Journal of Productivity and Performance Management*, Vol. 53 No. 8, pp. 726-737.

Tapinos, E., Dyson, R.G. and Meadows, M. (2005), "The impact of performance measurement in strategic planning", *International Journal of Productivity and Performance Management*, Vol. 54 Nos 5/6, pp. 370-384.

Taticchi, P., Balachandran, K.R. and Tonelli, F. (2012), "Performance measurement and management systems: state of the art, guidelines for design and challenges", *Measuring Business Excellence*, Vol. 16 No. 2, p. 4.

Taticchi, P., Balachandran, K.R., Botarelli, M. and Cagnazz, L. (2008), "Performance measurement management for small and medium enterprises: an integrated approach", *Journal of Applied Management Accounting Research*, Vol. 6 No. 2, pp. 57-72.

Thomas, M.M. and William, M.S. (2005), "Performance management: enabling smarter business", *Financial Executive*, Vol. 21 No. 7, pp. 60-63.

Toni, De. and Tonchia, S. (2001), "Performance measurement systems: models, characteristics and measures", *International Journal of Operations and Production Management*, Vol. 21 Nos 1/2, pp. 46-70.

Yadav, N. (2014), "Flexibility aspects in performance management system: an illustration of flexible strategy game-card", *Global Journal of Flexible Systems Management*, Vol. 15 No. 3, pp. 181-189.

Yadav, N., Sushil and Sagar, M. (2013), "Performance measurement and management frameworks: research trends of the last two decades", *Business Process Management Journal*, Vol. 19 No. 6, pp. 947-970.

Further reading

HBR (1998), *Harvard Business Review on Measuring Corporate Performance*, Harvard Business School Press, Boston, MA.

Appendix 1

Table AI. Company-wise survey respondents

S. No.	Name of oil company	No. of responses
1	Oil & Natural Gas Corporation Ltd (ONGC)	62
2	Oil India Limited (OIL)	24
3	Gujarat State Petroleum Corporation (GSPC)	22
4	Gas Authority of India Ltd (GAIL)	13
5	Cairn Energy India Ltd (CEIL)	7
6	Essar Oil Ltd (EOL)	5
7	Bharat Petroleum Corp. Ltd (BPCL)	2
8	Hindustan Petroleum Corp. Ltd (HPCL)	2
9	Hindustan Oil Exploration Corp. Ltd (HOECL)	1
10	Heramec Ltd	1
	Total	139

Appendix 2

Table AII. Respondent's profile

Level of managerial executives	Average years of experience	No. of respondents	Percentage respondents (%)
Senior management	29.4	45	32.37
Upper middle management	24.3	55	39.57
Lower middle management	9.8	39	28.06
Total	21.9	139	100

Appendix 3

Macro variables	Factor	Factor name	Eigenvalue	Percent variance	Cum. percent
Strategy planning (SP)	SP1	Vision and mission clarity	2.387	59.668	59.668
	SP2	Setting of strategic goals	0.724	18.090	77.758
Strategic flexibility (SF)	SF1	Impact of globalization and liberalization	6.456	49.658	49.658
	SF2	In-house capabilities	1.229	9.453	59.112
	SF3	External drivers	1.086	8.353	67.465
	SF4	E-business impact	0.858	6.596	74.061
Strategy implementation (SI)	SI1	Alignment with operational goals	6.048	60.478	60.478
	SI2	Resources allocation	0.973	9.725	70.203
Performance measurement system design (SM)	SM1	Selection of dimensions and measures	10.610	70.731	70.731
	SM2	Customized SPMS	0.808	5.387	76.118
Information system flexibility (IF)	IF1	SPMS functionalities	4.608	65.831	65.831
	IF2	IT flexibility	0.823	11.750	77.581
SPMS implementation issues (MI)	MI1	Effective SPMS implementation	11.066	69.161	69.161
	MI2	Top management support	0.703	4.395	73.556
	MI3	Quality of data flow	0.702	4.386	77.942
Performance feedback and learning (PL)	PL1	Performance reporting, feedback and learning	3.965	79.299	79.299

Table AIII. Factor analysis – independent micro variables influencing SPMS effectiveness

Appendix 4

Micro variables of SPMS	Cronbach's α
Vision and mission clarity	0.773
Impact of globalization/liberalization	0.909
In-house capabilities	0.825
External drivers	0.751
Alignment with operational goals	0.916
Resources allocation	0.816
Selection of dimensions and measures	0.973
SPMS functionalities	0.911
IT flexibility	0.807
Effective SPMS implementation	0.954
Top management support	0.947
Performance reporting and feedback	0.933
Strategic alignment	0.957
Strategic monitoring	0.961
Financial perspective	0.943
Customer perspective	0.956
Business process perspective	0.958
Learning and growth perspective	0.926
Independent micro variables (16)	0.928
Dependent micro variables of SPMS effectiveness (6)	0.915

Table AIV. Cronbach's α for macro and micro variables

About the authors

Dr Mohammad Akhtar is a Strategy, CPM and ERP Principal Consultant. He has worked with many companies, both government-owned – Oil and Natural Gas Corporation Ltd, New Delhi – and private – both in India and Saudi Arabia. He has served in different roles of strategic planning, CPM, benchmarking, business intelligence and data warehousing, productivity management, ERP/SAP implementation, IT management and software development. He has a PhD degree in strategic performance management and flexibility, an MTech degree in industrial engineering and management, and a university diploma in computer applications. He is a certified Oracle Database Administration Professional (OCP) and a certified Project Management Professional (PMP). He is a life member of professional institutions of Computer Society of India and Global Institute of Flexible Systems Management. He has few publications to his credit in refereed journals, chapters in books and international and national conferences. He regularly reviews papers in areas of strategy, EPM, business excellence in journals of *IJPPM* and *MBEX*. Dr Mohammad Akhtar is the corresponding author and can be contacted at: mk71b@yahoo.com

Sushil is the Abdulaziz Alsagar Chair Professor (Professor of Strategic, Flexible Systems and Technology Management) and the Chair at Strategic Management Group, Department of Management Studies, Indian Institute of Technology Delhi. He has served as the Deputy Director (Operations) and the Dean (Faculty) at IIT Delhi. He has served as a Visiting Professor and delivered seminars in many leading universities, such as Kyoto University, Tokyo, University of Minnesota, Minneapolis, MN, Stevens Institute of Technology, NJ, University of Lethbridge, Alberta, Université Paris 1 Panthéon-Sorbonne, Paris, among others. He is an active researcher and has supervised more than 60 doctoral dissertations. He has 20 books to his credit in the areas of flexibility, strategy, systems thinking and technology management, and over 300 papers in various refereed journals and conferences. He is the Founder Editor-in-chief of *Global Journal of Flexible Systems Management* and serving on the editorial boards of leading international journals. He is the Editor of *Book Series on Flexible Systems Management*, published by Springer. He has pioneered the area of "Flexible Systems Management" and made original contributions to the field of knowledge in the form of interpretive approaches in management such as SAP-LAP models/linkages, total interpretive structural modeling and interpretive ranking process. He has evolved the concept and framework of "Flowing Stream Strategy" as SF to manage continuity and change. He has also provided mantras for continuous organizational vitalization (LIFE), and models for strategic performance management (Flexible Strategy Game-card), sustainable enterprise (Star Model) and strategy execution (4A's Model). He has served as the Independent Director on the boards of RINL, HSCC and River Engineering. He has acted as a consultant to both governmental and industrial organizations; a few representative ones are Ford Foundation, APCTT, UN, Defense Research and Development Organization (DRDO), Wipro Infotech, LG Electronics, Rockwell International, Tata Consultancy Services, James Martin & Co., Gas Authority of India Ltd, Sona Koyo Steering Systems, NBCC and DGS&D. He is the Founder President of the professional body, "Global Institute of Flexible Systems Management." He has been awarded the 2014 AGBA Fellow (by Academy for Global Business Advancement, USA).