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Serbian Journal of Management 11 (1) (2016) 81 - 97

Serbian Journal of Management

DEVELOPMENT OF A STRATEGIC MANAGEMENT TOOL IN A THERMAL POWER PLANT USING ABC AND BSC MODELS

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(Received 22 July 2015; accepted 28 September 2015)

Abstract

In today's dynamic, uncertain and highly competitive business environment, the long term success of an organization critically depends on the perceptions, choices and actions of its managers regarding their strategies. Activity based costing (ABC) and balanced scorecard (BSC) are the modern day management approaches acknowledged as reliable tools for strategy formulation and implementation in an organization. In this paper, ABC and BSC models are separately proposed and applied in the merry-go-round (MGR) department of an Indian thermal power plant. The results elicited from adoption of these two models in the said power plant provide more accurate, timely, and reliable operational and financial information at different activity levels of the organization, which would help in effective strategic and tactical decision making. Even though, there are limited published research papers related to application of ABC model in power plants, none of them has adopted ABC and BSC techniques in an Indian contextual environment. Additionally, an integrated ABC-BSC model is designed to harness the complementary synergies of both ABC and BSC models.

Keywords: activity based costing, balanced scorecard, thermal power plant, cost, strategy, electricity

1. INTRODUCTION

Electricity is one of the most critical components of infrastructure, which enables a country to achieve sustainable economic growth. It facilitates development across varied sectors of a country's economy, like agriculture, automobiles, cement, manufacturing, pharmaceuticals, railways etc., and therefore, is often acknowledged as the heart of industrial growth. Power sector directly contributes to a country's gross

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DOI:10.5937/sjm11-8741

domestic product (GDP), and lessens its current account deficit through facilitating higher industrial exports. So, continuous expansion in the installed electricity generation capacity of power plants is vital to support a high GDP growth rate. A robust and thriving power sector is essential for any country's overall socio-economic development. The relevance of power sector is more in a country, like India, which is looked upon as a rising economic powerhouse. The electricity demand in India is anticipated to grow at a stable pace of 7.5% to 8% compound annual growth rate till 2017 according to a research report of Confederation of Indian Industry published in 2009. India is also the fifth largest generator of electricity in the world, according to a data derived from Central Intelligence Agency World Factbook in 2012. Moreover, based on a survey report of India Brand Equity Foundation published in 2015, it is estimated that the Indian power sector has a prospect of attracting an investment in the tune of Rs. 15 trillion (€ 200 billion) in the coming 4 to 5 years. With such a huge business opportunity available in the Indian power generation field, competition among the market players is bound to be intensified in order to supply electricity at minimum possible cost. This is all more significant in the present context with opening up of power sector for 100% foreign direct investment through direct route. So, immense pressure from market forces implies that the decision makers of each organization are compelled to devise sound and flexible strategies to maintain sustained competitive advantage. Till date, majority of the Indian power plants are engaged in practicing traditional costing and performance appraisal systems, which have lost their relevance in providing detailed and accurate information on cost and overall progress of the enterprise respectively. Traditional cost accounting system employs a single volume-based cost driver (machine hour or direct labor hour) to arbitraryly allocate overhead cost which often leads to inaccurate and inappropriate product costing, and is incompetent to provide cost information at different activity levels of the enterprise for effective planning, controlling and decision making. Therefore, activity based costing (ABC) model is developed as a modern accounting technique to overcome the shortcomings of the traditional costing method. The ABC technique has helped many manufacturing and service organizations enhance their competitiveness by enabling them to make better decisions based on an improved understanding of their product cost behavior. The main premise behind ABC model is to categorize overhead or indirect costs and assign them to end products or services based upon the activities required to produce these products (Nachtmann & Al-Rifai, 2004). On the other hand, traditional performance management system only focuses on short term financial measures, which only give information regarding an organization's past results and are not capable for predicting the future performance. The balanced scorecard (BSC) model is a contemporary performance measurement tool, aimed to present managers with a concise summary of the key success factors of a business, and to facilitate alignment of business operations with the overall strategy (Mooraj et al., 1999). Therefore, ABC and BSC are the two present day management accounting methodologies capable of providing management-oriented information that can aid in better budget allocation and resource requirement planning, and help in continuous

improvement through internal cost minimization.

In this paper, the merry-go-round (MGR) department of a thermal power plant in India is considered for implementation of ABC and BSC models individually to provide its policy makers with accurate cost information and other crucial business intelligence about vital components of the organization including resources, people, activities, services, products and customers. The detailed application procedures of the developed ABC and BSC models are also discussed in a simple and cost effective manner. Next, an integrated approach utilizing ABC and BSC models is presented for the said department of the power plant to show how it can be employed to aid mangers of the enterprise to devise effective and efficient strategies which improve cost and profit performance.

2. REVIEW OF THE PAST LITERATURE

Liu and Pan (2007) examined some of the key success factors pertinent to ABC implementation in a large Chinese manufacturing organization. Banker et al. (2008) investigated the impact of ABC model on adoption of world-class manufacturing practices and plant performance. Nurminen et al. (2009) implemented an ABC management system for timber harvesting and trucking on the basis of the cut-to-length harvesting method. Chamsilpa and Kiatsiriroat (2010) applied life cycle assessment approach to investigate environmental impacts of an amorphous silicon solar cell power plant over its entire life cycle while employing ABC methodology. Pedro et al. (2011) implemented an ABC model in a Portuguese organization manufacturing metallic structures to identify its real advantages and disadvantages. Azadvar et al. (2012) proposed a method to integrate ABC approach with mathematical decision support models for solving order management problems. Hasani and Vakilalroaia (2013) presented an ABC model for estimating the cost of a power station construction project located in city of Zanjan, Iran. Langmaak et al. (2013) proposed a generic factory cost model based on ABC approach that could calculate various costs at multiple levels of any manufacturing organization. Oh and Hildreth (2013) developed a novel decision model based on ABC method and stochastic programming to evaluate the impact of load curtailments. Korpunen and Raiko (2014) proposed an ABC model for estimating the production cost of power of a large scale biomass-based combined heat and power plant.

Huang and Hu (2004) employed BSC approach as a tool to integrate web services technology of an organization with its corporate strategies. Papalexandris et al. (2005) developed a compact and combined methodological framework for BSC synthesis and application. Fernandes et al. (2006) demonstrated how BSC model could be implemented successfully using a systematic and structured methodology. Punniyamoorthy and Murali (2008) applied a BSC model in an enterprise to provide an objective benchmarking indicator for evaluating the achievement of its strategic goals. Wong et al. (2009) proposed an optimization approach for design management through adopting BSC methodology. Voelpel and Streb (2010) introduced five action field frameworks and

BSC model for managing an aging workforce towards competitiveness and innovativeness. Jordao et al. (2011) explained how a BSC model could be implemented for sustainable deployment of renewable energy sources in the Czech Republic. Amado et al. (2012) presented a framework integrating BSC method with data envelopment analysis technique while utilizing various interconnected models for evaluating the organizational performance. Jordao and Novas (2013) analyzed the usage of BSC model as a part of a management control system for implementing strategies in a large mixed economy enterprise. Hoque (2014) explored the status of research work already carried out on BSC model with a view to identify the gaps for future research work.

Lin and Yahalom (2009) designed an evaluation system integrating ABC and BSC methodologies to examine the overall performance of Keelung Harbor. Gibaly and Diab (2012) developed a model combining ABC and BSC techniques in order to improve operational performance of the Egyptian organizations. Yakhou and Ulshafer (2012) presented ABC and BSC models as novel approaches to help deal with the challenges faced by higher education institutions. Cardos and Cardos (2014) established a conceptual framework of customer profitability analysis through managerial accounting tools, such as ABC and BSC. Dwivedi and Chakraborty (2015) developed a combined ABC-BSC model to demonstrate how it could enhance the accuracy of BSC and assign strategic values to different activity groups of ABC model. Patrick et al. (2015) studied the role of ABC and BSC models in providing managers with information for performance measurement.

The review of the earlier research works reveals that both ABC and BSC models have been successfully applied across varied fields of manufacturing as well as service sectors for diagnostic, formulation, implementation and evaluation of organizational strategies. But till date, both these models have not been implemented in an Indian power plant set-up. Therefore, in this paper, an ABC model is adopted to a MGR department of an Indian thermal power plant to exhibit its applicability as a comprehensive management tool which focuses on minimizing costs, and improving business processes and decision making. Next, a BSC model is developed for the said department to align departmental objectives with the overall organizational vision. Subsequently, a combined ABC-BSC model is proposed for MGR department to demonstrate how it can assist the decision makers in achieving long term competitive advantage in the present dynamic business environment.

3. ABC MODEL

The accounting system of MGR department of an Indian thermal power plant is considered here for the development and subsequent application of ABC model. The identity of this plant is not disclosed for secrecy reason, and henceforth, it is referred to as CGL Limited. It is one of the largest electricity generators in India and is a dominant player with presence in the entire value chain of the power generation business. The total installed capacity of the said coal-based power plant is 2340 MW. The MGR department is responsible to provide continuous coal supply to its power plant through a closed-circuit dedicated rail transportation system between the loading

point at supplier's location and unloading point at the power station end. It has a track length of almost 33 km and workshop yard of roughly 8 km. There is an intermediate mid section crossing station between the loading and unloading points. The track in the said department is fit for trains to run at a speed up to 75 km/h. Four locomotives and 69 wagons are employed by MGR department for transportation of coal round the clock. Multiple aspect color light signaling and very high frequency communication system are utilized in MGR department for signaling and telecommunication purpose. A schematic map showing unloading point, loading point, intermediate station, direction of rakes, different signal cabins, workshop yard, track hopper panels etc. of MGR department in CGL Limited is exhibited in Figure 1.

The traditional accounting system was developed to suit the typical requirements of organizations of industrial era. Organizations in those times were characterized with high labor cost, low product diversity, low overhead cost and little automation. But, in today's technically advanced business environment, overhead costs comprise of a substantial portion of the total cost. So, the traditional costing system that employs a single cost driver, such as direct labor hour, machine hour, output volume etc. to systematically allocate the overhead costs often distorts the final product or service cost. The ABC model is a present day management accounting tool that allocates overhead cost at different levels utilizing multiple cost drivers to provide more accurate and dependable cost information. Different steps required in developing an ABC model are mentioned as below:

a) Identification and determination of the cost object, i.e. cause for cost analysis,

b) Recognition of all activities that affect each cost object,

c) Identification of the sources of expenditure that influence each activity,

d) Assignment of resources' cost to different activities utilizing an assortment of resource cost drivers, and

e) Allocation of activities' cost to cost objects employing a variety of activity cost drivers.

The MGR department of CGL Limited

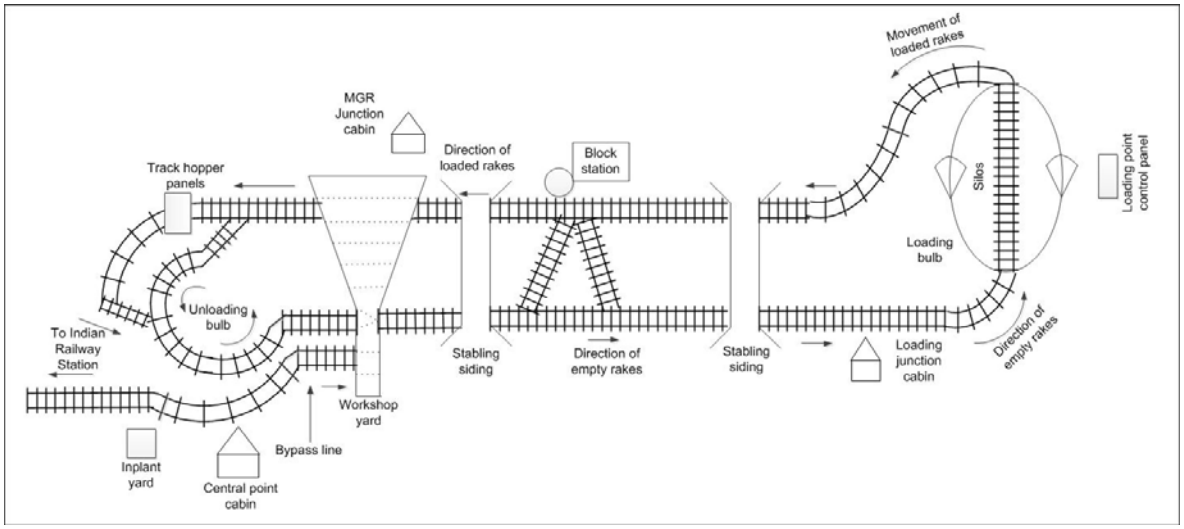

Figure 1. Schematic map of MGR department

mainly performs five functions, i.e. managing locomotives and wagons, operating the rail rakes, coordinating with coal supplier, repairing of rail tracks, and handling of signal and telecommunication system. So, five corresponding cost objects related to execution of the above-mentioned tasks in MGR department are identified as loco and wagon maintenance cost, rail rake operation cost, coal coordination cost, track maintenance cost, and signal and telecommunication cost. The cost object of loco and wagon maintenance cost comprises of the expenditure associated with maintenance of the rolling stock while performing scheduled inspections, unplanned repairs, modifications and overhauling. The cost object of rail rake operation cost provides information on the total expenses incurred on all activities/processes carried out while managing rail rake movement in MGR department. On the other hand, cost object of coal coordination cost contains the total cost associated with all those activities required in enforcement and monitoring of all legal terms agreed between the said power plant and its coal supplier in the fuel supply agreement. The information on monetary outlay related to all activities directly associated with upkeeping of tracks to facilitate smooth and safe running of the rail rakes is provided through the cost object of track maintenance cost. The cost object of signal and telecommunication cost includes total expenditure incurred on efficient functioning of the overall signal system in MGR department. It is concluded from the above discussions that the activities required by the five cost objects can be categorized into five activity pools, i.e. maintaining the rolling stock, movement of rail rakes, fuel supply agreement implementation, upkeeping of tracks and operation of signal system. The activity pool of maintaining rolling stock consists of all the activities mainly associated with collecting information on inspection and breakdown for each item of rolling stock, and subsequent development and application of maintenance plans for rolling stock. The activity pool of movement of rail rakes includes all those activities needed for optimal utilization of freight trains of MGR department to handle the coal demand of the power plant. The activity pool of fuel supply agreement implementation comprises of those activities required for successful accomplishment of legal formalities of the fuel supply agreement. In addition, each and every activity needed for maintenance of tracks under MGR department's control is put into the activity pool of upkeeping of tracks. The activity pool of operation of signal system consists of those activities as carried out in controlling the movement of rail rakes (freight trains) of MGR department between the loading and unloading points employing advanced signal and telecommunication system. The next stage in ABC model development is to recognize various resource centers required by these activity pools, and they are identified through critically analyzing the five activity pools. Executive employee resource cost, non-executive manpower resource cost, contract staff resource cost, building and infrastructure establishment resource cost, plant and machinery resource cost, operating supplies resource cost and administrative resource cost are identified as different resource centers necessary for the above-mentioned activity pools. The developed ABC model in MGR department of CGL Limited is shown in Figure 2.

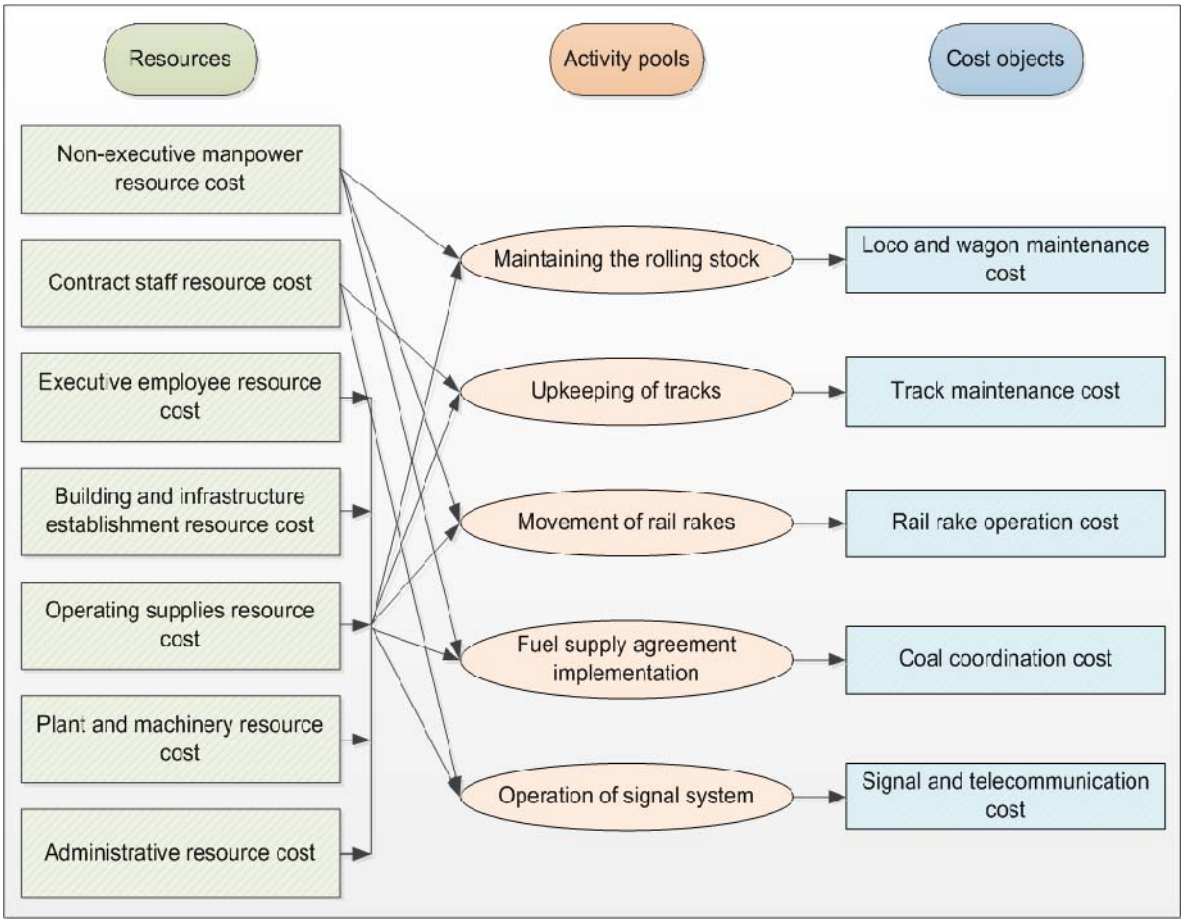

Figure 2. Developed ABC model for MGR department of a power plant

4. IMPLEMENTATION OF ABC MODEL IN MGR DEPARTMENT

The MGR department of CGL Limited has 26 executive employees and 9 non-executive staffs in financial year (FY) 2013-2014 working as a team to realize the objectives of the said power plant. The services of contractual labors are also utilized in the power plant to fulfil the specific incidental requirements. All the relevant data necessary for application of ABC model in MGR department are accumulated from FY 2013-2014. In order to enhance the relevance of this paper to a wider range of readers, the monetary units are both expressed in Indian Rupees (Rs.) and Euro.

4.1. Allocation of resource cost

It is observed that the executive employees of MGR department can be categorized into five groups according to the identified distinct activities they perform, i.e. maintenance of rolling stock, facilitating movement of rail rakes, implementation of fuel supply agreement, maintenance of tracks and operation of signal system. They execute planning, organizing, directing, controlling and coordinating works related to those activities of MGR department.

Therefore, the total cost associated with annual salaries of each group of executive employees is directly allocated to the corresponding activity pools. It is estimated that the total executive employee resource costs allocated to the activity pools of maintaining the rolling stock, upkeeping of tracks, movement of rail rakes, fuel supply agreement implementation and operation of signal system are Rs. 3517572 (€ 46901), Rs. 1673088 (€ 22308), Rs. 10689288 (€ 142524), Rs. 4446264 (€ 59284) and Rs. 1695120 (€ 22602) respectively.

The non-executive manpower of MGR department are delegated with the duties, like operating machineries, monitoring the processes, carrying out basic testing and quality checks, diagnosing and repairing faults, and controlling and maintaining auxiliary equipments. Further, it is observed that the non-executive workers are employed for performing only three functions of MGR department, e.g. managing locomotives and wagons, operating the rail rakes and coordinating with coal supplier. The scheduled duty chart of the individual non-executive worker is referred to accumulate information on the respective time devoted by each staff to those three activities. These time allocations are subsequently converted into monetary units through translating time devoted by individual non-executive staff to each activity into the time equivalent cost. It is computed that the total non-executive manpower resource cost assigned to three activity pools is Rs. 925560 (€ 12341) in maintaining the rolling stock, Rs. 2340540 (€ 31207) in movement of rail rakes and Rs. 902136 (€ 12028) in fuel supply agreement implementation.

Moreover, it is noticed that maintenance of tracks and operation of signal system are the two activities in MGR department which require services of contract staff in order to complete some explicit jobs arising out of exceptional situations. The total working hours per year dedicated to the two activity pools vary for each contractual worker, and are traced down from their respective job log books. These time allocations to two activity pools are then translated into monetary units employing the method adopted earlier. It is calculated that the total cost incurred on annual salaries of contract staff equals to Rs. 826685 (€ 11022), from which Rs. 429504 (€ 5727) is assigned to upkeeping of tracks and Rs. 397181 (€ 5295) is allocated to operation of signal system.

Building and infrastructure establishment resource cost comprises of expenditures necessary to sustain a built environment to achieve the intended objective of MGR department, i.e. uninterrupted supply of high quality coal to its power plant. The building and infrastructure establishment resource cost is derived from financial report of the department for the concerned period, and is distributed among different activity pools according to the proportionate utilization of building and infrastructure. It is observed that the total building and infrastructure establishment resource cost apportioned to five activity pools is Rs. 385693 (€ 5143) in maintaining the rolling stock, Rs. 86584 (€ 1154) in upkeeping of tracks, Rs. 193633 (€ 2582) in movement of rail rakes, Rs. 672207 (€ 8963) in fuel supply agreement implementation and Rs. 236138 (€ 3149) in operation of signal system.

The financial report for FY 2013-2014 of MGR department also provides the cost information on the total expenses made on consumables required for running its day-to-day business excluding the salary related expenditures. They include monetary outlay

related to a variety of items, like travel and vehicle expenses, office supplies, telephone bills etc. The total cost incurred on operating supplies is allocated to the activity pools of maintaining the rolling stock, upkeeping of tracks, movement of rail rakes, fuel supply agreement implementation and operation of signal system in accordance with the amount of operating supplies utilized in those activities. It is estimated that the total operating supplies resource costs assigned to activity pools of maintaining the rolling stock, upkeeping of tracks, movement of rail rakes, fuel supply agreement implementation and operation of signal system are Rs. 397208 (€ 5296), Rs. 311188 (€ 4149), Rs. 323838 (€ 4317), Rs. 991755 (€ 13223) and Rs. 505997 (€ 6747) respectively.

It is observed that an assortment of equipments, fixtures, machineries, tools and instruments is utilized in different operations carried out in MGR department. Those plant and machinery items require periodic, preventive and breakdown maintenance, and replacement for their appropriate functioning. Therefore, the total expenditure related to maintenance and replacement of plant and machinery items in the concerned period are put into plant and machinery resource cost. The plant and machinery resource cost is then proportionately allocated to the activity pools of maintaining the rolling stock, upkeeping of tracks, movement of rail rakes, fuel supply agreement implementation and operation of signal system according to utilization of the plant and machinery items by those activities in MGR department, and equals to Rs. 68448685 (€ 912649), Rs. 56847213 (€ 757963), Rs. 45941829 (€ 612558), Rs. 23667003 (€ 315560) and Rs. 37124711 (€ 494996) respectively.

Additionally, it is also noticed that there are some organizational level departments, whose services are usually required for proper functioning of MGR department, such as human resource department and finance department. The overhead cost associated with annual salaries of all the employees deputed in these departments is obtained from the departmental financial report for FY 2013-2014. This administrative resource cost allocated to MGR department is further distributed into five activity pools in accordance to proportionate utilization by the activities, i.e. maintaining the rolling stock, upkeeping of tracks, movement of rail rakes, fuel supply agreement implementation and operation of signal system, while achieving departmental objectives of MGR department. It is computed that the total administrative resource cost allotted to five activity pools is Rs. 9305 (€ 124) in maintaining the rolling stock, Rs. 7444 (€ 99) in up-keeping of tracks, Rs. 33498 (€ 447) in movement of rail rakes, Rs. 13027 (€ 174) in fuel supply agreement implementation and Rs. 7444 (€ 99) in operation of signal system.

4.2. Assignment of activity costs to cost objects

It is already discussed earlier that MGR department of the said power plant is entrusted to perform five separate identified activities, i.e. maintenance of rolling stock, facilitating movement of rail rakes, implementation of fuel supply agreement, maintenance of tracks and operation of signal system. Further, it is acknowledged that these activity pools are discretely consumed by the cost objects of loco and wagon maintenance cost, rail rake operation cost, coal coordination cost, track maintenance cost, and signal and

telecommunication cost. Therefore, the total costs assigned to five activity pools of maintaining the rolling stock, upkeeping of tracks, movement of rail rakes, fuel supply agreement implementation and operation of signal system are directly allocated to the cost objects of loco and wagon maintenance cost, track maintenance cost, rail rake operation cost, coal coordination cost, and signal and telecommunication cost respectively. So, it is estimated that the total cost assigned to loco and wagon maintenance cost is Rs. 73684022 (€ 982454), track maintenance cost is Rs. 59355021 (€ 791400), rail rake operation cost is Rs. 59522627 (€ 793635), coal coordination cost is Rs. 30692392 (€ 409232), and signal and telecommunication cost is Rs. 39966591 (€ 532888).

5. COMPARISON OF ABC MODEL WITH TRADITIONAL COSTING SYSTEM

It can be concluded from the annual cost data of MGR department, estimated through application of the developed ABC model, as provided in Table 1, that ABC approach presents cost information in a more detailed, accurate and functional way than the traditional accounting system, as shown in Table 2. Figure 3 shows various annual cost components of MGR department as calculated utilizing information elicited from ABC model.

The results derived from implementation of ABC model provide the policy makers of the department with an idea about the cost related to all the functions carried out in MGR department, which otherwise is not provided while employing the traditional costing system. It will aid the mangers to recognize value adding and non-value adding activities, to evaluate the cost associated with suppliers, to establish better performance parameters, and to analyze investments in new technologies and designs.

6. BSC MODEL

The traditional performance measurement system, which in present competitive global environment and technology-based

Table 1. ABC report of annual cost in MGR department for FY 2013-2014

Cost object	Amount (in Rs)	Amount (in €)
Loco and wagon maintenance cost	73684022	982454
Track maintenance cost	59355021	791400
Rail rake operation cost	59522627	793635
Coal coordination cost	30692392	409232
Signal and telecommunication cost	39966591	532888

Table 2. Traditional costing report of MGR department for FY 2013-2014

Cost head	Expenditure (in Rs)	Expenditure (in €)
Repair and maintenance - plant and machinery	219027987	2920373
Repair and maintenance - building	1574256	20990
Repair and maintenance - others	13001454	173353
Direct salary and wages	27016253	360217
Administrative overhead	70717	943
Other plant overhead	2529986	33733

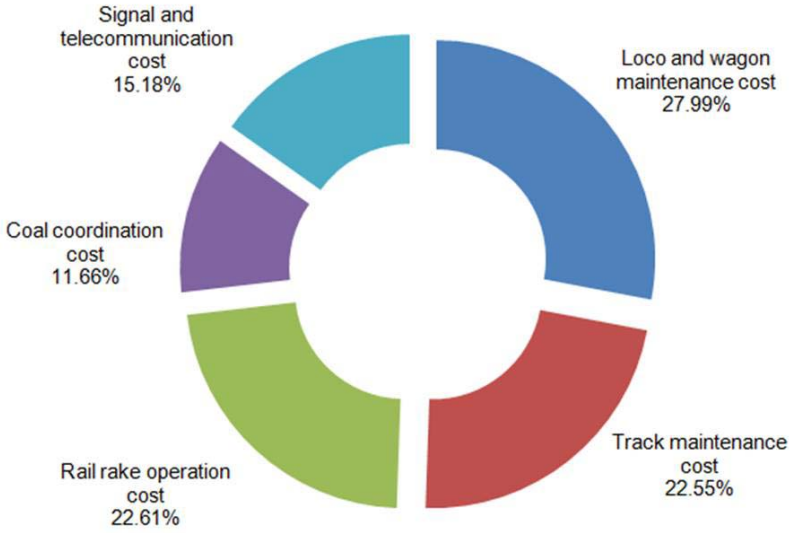

Figure 3. Different cost components of MGR department based on ABC model

enterprises has lost its ability to monitor the overall performance of an organization, often required in future strategy formulation. The formulation and implementation of right corporate, business and functional strategies are important for all categories of organizations, whether small, medium or large. Those are also the key indicators of the external business environment. The BSC is a management tool designed for performance measurement, and performs a critical role in providing a balanced view of the organizational progress on four interrelated perspectives, i.e. financial, customer, internal business processes, and learning and growth. It embodies both traditional quantitative and more subjective qualitative performance measures. It also intends to attain equilibrium between value and natural indicators, between short term and long term goals, between lagging and indicating indicators, and between internal and external performance measures. With time, BSC has been changed from a performance measurement system to strategic management tool because of its ability to combine organizational strategy into operational methods and everyday decision making procedure of workforce. The BSC model also addresses to the following four fundamental questions, i.e.

a) How do the customers see the organization? - Customer perspective

b) What must the organization excel at? - Internal business process perspective

c) Can the organization continue to improve and create value? - Learning and growth perspective

d) How does the organization look to the shareholders? - Financial perspective

Moreover, BSC model facilitates four significant management functions with a view to apply strategy at all levels of the organization. Those functions are elucidating the strategies through transforming vision into quantifiable measures, communicating employees about critical objectives, and how these will be evaluated, examining feasibility of the overall strategy, and planning and aligning strategic initiatives. The BSC model is also capable to work in tandem with the existing management approaches and related tools.

6.1. Designing a BSC model for MGR department

Factors, like organizational capabilities, stakeholder resource contribution, customer retention and behavior, infrastructure capabilities, market potential, productivity, process quality, stakeholder capabilities, market share etc. are critically analyzed in order to design a suitable BSC model for an organization. The BSC model is developed in a specific manner, so that there is an interaction between operational and financial indicators with a cause-and-effect linkage between them. Here, a group of managers and subject experts is selected to develop a unique BSC model for MGR department of CGL Limited taking into account its external business environment and associated constraints. The customer perspective is substituted by supplier perspective in the designed BSC model because supplier of coal holds the same relevance as customer in MGR department. The developed BSC model in MGR department of CGL Limited is exhibited in Figure 4.

It can be noticed that the developed BSC model recognizes 19 performance measures, which provide the decision makers with an overall progress of MGR department on vital performance indicators. For instance, the performance measure of level of lifting of coal reflects the competence of the department to support the power plant's coal demand, whereas, shortfall in supply of annual contracted quantity of coal explains about the department's flexibility and adaptability to realize the coal demand of its power plant from other sources. On the other hand, amount of coal that surpassed the threshold limit of monthly weighted average surface moisture content indicates profitability of the core business of the power plant. Quantity of stones received in coal suggests about efficiency of quality control and quality assurance processes of MGR department. Similarly, coal coordination cost, rail rake operation cost,

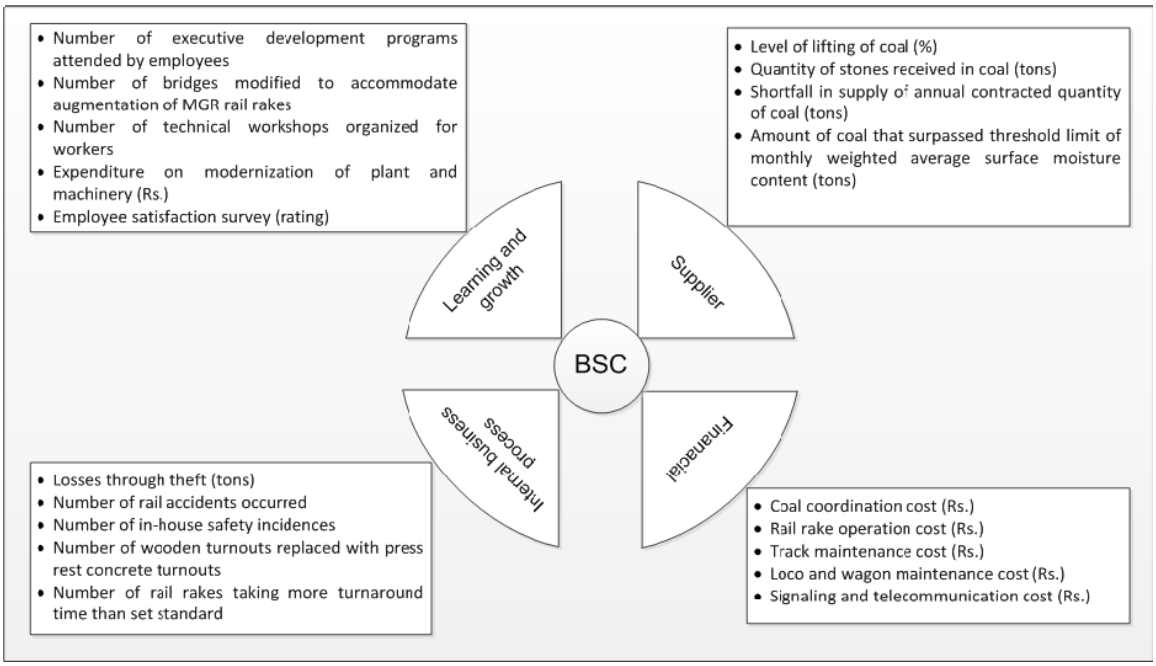

Figure 4. Developed BSC model for MGR department

loco and wagon maintenance cost, track maintenance cost, and signaling and telecommunication cost reveal the cost effectiveness of various functions carried out by the said department. Number of executive development programs attended by employees, number of bridges modified to accommodate augmentation of MGR rail rakes, number of technical workshops organized for workers, expenditure on modernization of plant and machinery, and employee satisfaction survey are the important performance measures elucidating the learning and growth feature of the workforce in the department, which are critical for achieving and sustaining competitive advantage in the prevailing business environment. Losses through theft, number of rail accidents occurred, number of in-house safety incidences, number of rail rakes taking more turnaround time than set standard and number of wooden turnouts replaced with press rest concrete turnouts are the most crucial internal performance parameters that contribute in creating value for stakeholders of the department. Therefore, the developed BSC model can provide the managers with accurate representation of a department's value propositions in order to simplify and operationalize the mission and vision of the power plant.

7. INTEGRATED ABC-BSC MODEL FOR SUSTAINABLE COMPETITIVE ADVANTAGE

The ABC and BSC models are the two widely accepted management techniques, which can be individually implemented to provide more detailed and precise cost information of an organization and to evaluate its progress respectively. The accurate information derived from application of ABC model help managers of the organization in optimal decision making. On the other hand, BSC model through its coherent and linked set of financial and operational performance measures facilitates better measurement of an organization's capabilities to create long term sustainable competitive advantage by recognizing its key drivers. Although, ABC model gives a better understanding of costs at different activity levels of the organization, but it cannot attach strategic importance to various activities carried out in the organization. Moreover, ABC methodology is also inept to offer a procedure to validate whether the entire key cost areas are covered during cost calculation or not. In addition, managers employing BSC model in conjunction with traditional costing method are presented with inexplicit and imprecise cost data for monitoring the performance of the organization. These limitations can be overcome through combining ABC and BSC models.

So, an integrated ABC-BSC model is developed for application in MGR department of CGL Limited. The policy makers are benefitted from accurate, reliable and quantified visibility of what is really the driving cost from outside the organization as well as within, provided through application of this combined ABC-BSC model. The integrated ABC-BSC model for the said department is shown in Figure 5. It can be observed from the designed model that BSC framework first translates the vision of MGR department into different actionable and measurable activities. Next, BSC is employed to keep track of progress of the department with respect to the following identified objectives:

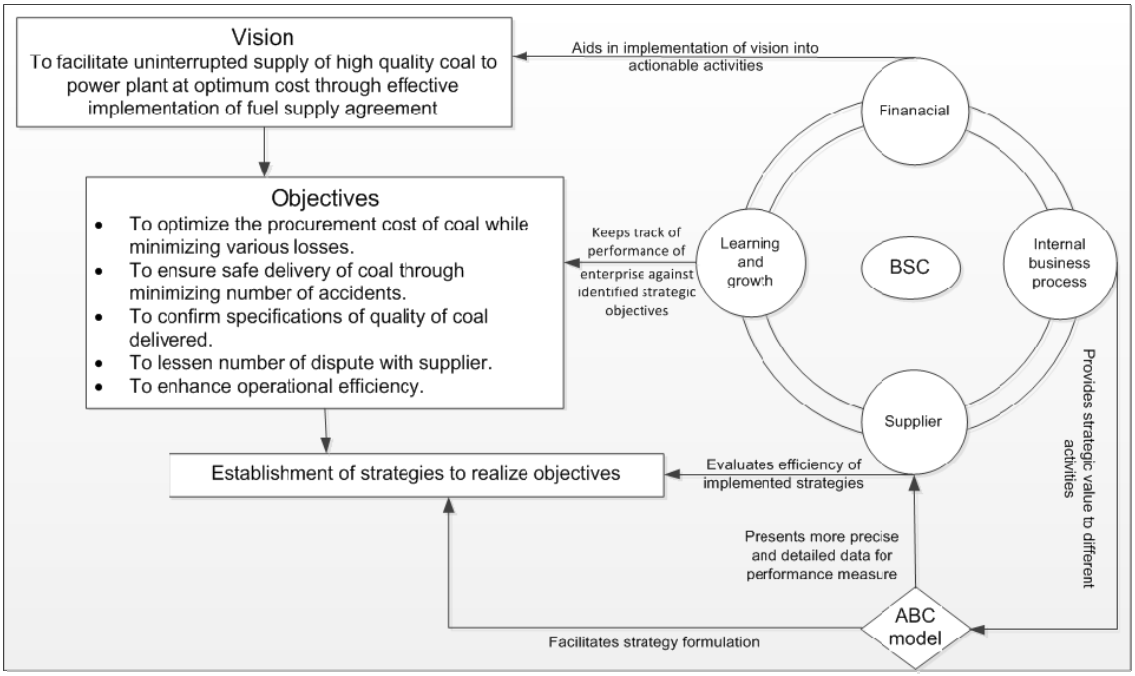

Figure 5. Integrated ABC-BSC model for MGR department

a) to optimize the procurement cost of coal while minimizing various losses,

b) to ensure safe delivery of coal through reducing number of accidents,

c) to confirm the specifications of quality of coal delivered,

d) to lessen the number of disputes with seller, and

e) to enhance operational efficiency.

These objectives are achieved through formulating and implementing effective strategies. The BSC model is subsequently utilized to evaluate efficiency of the applied strategies. In this integrated model, ABC technique can be treated as enabler to support the development of cost effective strategies while accurately measuring various performance parameters across all four perspectives of BSC model. Additionally, according to this model, the impact of any decision is not only analyzed on short term basis, like activity elimination, but their long term strategic consequences are also evaluated.

8. CONCLUSIONS

An organization in the current business environment cannot afford to make mistakes and at the same time, can remain competitive. Therefore, in order to be competitive under these dynamic conditions, it is indispensable to understand how a business operates, how costs are incurred and how they can be effectively managed/monitored. The current traditional accounting system is incapable or imprecise to provide relevant information for managerial decision making and control. So, this paper proposes the application of ABC model in MGR department of an Indian thermal power plant to evaluate its processes and work-flows to recognize actual activities that cause costs. The wider and more realistic view on costs provided through the implemented ABC model helps in streamlining the strategic decisions based on more accurate information, which can enhance quality of decisions. Further, a BSC

model is separately adopted in the said department to provide a comprehensive performance management system encompassing both traditional quantitative and subjective qualitative performance measures. This BSC model can help policy makers of the said department to extract useful data on its performance and recognize significant factors that facilitate or hinder the achievement of the desired results. The results derived through implementation of ABC and BSC models in MGR department of an the power plant exactly corroborate with the previously established perceptions that they can be efficiently employed to devise, implement and evaluate effective strategies for achieving competitive advantage. Additionally, a framework to integrate both ABC and BSC models is provided for the said department with a view to take advantage of their complementary synergies. This integrated ABC-BSC model can provide more accurate cost information for monitoring strategy implementation and present a strategic perspective to operational decisions. Although, ABC, BSC and integrated ABC-BSC models have many benefits, their successful implementation involves small initial investment because the current management information system practiced in MGR department of CGL Limited is inept to provide some required information for adoption of those models, and the same needs to be redesigned. Moreover, ambiguity in any form, as related to identification of cost objects, activities, resources, cost drivers, performance measures etc. may lead to imprecise results and in turn, undermine all the benefits achieved after application of ABC, BSC and integrated ABC-BSC models. Therefore, a special care should be taken so as to avoid ambiguities. Even though, these models are designed for a specific department of a power plant, there is a future scope of their application at the organization-wide level.

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РАЗВОЈ АЛАТА СТРАТЕГИЈСКОГ МЕНАЏМЕНТА У ТЕРМОЕЛЕКТРАНИ КОРИШЋЕЊЕМ "ABC" И "BSC" МОДЕЛА

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Извод

У данашњем динамичном, неизвесном и високо конкурентском пословном окружењу, дугорочни успех организације пресудно зависи од перцепција, избора и деловања менаџера у погледу стратегија. Обрачун трошкова заснованих на активностима (ABC) и систем уравнотежених показатеља (BSC) су модерни менаџмент приступи, признати као поуздани алати за формулисање стратегије и њену имплементацију у организацији. У овом раду, ABC и BSC модели су одвојено предложили и примењени у merry-go-round (MGR) одељењу једне термоелектране у Индији. Резултати добијени усвајањем ова два модела у поменутој термоелектрани, прецизније, благовремено и поуздано обезбеђују оперативне и финансијске информације на различитим нивоима активности у организацији, које могу помоћи у ефикасном стратегијском и тактичком одлучивању. И поред ограниченог броја објављених радови који се односе на примену "ABC" модела у термоелектранама, ниједан од њих није усвојио ABC и BSC технике у контексту окружења у Индији. Осим тога, интегрисани "ABC-BSC" модел је дизајниран тако да искористи синергетски ефекат оба модела, "ABC" и "BSC".

Кључне речи: обрачун трошкова заснованих на активностима, систем уравнотежених показатеља, термоелектрана, трошкови, стратегија, електрична енергија, динамичност, контекст

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