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SYSTEM (CMS) MATRIX**

by

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An Application of the Planned Value Control (PVC) Concept into the Cost Management System (CMS) Matrix

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An Application of the Planned Value Control (PVC) Concept into the Cost Management System (CMS) Matrix

Abstract

Performance measurement is an area of the management accounting information system. In this article, an application of the concept of Planned Value Control (PVC) as a mechanism for improving performance measurement continuously at a major steel producer in Australia, Slab and Plate Product Division (SPPD) of the Broken Hill Proprietary Company Limited (BHP), is examined. An observation is that although the ability of the PVC concept can be enlarged to manage various facets of the business at SPPD, the predominant application has remained limited to costing system with exceptions. At SPPD, the concept is used to improve performance measurement in various business processes including variance analyses, budgeting, production control, management of overtime, absenteeism, maintenance labour, supply operations and key performance indicators (KPI).

Key words: Performance Measurement, Planned Value Control (PVC), BHP-SPPD.

Introduction

Today's management accounting information ... is too late, too aggregated, too distorted to be relevant for managers' planning and control decisions. (Johnson and Kaplan 1987, p1)

Although Johnson and Kaplan made the above statement about a decade ago, it is equally valid in today's organisation. If management is to make sound decisions it must be supported by information that appropriately reflects the technology, the processes and the environment in which the organisation operates. In the case of world-class manufacturing organisations, these features are seen as a continuous challenge.

The authors of a recent text book state that "performance measurement is perhaps the most important, most misunderstood, and most difficult task in management accounting" (Atkinson et al 1995, p51). These authors further argue that today many organisations are taking a different approach to evaluating performance that involves continuous reevaluation and improvement of ongoing activities. The processes of continuous improvement and performance evaluation can vary in practice. In addition, there exist many concepts and terms associate with the philosophy of continuous improvement such as benchmarking, activity based management, business process reengineering and total quality management. Perhaps, it would not be an exaggeration to state that little is known about actual functioning of such practices in organisational context.

In this article, an application of the concept of Planned Value Control (PVC) as a mechanism for continuous improvement of performance in a major steel producer in Australia, Slab and Plate Product Division (SPPD) of the Broken Hill Proprietary Company Limited (BHP), is examined. The organisation of the article is as follows. *Firstly*, we introduce a background of SPPD. *Secondly*, we turn to elaborate the PVC concept. In the next, *thirdly*, we examine the use of the PVC concept at SPPD and, *finally*, followed by a conclusion.

SPPD's Background

SPPD is one of the eight major divisions of the BHP Steel Group (BHP steel) which performs one of the three main businesses of BHP.¹ BHP steel is a major supplier of steel products to both

¹ BHP's Other businesses are petroleum and minerals. In addition, BHP incorporates various services and specialist operations including transport, engineering, research and development and information technology. In recent years,

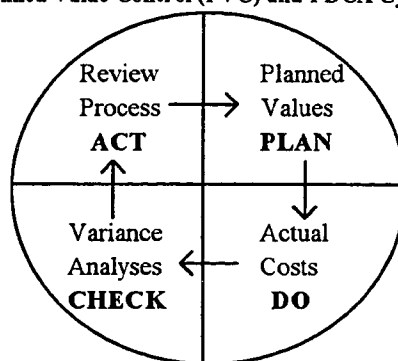
home and overseas markets. BHP steel has four integrated steelworks from which a wide range of steel products are produced. SPPD is the largest producer of flat steel in Australia with a production capacity of 4.3 mtpa. There is a long history of SPPD which goes back to the earliest era of steel making in Australia (see McLennan 1974, Hughes 1964, Trengrove 1975, Kelly 1989). The establishment of the steel works located at Port Kembla near Wollongong in NSW contributed over the years to developing what is now the City of Greater Wollongong and its surrounding areas. It was 1928 when SPPD (it was then registered as Hoskins Iron and Steel Company Ltd, generally known as Hoskins Kembla Steel Works) began its production operation by the blowing in of the first blast furnace. Since then it has been growing as one of the world's great integrated iron and steel making plants, more recently producing a divergent range of steel products. It was in 1935 that BHP acquired Hoskins Kembla Steel Works. Ever since, the company has been growing in terms of both technologies in steel making, product development and expansion of markets. Today, it is considered one of the world's most technically advanced producers of quality steel products.

SPPD's operations have been involved with an array of plants making the steelworks a self-contained iron and steel making facility, albeit including complex interlinked processes. It produces a range of specialised products including steels slabs, hot rolled coils, slit strip and coil plate, tin plate coils and sheet, plate for pipeline and construction industries. In May 1992, the division had a workforce of eight thousand and one hundred people (BHP Factsheet 1992).

Planned Value Control (PVC) Concept

The PVC concept was originally developed by the Nippon Steel Corporation (NSC) in Japan. The basic concept of PVC is the setting of specific "forward looking" targets for key parameters of operational and cost control and comparing actual performance with these targets. These targets are called Planned Values (PVs). A key aspect is that these targets are not imposed from above but are set by those people responsible for performance. The drive for continual improvement is an essential part of the setting of planned values. It is a concept which supports the PDCA cycle (see Figure 1) of Total Quality Control (TQC) philosophy in setting the PVs.

Figure 1 Planned Value Control (PVC) and PDCA Cycle



The PDCA cycle is **Plan, Do, Check and Act**. The cycle starts by developing a **Plan** for what needs to be accomplished in any given time frame. In this phase there is a need for analysing the

BHP has been considered a most successful Australian company as well as an international resources company. In 1991 BHP ranked 120th on the Fortune Global 500 list of the world's largest industrial companies (Factsheet, 1992).

existing situation so that appropriate objectives can be set to improve present practices. The **Do** phase incorporates the applications of the plan undertaken. That is, it involves putting the plan into effect. The **Check** phase involves investigating whether the desired improvements have been attained. In the **Act(ion)** phase the successful aspects of the plan are identified and become new benchmarks for future improvement. This cycle is a continuous process. According to Imai (1986), "the PDCA cycle goes round and round. No sooner is an improvement made than it becomes the standard to be challenged with new plans for further improvement" (p21). That is, the cycle continues by returning to the Plan phase to set objectives for further improvement opportunities that have been identified.

When these processes are applied to review PVs by benchmarking the existing situations and current work practices, it is referred to as the PVC concept. It is a dynamic control mechanism aimed at achieving continuous improvements in setting new targets and challenges. It is a concept of setting co-ordinated PVs and reviewing them regularly against actual performance.

Use of the PVC Concept at SPPD

During the period 21 July through 8 August 1986, in accordance with a technical cooperation agreement, Nippon Steel Corporation (NSC) from Japan conducted a field study at SPPD for the introduction of the PVC into the Cost Management System (CMS) matrix of the steel works. Together with PVC, NSC also looked at the possibility of introducing Integrated Quality Control systems and how these control systems could be positioned and used in SPPD as part of total quality control (TQC).

On the basis of NSC's report (NSC, 1986), SPPD incorporated the PVC concept in their CMS matrix in order to improve performance measurement (feedback and feed forward control) at all levels. At SPPD the utilisation of the PVC philosophy is not limited to control cost, but is also used to manage and improve aspects such as production planning (capacity, productivity, time efficiency, etc), customer "value-chains" analysis (cf Porter 1985), maintenance standards, yields evaluations and various levels of performance measurements.

It is claimed that PVC was one of the founding platforms for the introduction of TQC at SPPD. As well, it has been considered a systematic and formalised way of improving the CMS at SPPD by encouraging cross functional involvement in all areas such as production, supply, maintenance, finance and planning and human resources. Not only is the focus of the PVC at SPPD to manage and improve cost aspects but to better manage activities and business processes in all areas and thus provide a platform for total commitment.

Subsequent to the introduction of PVC a department was created to monitor the regular reviews of PVs and report these to senior management. In reviewing these PVs the PVC department plays an important role in encouraging and supporting the personnel involved. In order to maintain such a role a steering group consisting of senior staff members from the Production Planning, Finance and Planning and Technical Support departments was formed. At various levels of the plant a hierarchy of PVC co-ordinators was also established to assist the activities of the PVC group. The introduction of the PVC concept led SPPD's people, in particular the Finance and Planning department, to broaden their understanding and relate various activities of their business to several approaches/philosophies such as Total Quality Control (TQC), Total Performance Management (TPM) and Activity Based Management (ABM).

Cox [an ex-PVC accountant at SPPD] emphasised that

At Nippon Steel, Planned Values are regarded as the embodiment of the willingness of departments to improve their operation and achieve their goals. They are not simply an extrapolation of the past but combine challenge with reality. Their foundation is on recent operating results, but they must allow for improvement and provide a challenge for the future. All departments (not just production departments) must constantly look for problems and discover the means for improvement, incorporating them into the planned values set. The positive participation of management and shop floor personnel should be encouraged in this process.

[Whereas] at SPPD, the Planned Value Control concept is used predominantly with the costing system. To the extent this has been to the concept's detriment, people have come to understand PVC to be the costing system itself. PVC does not represent a means or format for representing costs to plant personnel. What it does offer is meaningful standards of performance against which costs can be compared for control purposes. PVC is in essence a philosophy. It offers ideas and concepts which can enhance the use within costing system as it is within any performance measurement system. Though not used to the same extent, the PVC concepts at SPPD have been used in financial budget setting, production planning and operational control, equipment maintenance, research and development, and new equipment plans. The aim is to bring all these plans together into a co-ordinated plan for the future of the steelworks. This is represented by SPPD's Business plan, which forms a major foundation with which many performance aspects are compared. (1989, pp109-110)

From a costing and budgeting point of view these PVs are targets or standard values that form the basis of evaluating operating results. The PDCA cycle aims at formalising a process structure that enables active involvement and participation at all levels from top management down to the shop floor level. Thus, Cox goes on to argue that,

.. an important aspect in introducing this concept is the attitudinal change required. People must understand that the established standard (planned value) is merely a place to start in the process of improvement. Standards should not be perceived as fixed goals [not an end in itself, rather they should be used as means]. This step is not an easy one, for the ratchet effect of imposed tighter budgets still runs strong in the minds of many. The benefits here, however, are that the goals and standards are self imposed... The positive participation of management and shop floor personnel should be encouraged in this process. (1989, p109)

As stated earlier, setting PVs requires a dynamic involvement at all levels. Although the ability of the PVC concept can be enlarged to manage various facets of the business at SPPD, the predominant application has remained limited within the scope of the costing system with exceptions. In costing, PVC is used for developing various PVs, such as material feed, production delay, operating cost, standard process routes and standard price and rates. In addition, at SPPD the PVC concept has been used equally successfully in managing overtime, absenteeism, labour numbers and maintenance performance criteria such as labour gang manning, labour utilisation and forward work load planning. The PVC concept has also been used to measure such aspects as time efficiency of production processes, productivity and product yields.

Since its incorporation the PVC process has become an integral part of the budgeting process, while the roles and functions of budgeting at SPPD are dictated by differing natures of its preparations and use. This article is not about analysing the 'constitutive roles' that SPPD's budgeting might play. Rather, an indication here is that the PVC process plays a significant role in the budgeting process at SPPD.

Conclusion

An important conclusion that can be drawn from the above discussion on PVC is that the significance of the PVC concept as a philosophy for improving SPPD's CMS should not be

underestimated. However, it has not been operated without limitations. The Costing System Review (1989) team identified several problems concerning the operations of the PVC concept at SPPD. For example, it was stated that:

It is difficult to determine the effect of changes to planned values prior to submission and acceptance. The current method of setting PVs is unsatisfactory as it involves multiple handling of data. Changes to PVs are made without the users' knowledge. The time delay in effecting a change to a PV is unacceptable to the user departments. It takes eight weeks for changes to be reflected in the cost reports. (Costing System Review 1989)

This is a reason why SPPD's Finance and Planning department has looked forward to implement an Integrated Business System (IBS) to improve its CMS, thus improving the PVC process.²

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² It should be mentioned that this paper is a part of a major study conducted by the author during 1992 to 1994 which investigates SPPD's cost management systems implementation using a world-class Integrated Business System (ie the SAP system) [see Lodh 1994].