ASSET PERFORMANCE FOR PROFITABILITY

A framework to realise optimal benefit from effective asset management

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Mainstream maintenance publications consistently highlight why maintenance makes good business sense but the message has not been widely understood by business management.

In order to compete in the global market place the necessity to improve efficiency is now more urgent than ever. The scope to improve efficiency by continuing to decrease employee head count no longer exists. Continued use of traditional asset management models is inadequate in today's environment. Organisations that have achieved operational excellence are those that apply a fundamentally different approach to that associated with traditional asset management models and scientific management concepts.

This paper offers some reasons as to why the message has not been understood and presents a framework by which the known business benefits of good maintenance management practice can be realised. The framework is a coalescence of operations management, continuous improvement, maintenance management, employee involvement and change management.

Key Words: Maintenance, Management, Performance, Profit, Work Systems

TRADITIONAL ASSET MANAGEMENT MODEL

The concepts that underlie the widely accepted, traditional view of maintenance management are embodied in models similar to that shown in Figure 1. The model depicts a maintenance management system as part of an asset life cycle management process. It implies a linkage to the business plan as input to long-term requirements and decisions regarding operating (production and maintenance) activity over the asset life cycle.

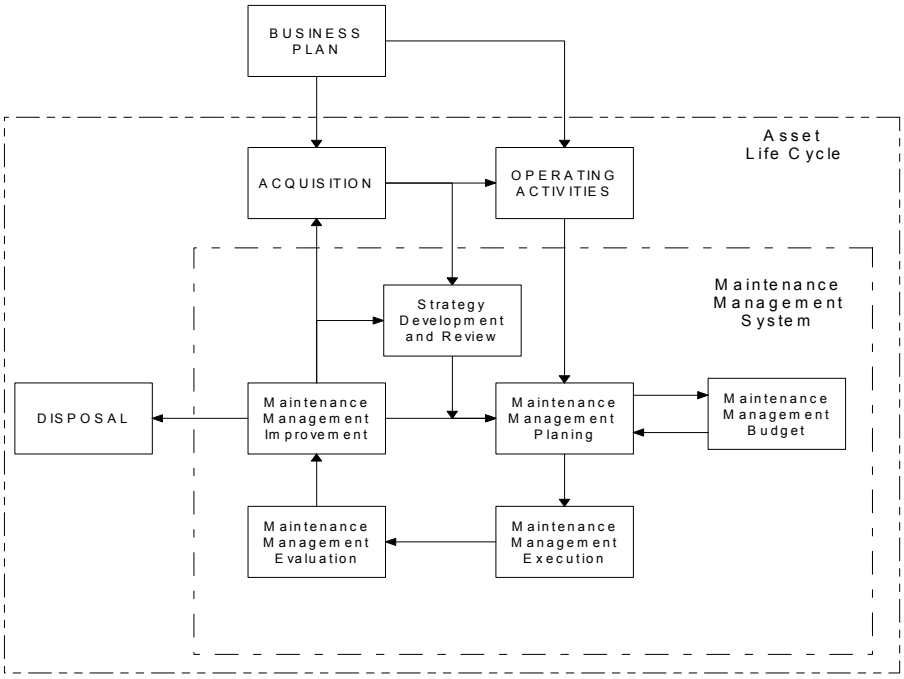

Figure 1 Traditional Asset Management Model

One problem with this type of model is that it accentuates a focus on the solution of technical issues regarding equipment reliability and data analysis when deploying the “maintenance management system”. The traditional model frames the maintenance management system within the asset life cycle. This creates a dilemma for

maintenance managers as it reinforces the perception of maintenance management as largely a technical matter. The traditional asset management model does not portray maintenance in terms that are perceived by business and financial managers as critical to operational performance and profitability.

THE MAINTENANCE MANAGER'S DILEMMA

The business benefit or value delivered by efficient maintenance practice is widely published in mainstream maintenance literature. Despite this, the value delivered by efficient maintenance management is not universally understood across industry. Consequently, maintenance is not managed as a strategic business function but as an expense.

It is common for maintenance managers to complain about not being understood by business and financial managers and that they are subsequently being hindered in their efforts. The lack of understanding by business and financial management about the business benefit of maintenance management is the result of an inadequately defined linkage to the broader operation management context. If this is to change then it is up to maintenance managers to change the way they perceive maintenance management, and to educate business and financial managers.

Maintenance managers are generally unable to gain wide acceptance of maintenance as a strategic business function due to the continued use of the traditional asset management model. In order to address this problem, maintenance managers need to broaden their definition of the maintenance system beyond the technical issues of maintenance management. The solution to this dilemma lies in promoting and delivering maintenance management in the context of a manufacturing operation model.

THE MANUFACTURING OPERATION MODEL

Russel & Taylor (14) define the operation function as a series of activities that involves acquisition of resources (inputs), and transformation of these into outputs using one or more conversion processes. The operation function involves management of the conversion process with consideration of the requirements and feedback identified as a result of operation activity, and responding as appropriate. This is depicted in Figure 2.

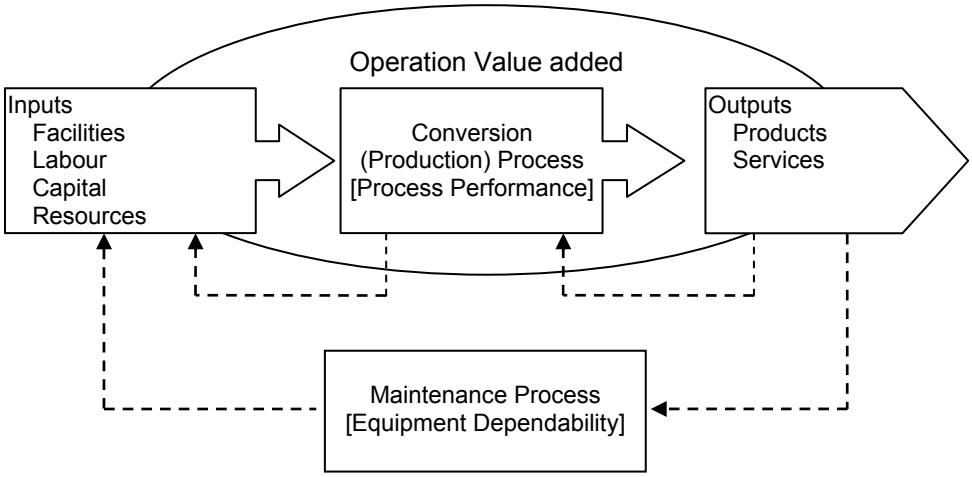

Figure 2 Manufacturing Operation Model

The purpose of operation management is to "add (maximum) value" during the conversion process. The objective of operation management is to ensure that the conversion process is performed as efficiently as possible so that the 'value' of outputs is greater than the sum of all inputs. Added to this is the essential requirement to achieve this in a safe and environmentally sustainable manner. Clearly then, delivering optimal business benefit from effective asset management involves a demonstrated superiority by an operation in adding value during the conversion process.

In the manufacturing operation environment, production and maintenance are both responsible for achieving output, value added and performance (safety, environmental) targets together. The production function is primarily responsible for process performance (product quality and throughput), achieved by using equipment capability to deliver output targets at lowest possible conversion cost. The maintenance function responsibility is plant dependability (reliability and availability), achieved by assuring the capability of equipment to deliver operational targets at best return for expenditure. At the centre of this manufacturing operation model is a radically different relationship between production and maintenance that delivers optimal business benefit from effective asset

management. Understanding this concept of the manufacturing operation provides a focus on how an operation will manage and deliver both equipment dependability and process performance.

The traditional relationship of production as customer and maintenance as service provider inherent in traditional models is no long appropriate. Jambekar (7) confirms that the “traditional maintenance service supplier and customer relationship between maintenance and production” should be redefined. The bottom line is that maintenance and production need to work together to have their products available at the right time, cost and quality for purchase by customers. All this needs to be achieved safely and in an environmentally sustainable way. The manufacturing operation model provides a simple yet powerful medium to educate business and financial managers.

The manufacturing operation model is hardly revolutionary. Much of what is embodied within the model is generally accepted, at least within the maintenance management arena. The revelation is not the model but how this has been practically applied.

Consideration of operations management concepts together with characteristics of a high performance work system will provide a better understanding of how the model is applied.

OPERATIONS MANAGEMENT CONCEPTS

Development of operations management theory follows two main schools of thought, Scientific Management and Human Relations.

Scientific management principles, originally developed by Frederick Taylor in 1911, promote “maximising output” and the technical aspects of work design. Scientific management has a strong focus on directing individuals to achieve productive output. The use of scientific management principles still dominates the management approach currently used in manufacturing operations.

HR principles, initiated by the work of Elton Mayo in 1930, identified that as well as the physical and technical aspects of work consideration of worker motivation is critical to improving operational performance. These principles were extended through the development of management science concepts concerning worker motivation, and quantitative models and techniques initiated by operation research groups during World War II. This was further developed and successfully applied to manufacturing by quality management advocates such as Ohno, Deming and Juran.

More recently operations management concepts have been influenced by "the information age" (technology deployment), and globalisation. This has led to the trend within industry, of implementing new technology and carrying out associated head count reductions in order to achieve efficiency improvement and lower operating costs. Evidence suggests that this formula (new technology + reduced employee numbers) does not offer a sustainable long-term solution.

There is a general awareness in the mainstream maintenance management arena of the need for team synergy, people involvement, and team capability, to supplement technical capabilities (1, 5, 6, 9, 11, 13). However the focus remains on technical applications (e.g., modelling or performance measurement) rather than providing the ingredients to improve people performance in the delivery of operational excellence.

Acknowledgement that worker motivation and quality management principles are accepted by manufacturing enterprise as central to achieving performance excellence is represented by findings typified by Sutton & Konzelmann (17), and Sharp & Bamber (15).

The approach to operations management used by leading organisations that adequately utilises these principles has been termed as “high performance work system” (HPWS). According to Tomer (19), “Leading organisational behaviour specialists believe that high performance work systems has the greatest potential to provide sustained competitive advantage to companies adopting it.”

HIGH PERFORMANCE WORK SYSTEM

Kirkman et al (10) provide the most succinct definition of HPWS. HPWS is defined by 5 elements used by organisations in synergy to improve financial and operational performance:

1. Self-Managing Work Teams are groups of employees performing and managing their assigned work together. These teams operate with high levels of autonomy and responsibility to achieve specific goals defined by business plans.
2. Employee Involvement (also termed empowerment) is where employees are encouraged to participate and take responsibility for decisions and management of their day-to-day tasks.

3. Integrated Manufacturing Technologies is the systems and tools (e.g. CMMS, JIT, Lean, etc.) integrated with available technologies (e.g. PDA, Internet, CAD/CAM, Robotics, etc) applied to improve work efficiencies.
4. Organisational Learning refers to knowledge acquisition, sharing and use, and systems thinking where people are continually learning how to learn together.
5. Total Quality Management represents the set of standardised, documented and controlled processes used by people to deliver products or services. The focus of TQM is on customer and employee retention.

When considering operation strategy Stevenson (16) suggests that some of the latest approaches that involve teams of managers and workers "may reflect a growing awareness of the synergetic effects of working together." A critical finding of Kirkman et al (10), supported by the empirical studies of Varma et al (20), is that improved performance is more dependent on the people involved than the sophistication of the technology or techniques employed. A number of sources have found the financial benefits of HPWS to be tangible and significant (2, 3, 7, 21).

Coupling the principles of HPWS with the manufacturing operation model provides a framework within which maintenance management can be redefined, promoted and delivered in terms recognised by business and financial managers.

For an organisation to be capable of achieving efficiencies exceeding those provided by applying traditional asset management models, they need to build this framework into a methodology that harnesses the synergy of maintenance and production people, all empowered and directed to deliver optimum operational performance. Continued use of traditional asset management models is inadequate in today's environment.

SYNERGETIC ASSET MANAGEMENT MODEL (SAM)

The SAM model shown in Figure 3 acknowledges the already accepted position that the key to realising business benefits available from effective asset management is provided through people.

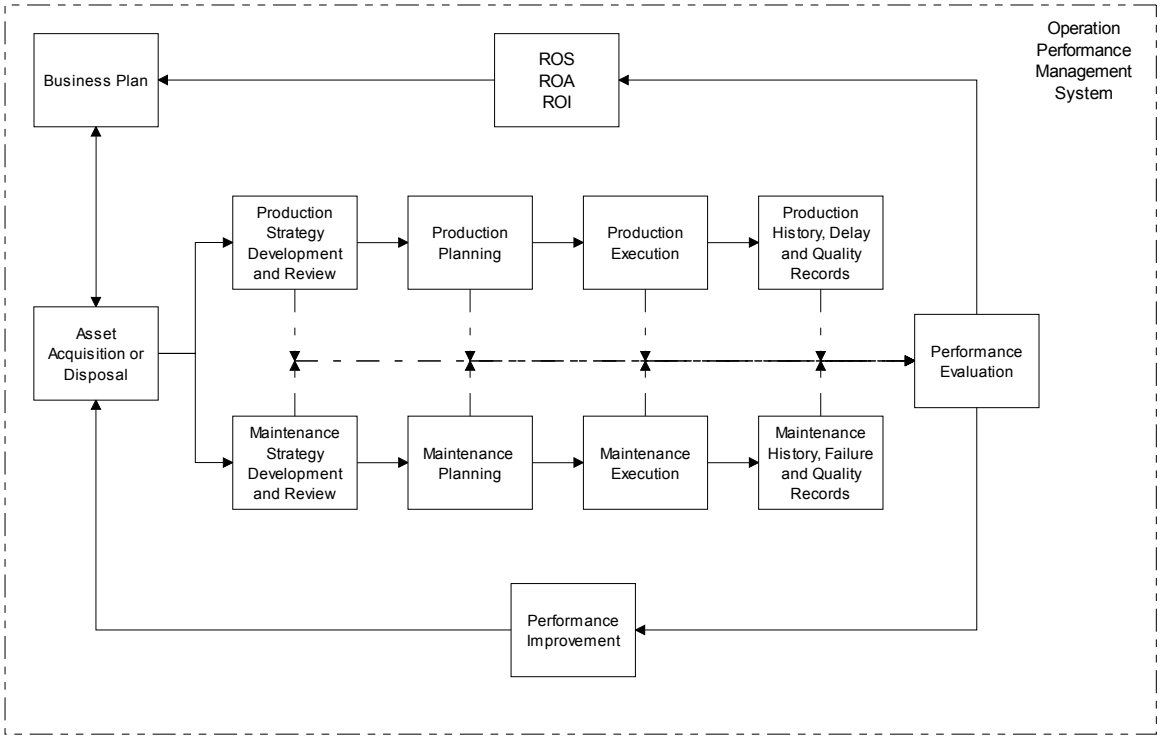

Figure 3 SAM

SAM is a holistic approach applied to three asset elements – People, Plant and (management) Processes.

The model depicts management of the asset life cycle within the context of a people performance management system. Performance management relies on adequate feedback, reward, recognition, and support to optimise employee motivation. Effective leadership relies on performance management to ensure goals are realised and control limits are maintained.

The business plan establishes the goals required for all operational functions (defined by maintenance and production management processes) over the asset life cycle. Production and maintenance then cooperate to

formulate performance and dependability strategy and tactics that are mutually inclusive for realising optimal operational performance (ROA / ROI).

The underlying principle of the model is that managers (mentors) work together with employees growing the synergy in:

- Operations in league with maintenance,
- Employee involvement / empowerment,
- People working together in teams for common business goals,
- Appropriate use of systems and technologies,
- Organisational learning for improvement;

all within a TQM system that sponsors continuous improvement and change management.

However, just like the plethora of other improvement initiatives applied to manufacturing operations SAM is not a silver bullet. This is because, as Tomer (189) points out "… it is not a simple matter of acquiring and plugging in a best practice technology or method." Adopting SAM results in a profound change in the relationships and behaviour of individuals in the business. Consequently, the application of the framework represented by the SAM model requires a staged and sustained effort to achieve operational excellence.

CONCLUSIONS

The continued use of traditional asset management models is no longer appropriate in the global business environment. This type of model accentuates a focus on the solution of technical issues and hinders understanding of maintenance as a vital business function in a manufacturing operation.

The Synergetic Asset Management framework provides a high performance work system specifically applicable to manufacturing operation management. It centres on the development of an operational team culture that embraces both maintenance and production functions to realise operational excellence. Despite many publications about operational excellence, lean manufacturing, and maintenance management generally, the awareness of business management to the existence of this framework has been practically nil despite the fact that operations prosperity and reliability are central to business success.

Asset management must be delivered within an operation management context to ensure:

1. Business, financial and operation (maintenance and production) managers have a common understanding of the strategic business role of maintenance, and
2. Operation managers can deliver and sustain the known benefits available from efficient asset management.

Business, financial and operation (maintenance and production) managers need to adopt the synergetic model of asset management. Integrating maintenance and production, and empowering people (assets) will ensure plant assets achieve the required operational performance. The synergetic asset management framework must be inculcated in the operation management system.

Ultimately, improved performance is more dependent on the people involved than the sophistication of the technology or techniques employed. Applied research and development of an integrated ensemble of tools, systems, techniques and people empowerment mechanisms for achieving SAM are ongoing within a variety of Australian manufacturing enterprises.[1]

[1] The valued contribution to the preparation of this paper by Mike Wood and Brendan Smith, the author's colleagues at acm, is gratefully acknowledged.

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