Chapter 1
Introduction to Asset Management

Abstract The aim of this chapter is to introduce to the main concepts of Asset Management. *Outcomes* After reading this chapter you will know about:

- The purpose of this book;
- The historical background to asset management;
- The ISO 55000 series of standards for asset management;
- Definitions of assets, liabilities, and related terms with reference to ISO 55000 and to accounting applications;
- The broad types of assets which organizations have;
- The types of industry to which asset management is particularly important;
- The aim of asset management within an organization;
- An outline of the asset management life cycle;
- The basic questions to be addressed by asset management;
- The benefits of good asset management;
- The dangers of the asset death spiral.

1.1 Purpose of This Book

This book presents a systematic approach to the management of physical assets from concept to disposal. The aim is to develop the general principles of asset management in order to make them accessible to a wide audience.

The book is intended to act as an introductory text which can form the basis for educational courses in asset management at the postgraduate or advanced undergraduate level, as well as being suited to the asset management practitioner as a convenient reference on asset management topics.

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Fig. 1.1 Military assets—city of Ur 2600 B.C. From the "Standard of Ur"

1.2 Evolution of Asset Management

The development of physical assets has been a hallmark of human activity from early times. Figure 1.1 shows military wagons from the city of Ur dating from 2600 B.C. Clearly the citizens of Ur were familiar with the wheel, but this means that there must also have been artisans who were familiar with the bearing, on which the wheel depends, with lubrication on which the bearing depends, and with the lathe and other woodworking and metalworking tools needed to build the wheels and the wagons. A developed system of manufacture, maintenance, and logistic support for these assets must have existed from a very early date.

Despite these early beginnings, physical asset management has never been a well-understood activity within populations at large. The pattern of educational and professional specializations has generally by-passed the physical asset management field. Various technical areas, such as defense, aviation, and civil works, have evolved their own approaches to the topic, under such headings as logistics, systems engineering, public works engineering, infrastructure, and maintenance.

1.2.1 Why Do We Need Asset Management?

The need for asset management as a recognized discipline arises from the complex technical nature of modern systems. Let us take an example from aviation. A contrast can be drawn between, on the one hand, the Wright Brothers Flyer of 1903 (Fig. 1.2), which was the first aircraft to achieve controlled flight, and on the other hand, the modern aviation industry.

Initially, the Wright brothers designed, built, flew, repaired, and financed their own aircraft. They did not need asset management as a separate activity. But, aviation today involves flight operations, engineering, maintenance, finance, human resources, and a wide range of asset types on a huge scale. Figure 1.3 gives some indication of this. It is this vast increase in complexity, across a wide range of industries, which has led to the need for asset management as a recognized discipline.

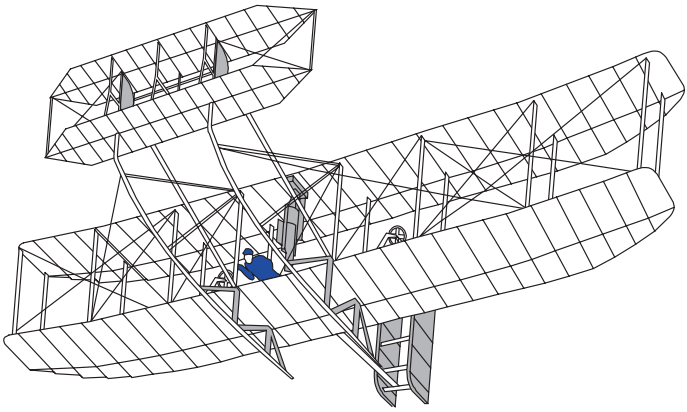

Fig. 1.2 Wright Brothers Flyer 1903

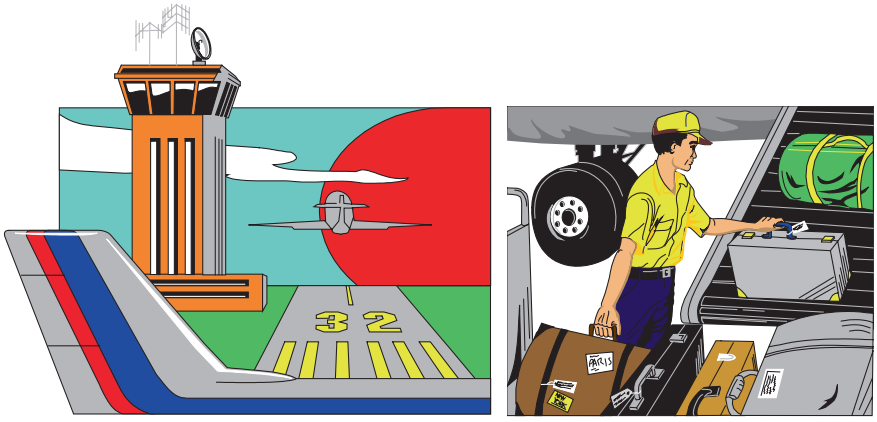

Fig. 1.3 Modern aviation industry assets

1.3 ISO 55000 Series Asset Management Standards

In recent years, a determined effort by those working in the field has resulted in the development of a formal approach to asset management systems, knowledge, and education. This led to the publication in 2014 of the International Standards Organization's ISO 55000 series of Asset Management standards.[1] These standards supersede the earlier document known as PAS-55, and are complementary to

[1] ISO 55000 Asset management. Overview, principles and terminology. ISBN: 978 0 580 86467 4 ISO 55001 Asset management. Management systems—Requirements. ISBN: 978 0 580 75128 8 ISO 55002 Asset management. Management systems—Guidelines for the application of ISO 55001. ISBN: 978 0 580 86468 1.

the International Infrastructure Management Manual.[2] These developments have been accompanied by the formation of Asset Management professional organizations in many countries. This has acted as a catalyst for the recognition of the key role of asset management in modern organizations and has led to a demand for mainstream education and training in physical asset management.

The ISO 55000 series standards are designed as a guide for organizations involved in establishing, implementing, and maintaining asset management systems and for the planning, design, and implementation of asset management activities.

ISO 55000 gives an overview of the asset management topic and the definitions of terms used.

ISO 55001 specifies requirements for establishing and maintaining an asset management system and for supporting the delivery of asset management activities.

ISO 55002 provides guidelines for the implementation of the requirements specified in ISO 55001.

This book links its main subject matter to the ISO 55000 series of standards and provides examples, exercises, explanations, and discussion to assist in the implementation of the principles involved. It also covers a range of related topics which are important in a business setting. These include financial analysis, budgeting, risk analysis and risk management, and reliability and maintenance management.

Footnotes to various sections in this book give cross references to the corresponding clauses in the ISO 55000 series standards. In addition, Chap. 29 deals specifically with the standards. Section 29.2 gives a detailed series of cross references from ISO 55001 to corresponding chapters, sections, and figures in this book. Section 29.4 discusses the Strategic Asset management Plan (SAMP), which forms a central feature of the documentation required by the standard. Other sections of Chap. 29 assist the reader to relate their own asset management system and its status to the requirements of the standard.

1.4 What is an Asset?

The asset management standard ISO 55000 defines an asset[3] as:

> an item, thing or entity that has potential or actual value to an organization.

This is a very general definition which can cover any type of asset. To focus our thinking, we can recognize the following types of assets which can normally be identified within organizations:

- Physical Assets
- Financial Assets

[2] International Infrastructure Management Manual. Association of Local Government Engineering NZ Inc. P.O. Box 118, Thames, New Zealand. www.ingenium.org.nz.

[3] ISO 55000 Clause 3.2.1.

- Human Assets
- Information Assets
- Intangible Assets

Physical assets are items such as plant, machinery, buildings, roads, vehicles, railways, aircraft, pipes, wires, communications equipment, and other infrastructure.

Besides physical assets, we also consider financial, human, and information assets to the extent that they support the management of physical assets. Intangible assets are nonphysical things such as goodwill and intellectual property.

1.4.1 Who Needs Asset Management?

Organizations in which physical asset management is of particular importance include all those involving plant, machinery, buildings, roads and bridges, utilities such as electricity, gas and water, transport industries; oil and gas extraction and processing; mining and minerals processing; chemicals, manufacturing, distribution, aviation, and defense.

1.5 Asset Management Role

Asset management sits at a meeting point between the technical and business fields. The role of the asset manager is to bring to bear a combination of technical knowledge and business knowledge in order to effectively and efficiently meet the asset-related needs of the business as a whole. This involves a number of specific areas of professional activity in asset appraisal, asset acquisition, and logistic support over the asset life cycle.

The typical asset manager is likely to be an engineer, maintenance manager, or logistics specialist who has become involved with business decisions, which require both technical knowledge and a financial focus. Asset management is, however, a separate activity from technical engineering and from maintenance management. This is because the practice of engineering or of maintenance management require time, dedication, and a focus which is different from the combination of logistic and business issues involved in asset management.

With regard to other roles in business, finance and accounting specialists are aware of fixed assets as a balance sheet entry whose technical depths are unknown. Information technologists are skilled in establishing data management and communication systems, but the structure, content, and use of the information lie elsewhere.

Senior managers from political, legal, financial, or marketing backgrounds have business priorities and short-term imperatives and must rely on asset managers for sound asset-related advice. And lobbyists for particular solutions may put forward unbalanced views of asset development options.

To the public, debate may rage over the provision of facilities, or issues such as environmental impact, but this rarely involves a balanced appreciation of what

is involved in planning, financing, creating, operating, and maintaining assets. Vocalized or politicized fads and fancies can overwhelm the voice of asset management in the short term, but eventually the realities come home to roost. This book seeks to achieve a holistic view of asset management, which can help create a new generation of professionals in this important field.

1.6 An Accountant's View of Assets

Asset management links closely with financial management and asset managers need to able to express their opinions in the language of accounting and finance. It is important to recognize the accounting definition of assets, and in particular the split between fixed and current assets. The reason for this distinction lies in how the items are treated from a tax point of view.

1.6.1 Fixed Asset

A *fixed asset* (also called a *non-current asset*) is a physical item which has value over a period exceeding one year, for example, land, buildings, plant, and machinery. When fixed assets are acquired, their cost cannot be counted as an expense for tax purposes in the year of acquisition. When we buy or sell fixed assets we are regarded as having swapped one asset—money—for another asset, a machine, for example. Only the depreciation of the machine in any given year is considered to be an expense in that year. This is important as far as tax treatment is concerned. Planning for the acquisition or disposal of fixed assets involves the Capital Expenditure budget or CAPEX (Fig. 1.4).

Fixed Assets are the physical things that our organization uses in carrying out our business. Examples are, trains and boats and planes; land, buildings, machinery and so on. The distinguishing feature of fixed assets is that they are physical items which normally remain with, and retain value within the organization*, for a period of longer than one year.*

Fig. 1.4 A fixed asset

1.6.2 Current Asset

Faster moving assets such as: cash; accounts receivable; raw materials, work in process, finished goods, consumables are referred to as *current assets* (Fig. 1.5). Slow moving spares which are normally held for longer than a year should be regarded as fixed assets.

1.6.3 Expense

Expense is money or assets consumed in generating sales or service in the current year. This typically includes wages, materials, and overhead costs. In manufacturing it will comprise the materials and labor that go into making the goods sold in the year, plus administrative costs. It also includes depreciation, which is the proportion of the fixed assets "consumed" in the year. Planning for operating expenses involves the Operating Expense budget or OPEX.

1.6.4 Liabilities

Liabilities are money that we owe. *Short-term liabilities* are amounts that we will need to pay in the immediate future, such as bills for recent purchases or interest or capital payments due in the current year. Loans that we will repay in future years are *long-term liabilities*.

Current Assets are convertible or mobile in nature.
They consist of cash or other financial instruments, and physical items which normally move through the system in less than one year. The following are examples of current assets:

- Cash
- Accounts receivable
- Trade goods,
- Work in process,
- Raw materials,
- Consumables
- Fast moving spares.

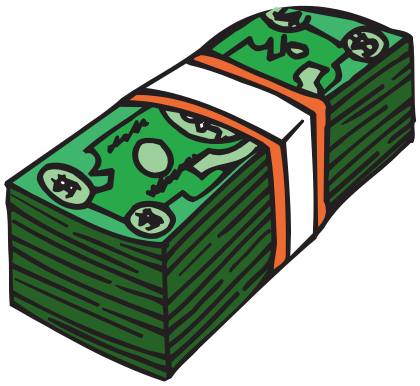

Fig. 1.5 A current asset

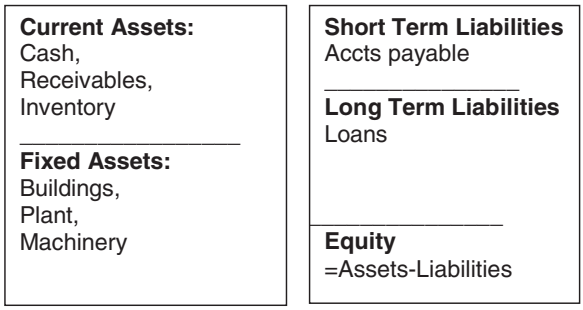

Fig. 1.6 Balance sheet

1.6.5 Equity

Equity means the net value of the company after the liabilities are subtracted from the assets. If the result is not a positive number, the company has gone broke. The assets, liabilities, and equity feature in the company balance sheet. Figure 1.6 illustrates this.

1.7 What is Asset Management?

1.7.1 ISO 55000 Definition

The following definition of asset management is given in ISO 55000.[4]

> co-ordinated activity of an organisation to realize value from assets.

1.7.2 Extended Definition of Asset Management

If we wish to tell someone what asset management involves, we need a definition that is more informative to the general public than that given in ISO 55000. The following is such a definition:

Given a business or organizational objective, Asset Management is the set of activities associated with:

- identifying what assets are needed,
- identifying funding requirements,
- acquiring assets,
- providing logistic and maintenance support for assets,
- disposing and renewing assets,

so as to effectively and efficiently meet the desired objective.

[4] ISO 55000 Clause 3.3.1.

From this definition we see that asset management encompasses a broader set of activities than "maintenance", which is primarily concerned with keeping existing equipment in operating condition. Asset management is concerned with applying technical and financial judgement and sound management practices to deciding what assets we need to meet our business aims, and then to acquiring and logistically sustaining the assets over their whole life, through to disposal.

1.8 Aim of Asset Management

The aim of asset management is to enable the organization to have the assets that are appropriate to its business needs, and to provide supporting services so that these can operate effectively. In more abstract terms, the aim of asset management is to enable an organization to realize value from its assets as it pursues its organizational objectives. Asset management supports the realization of value while balancing financial, environmental and social costs, risk, level and quality of service, and asset performance.

1.8.1 Asset Management System

A basic illustration of the role of physical assets and of asset management within an organization is shown in Fig. 1.7. There we see that the key driver is customer demand which lead to business objectives and business plans. To meet the business objective we need business operations which require the support of physical assets. Asset management works to provide assets to support the business operations. This requires an asset management system[5] which supports asset planning, acquisition, maintenance, and logistics. Other support services such as information technology, financial and legal services are also required across all the activities.[6]

1.9 The Asset Life Cycle[7,8]

Figure 1.8 illustrates, in broad outline, the life cycle of a physical asset. The main stages in the life cycle are:

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[5] ISO 55001 Clause 4.4 Asset Management System: "*The organization shall establish… an asset management system…*".

[6] ISO 55000 Clause 2.4.2 Fundamentals: "*Asset management is based on a set of fundamentals… This includes…integration with finance, human resources, information systems, logistics and operations.*".

[7] Standards Australia AS 4536 Life Cycle Costing.

[8] ISO 15288:2002 Systems Engineering—System life cycle processes.

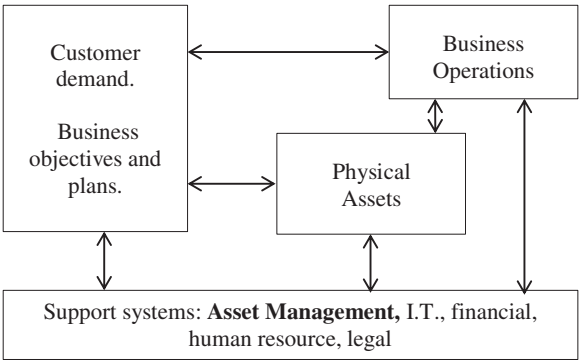

Fig. 1.7 Asset management is a support system for a business

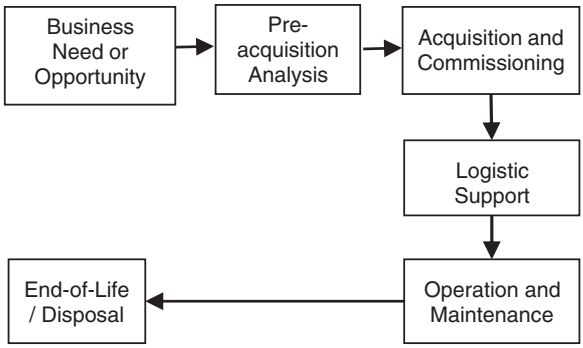

Fig. 1.8 The asset life cycle

- Business Need. Identification of business opportunities or needs
- Pre-acquisition analysis, physical and financial—options selection
- Acquisition, including implementation into operations
- Logistic support provision, such as maintenance facilities, consumables, and spares
- Operation and maintenance
- Disposal.

Asset managers are involved in all aspects of the asset life cycle for the following reasons:

- To assist the organization to identify and acquire the assets needed to support its business aims.
- To provide knowledgeable input into the process of budgeting for the capital and operating costs over the whole asset life cycle.
- To ensure that systems are in place to support the asset over its lifetime.
- To avoid nasty surprises down the track.

1.9.1 Asset Decision Support

The complexity of modern asset-intensive businesses means that a well-developed asset management function is needed to provide support for asset-related decisions. In the area of capital planning and budgeting, or CAPEX, this involves:

- Asset (and associated capability) development planning and implementation
- Asset continuity planning and implementation
- Logistic support facilities development and management
- Business case development for related capital budgets

In the area of operating budget or OPEX it involves decisions related to:

- Organization wide, asset-related systems and procedures, e.g., maintenance facilities, computer systems applications in asset management and maintenance, shutdown/turnaround planning;
- Stock control systems for consumables and spares;
- Development and management of maintenance outsourcing;
- Awareness and management of regulatory compliance;
- Business case development for related operating budgets.

Asset managers need to be able to provide an overview of the asset situation and be aware of factors such as the age and condition of asset fleets, the evolving role of assets in the business, and of developments in terms of technical and service expectations. For examples and further discussion see the chapter entitled "Know Your Assets".

1.9.2 Regulation

Another factor that creates the need for a professional level of asset management is the rise in regulations, which has grown alongside the increasing complexity of industry. The need for compliance with regulations is an essential feature of modern industry. Regulations apply to many aspects of industrial operations, in such things as health, safety, and environmental impact.[9,10]

Activities that are impacted by regulation include materials handling and storage, maintenance access, chemicals use or processing, pressure vessels, hot or cold areas, high or enclosed spaces. Design and operation of industrial equipment requires familiarity with the relevant regulatory regimes, and this reflects back on asset acquisition, maintenance, and logistic systems. It is for these reasons that we now need the comprehensive approach to asset management which is addressed by the ISO 55000 standard.

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[9] OHSAS 18001 Occupational health and safety management systems requirements.

[10] ISO 14001 Environmental management system requirements.

1.10 Asset Management Basic Questions

Asset management needs to continuously provide answers to basic questions about any asset, such as:

- Does it work?
- Is it safe?
- Does it support the business aim?

In relation to our business aims have we got the right:

- Equipment by type and location;
- Support facilities, buildings, logistics, and services by type and location;
- Support personnel by quantity and skills?

If not, what should we be doing about it, for example:

Developing a case for activities such as the following and following up with the appropriate level of management:

- Buildings, plant, machinery, equipment: buy or sell, lease or terminate lease;
- Asset support facilities expand, contract, consolidate, relocate;
- Asset support personnel, recruit, reduce, train, outsource, in-source.

1.11 Dangers of Poor Asset Management

In asset intensive businesses it is essential to structure the organization so that the development, acquisition, and operation of the assets are carried out effectively. Business functions, such as Sales, Operations, Finance, and Human Resource Management, may be clearly represented in the business structure, whereas asset management can be a "gray area", beneath the purview of senior management, but above the level of maintenance. Figure 1.9 illustrates this.

A lack of asset management focus can lead to problems from poor communication between operations and maintenance on the one hand and senior management on the other. This applies to both the understanding of physical situations and to the financial steps needed to address an actual or potential problem.

As an example, a fitter may see a problem of equipment availability, such as when a shortage of tires leads to a loss of availability in a fleet of dump trucks. But from an overall business sense, it is not readily apparent whether this is a temporary problem which it is best to live with, or whether more tires or more trucks are needed. To get the best solution will require analysis of the business operational plan and the asset management plan. Figures 1.10 and 1.11 illustrate this dilemma. The ongoing recurrence of problems of this type indicates the essential role played by the asset manager.

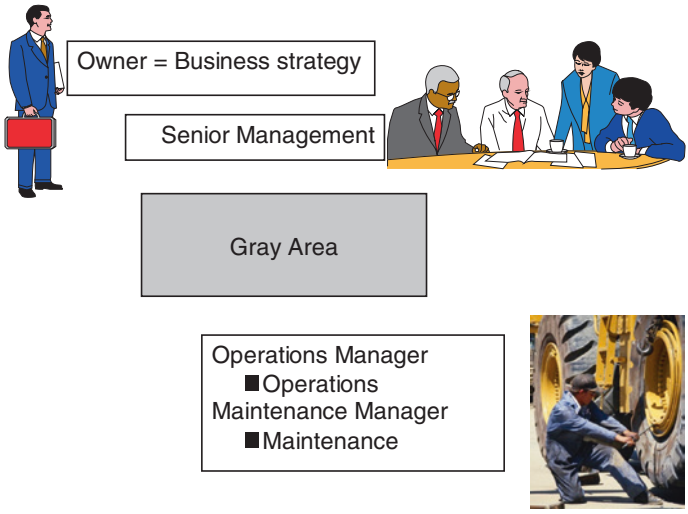
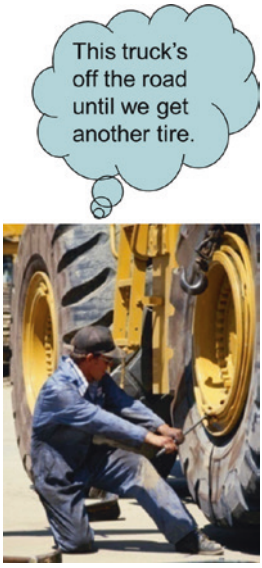


Fig. 1.9 Asset management—a gray area?



The maintenance fitter can see an immediate problem, such as when a shortage of tires leads to a loss of availability in a fleet of dump trucks.

But it is not readily apparent whether this is a temporary problem which it is best to live with, or whether more tires or more trucks are needed.

To get the best solution will require analysis of the business operational plan and the asset management plan.

Fig. 1.10 The fitter sees a problem

Successful asset management requires recognition and effective implementation of the functions indicated in the definition of asset management in Sect. 1.7.

The "gray area" of Fig. 1.9 needs to be replaced by the functions shown in Fig. 1.12.

Fig. 1.11 Analysis is needed to get the best business solution

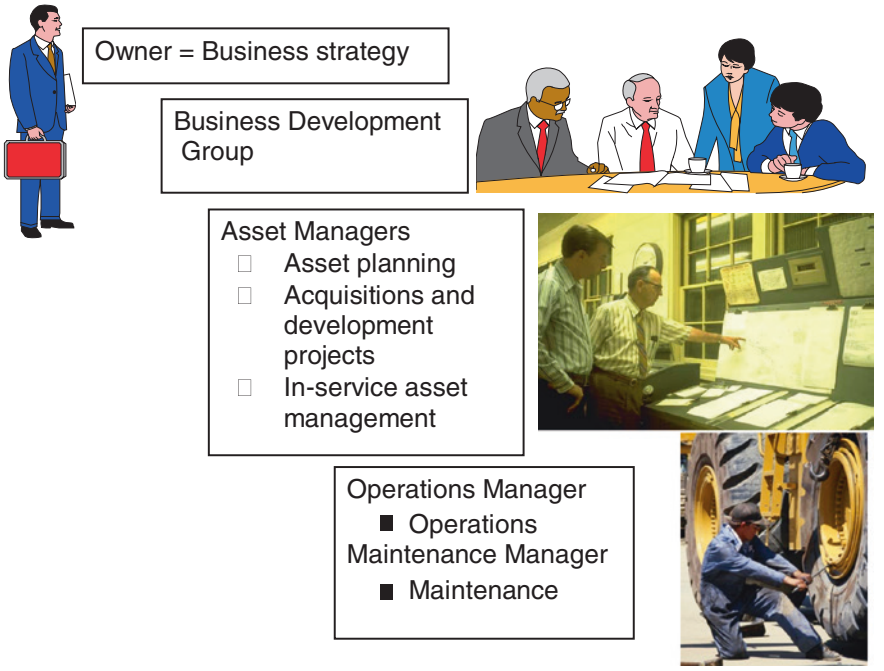


Fig. 1.12 Business activities and asset management

1.12 Benefits of Good Asset Management

Good asset management provides the following benefits which enable an organization to effectively and efficiently deliver business capability, and to achieve its aims in regard to profitability and service delivery:

- A systematic approach to asset-based decisions, so that asset requirements, acquisition, and disposal match the objectives of the business;
- Appropriate logistic support over the asset life cycle, creating improvements in asset performance;
- Effective internal processes for managing assets;
- Benefits in meeting business and regulatory targets, including:
  - operational targets,
  - financial targets,
  - environmental regulations,
  - health and safety regulations,
  - insurance requirements,
  - risk management.
- A systematic framework for the training and development of staff, in understanding and managing the asset portfolio.

The ISO 55000 series of standards provides a general framework for the management of physical assets. The adoption of ISO 55000 can provide:

- A structured view and understanding of asset management;
- Effective relationships between top management, asset management, operations, and maintenance;
- Improvements in asset financial returns;
- Well-informed asset management decisions;
- Insurance, health and safety, regulatory, and risk management benefits;
- Company recognition/marketing;
- Improvements in training and development.

1.13 The Asset Death Spiral

Classic situations have arisen where a plant is central to business profitability, but it is aging—in other words, it is an aging cash cow. Senior managers see no glory in it and the engineers have been redeployed to projects elsewhere. Capital funding is cut and the maintenance budget is cut. Spending on simple problems falls, and in time, simple problems become big problems. Eventually a major accident occurs resulting in fatalities, financial loss, and ignominy for those unfortunate enough to be involved. The situation is known as the Asset Death Spiral and is illustrated in Fig. 1.13.

In Fig. 1.13 initially the plant is running with an appropriate level of budget, which we have shown schematically as being divided between Non-Routine

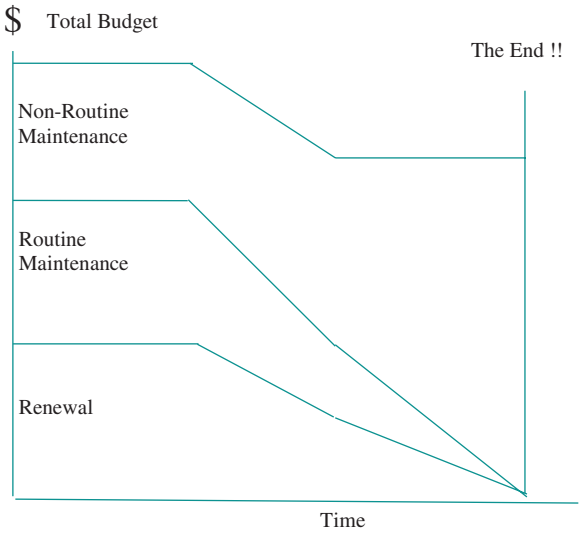


Fig. 1.13 The asset death spiral

Maintenance, Routine Maintenance, and Renewal. The total budget is then cut, reflecting a perceived reduced importance of the plant. Breakdowns still occur, so non-routine maintenance work must be carried out, but this now requires resources funded from a reduction in expenditure on routine maintenance and/or renewal. This reduction exacerbates the situation, causing more breakdowns, which in turn further reduces the routine and renewal budgets, so that the plant spirals down into a situation where the entire budget is being spent on breakdowns. Eventually the maintenance department is overwhelmed and the plant dies.

1.13.1 Texas City Oil Refinery

In March 2005, an explosion occurred at BP's Texas City oil refinery. 15 people were killed. This was the worst industrial accident in the US for more than 10 years, and led to lawsuits and inquiries. Carolyn Merritt, who chairs the US Chemical Safety Board, said in October 2006 that:

"stringent budget cuts throughout the BP system caused a progressive deterioration of safety at the Texas City refinery". *The Australian, 21 December 2006.*

1.14 Exercises

1.14.1 Self-Assessment Quiz 1.1

1. Why has Asset Management become more important in recent years than it was 100 years ago?

2. How does ISO 55000 define the word “Asset”?
3. Name five different types of assets that we find in large organizations.
4. Give an example of each type of asset from an organization with which you are familiar.
5. What is the role of asset management in an organization?
6. Why is asset management a separate activity from engineering and maintenance?

1.14.2 Self-Assessment Quiz 1.2

1. What is the difference between a fixed asset and a current asset? Why is this distinction made?
2. What is the ISO 55000 definition of asset management?
3. Give a definition of Asset Management which explains what it is about to someone who doesn’t know.
4. What should a manager do if he or she thinks that his area is short of essential equipment or resources?
5. Name six stages in the asset life cycle.
6. Identify four benefits of good asset management.
7. Identify two dangers for an organization that has inadequate resources in asset management.

1.14.3 Gas Processing Plant Exercise

You are the maintenance superintendent of the Longton Gas Processing Plant and you recently attended a presentation on ISO 55000 Asset Management Standards at a local Asset Management Society group meeting.

The following week, the plant manager, a recent appointee in the role, tells a meeting of senior staff that the plant is running smoothly and has a good financial record, but that some cost cutting is needed to support developments on other sites. He says that the engineers currently on-site are being transferred to head office, 220 km away, and that the maintenance budget (CAPEX and OPEX) is to be cut by 10 %.

You are concerned at this. Most of the items of plant are nearing the end of their useful life and maintenance demands are increasing. Although you are familiar with the maintenance of the plant, you rely on the engineers for failure diagnosis and for dealing with nonstandard conditions that occur when component change-outs or shutdowns are required. You plan to express these concerns to the plant manager.

Prepare a series of dot points that you intend to cover in your meeting with the plant manager.

1.15 Solutions to Exercises

1.15.1 Self-Assessment Quiz 1.1

1. *Why has Asset Management become more important in recent years than it was 100 years ago?*
   The complexity of modern asset-intensive businesses means that a well-developed asset management function is needed to provide support for asset-related decisions.
2. *How does ISO 55000 define the word "Asset"?*
   ISO 55000 defines an asset as "an item, thing or entity that has potential value to an organization."
3. *Name five different types of asset that we find in large organizations.*
   Five types of assets are:

   - Physical Assets
   - Financial Assets
   - Human Assets
   - Information Assets
   - Intangible Assets

4. *Give an example of each type of asset from an organization with which you are familiar.*
   You will need your own solution for this one.
5. *What is the role of asset management in an organization?*
   The role of asset management is to effectively and efficiently meet the asset related needs of the business as a whole, by bringing to bear a combination of technical knowledge and business knowledge. This involves a number of areas of professional activity in asset appraisal, asset acquisition, and logistic support over the asset life cycle.
6. *Why is asset management a separate activity to engineering and maintenance?*
   Because the practice of engineering or of maintenance management both require time, dedication, and a focus which is different from the combination of logistic and business issues involved in asset management.

1.15.2 Self-Assessment Quiz 1.2

1. *What is the difference between a fixed asset and a current asset? Why is this distinction made?*
   A *fixed asset* (also called a *non-current asset*) is a physical item which has value over a period exceeding 1 year, for example, land, buildings, plant, and machinery. Faster moving assets such as: cash; accounts receivable; inventory (materials, work in process, finished goods, consumables) are referred to as *current assets*. The reason for this distinction lies in how the items are treated from a tax point of view.

2. *What is the ISO 55000 definition of asset management?*
   The following definition of asset management is given in ISO 55000

   co-ordinated activity of an organisation to realize value from assets.

3. *Give a definition of Asset Management which explains what it is about to someone who doesn't know*.
   "Given a business or organisational objective, Asset Management is the set of activities associated with:

   - identifying what assets are needed,
   - identifying funding requirements,
   - acquiring assets,
   - providing logistic and maintenance support systems for assets,
   - disposing or renewing assets,

   so as to effectively and efficiently meet the desired objective."

4. *What should a manager do if he or she thinks that his area is short of essential equipment or resources?*
   Develop a case for activities such as the following and follow-up with the appropriate level of management:

   - Buildings, plant, machinery, equipment: buy or sell, lease or terminate lease,
   - Asset support facilities expand, contract, consolidate, relocate,
   - Asset support personnel, recruit, reduce, train, outsource, in-source.

5. *Name six stages in the asset life cycle.*

   - Business need. Identification of business opportunities or needs.
   - Pre-acquisition analysis, physical and financial—options selection
   - Acquisition, including implementation into operations
   - Logistic support provision, such as maintenance facilities, consumables, and spares
   - Operation and maintenance
   - Disposal.

6. *Identify four benefits of good asset management*.
   Any of the following:

   - A systematic approach to asset-based decisions, so that asset requirements, acquisition, and disposal match the objectives of the business.
   - Appropriate logistic support over the asset life cycle, creating improvements in asset performance.
   - Effective internal processes for managing assets.
   - Benefits in meeting business and regulatory targets, including:
     - operational targets,
     - financial targets,
     - environmental regulations,

  - health and safety regulations
  - insurance requirements
  - risk management.
- A systematic framework for the training and development of staff, in understanding and managing the asset portfolio.

7. *Identify two dangers for an organization which has inadequate resources in asset management.*
   A lack of asset management resources can lead to poor communication between operation and maintenance on the one hand and senior management on the other. This applies to both the understanding of physical situations and to the financial steps needed to address an actual or potential problem.

1.15.3 Gas Processing Plant Exercise

Dot points to cover in your meeting with the plant manager.

(a) The plant is nearing the end of its useful life and maintenance demands are increasing.
(b) Budget cuts will decrease maintenance effort and will accelerate the decline, which will mean more outages and safety risks.
(c) Asset continuity and renewal planning are needed now.
(d) I cannot tackle this as maintenance needs my full attention.
(e) The engineers who might have been a resource for asset management are leaving.
(f) Technically, the engineers are needed to support nonstandard operating and maintenance issues.
(g) The profit from the plant means that investment in it should continue.
(h) An asset death spiral could result in an accident and major production loss.

1.16 A Top Level Decision

Jock and Sheila were lying in bed one Sunday morning when Jock reached for an envelope that had been lying on the bedside table for a couple of days. He knew what it contained.

"We need to renew the lease on this place," he said. Sheila said nothing, which Jock realized was an ominous sign.

"We have to live somewhere," he ventured, but the silence continued. She must be ahead of him on some other track.

"I'm going to go off the pill next month," Sheila said.

Jock and Sheila had discussed having a family and had agreed that it was what they both wanted. Obviously, going off the pill was a necessary start, but why bring it up now? And what did it have to do with the lease on the flat? Then Jock had a blinding insight.

At the beginning of the year he had moved out of the maintenance department of the industrial conglomerate where he worked, and got a job in Asset Management. He didn't know what asset management was, but he liked the sound of it, and more importantly, the job offered a rise in his pay.

It was the asset management perspective which made him realize that his and Sheila's Sunday morning sports session had morphed into a Business Development Meeting.

"There are some house blocks just released in Mullum Gully," said Sheila.

"We could go and look at them this afternoon," said Jock. Sheila smiled.