

How Reliability Impacts Shareholder Value

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As reliability professionals, we understand the obvious benefits of lower manufacturing costs and higher uptime in embarking on a reliability improvement initiative. However, many organizations that are well down this path find that there are many additional benefits that are seen, many of which were completely unexpected. In other words, the payback of reliability greatly exceeds the planned benefit that the original business case was based upon. Some of these additional benefits are tangible and measureable; others are intangible but no less real or important. This paper will explore some of the reasons behind these unexpected benefits and may provide some assistance in determining a business case for your own reliability initiative.

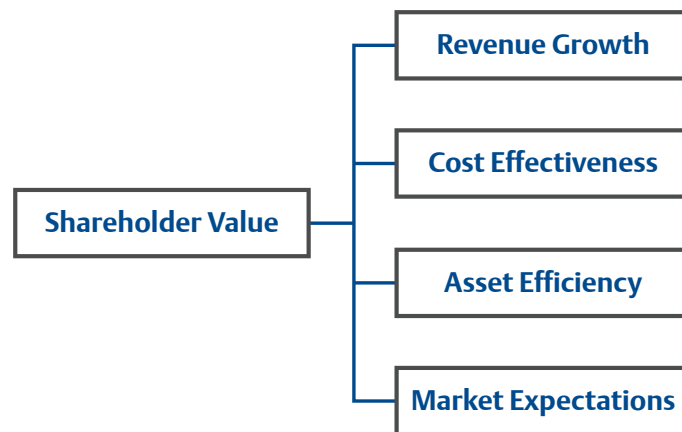


Figure 1

There are four general areas of value generation due to a reliability initiative (refer to Figure 1):

- **Revenue Growth** – Reliability of manufacturing systems and equipment enhances an organization's ability to increase revenue through a number of factors. Even though the business climate may be such that the market is sold out, many of these factors will still provide the potential to increase revenue.
- **Cost Effectiveness** – A reliable manufacturing process makes efficient use of labor and raw material resources, and a sound maintenance process makes efficient use of craft labor and spare parts resources. Both of these result in the minimum unit cost of manufacturing.
- **Asset Efficiency** – Just as a good reliability program makes efficient use of financial resources, it also promotes efficient use of physical assets, enhancing the organization's ability to maximize return on those assets.
- **Market Expectations** – In deciding to invest in a publicly traded company, investors tend to look at a number of factors such as a sound balance sheet, consistently meeting or beating analyst's earnings projections, and a consistent ability to grow dividends. A stable, predictable and reliable manufacturing process enhances an organization's ability to meet and exceed these expectations.



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Details of the benefit areas are shown below in Figure 2 and are described in detail throughout the document.

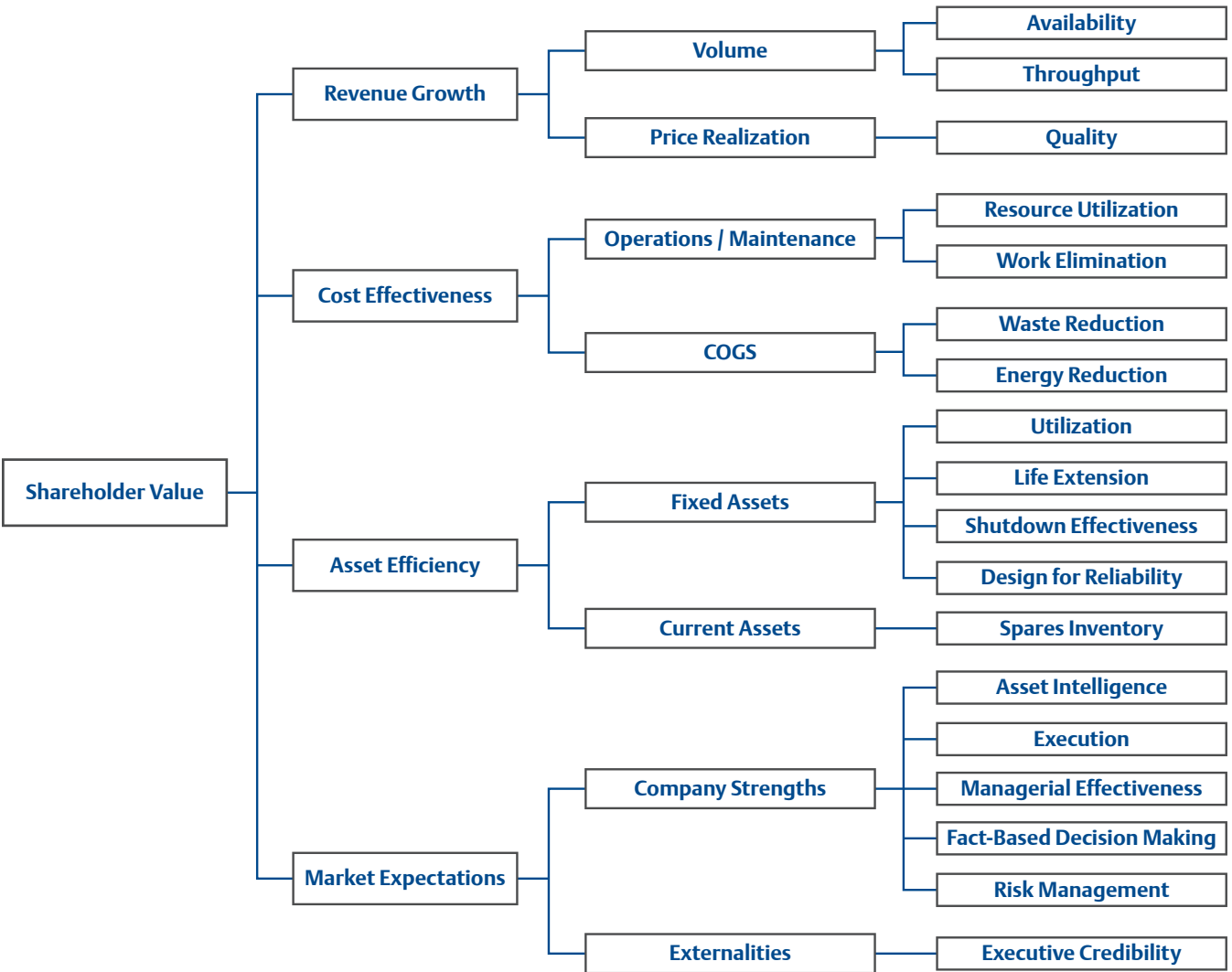


Figure 2

Revenue Growth

A manufacturing organization has the potential to grow revenue by increasing sales volume and increasing pricing (refer to Figure 3 below). It does this by maximizing the three factors of Overall Equipment Effectiveness (OEE) which are Availability, Throughput and Quality.

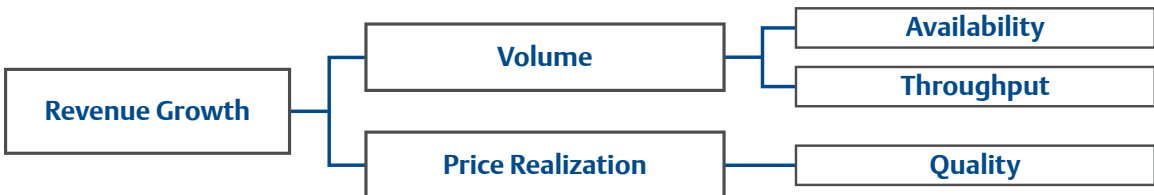


Figure 3

Sales volumes are increased by ensuring the physical assets are available to manufacture products when needed and can manufacture them at the required rate. Availability is defined as the percentage of time the process is actually operating compared to when it is scheduled to operate. Throughput is defined as the percentage of actual production rates or speeds compared to the best potential run rate or speed. As availability and throughput improve, the potential exists to increase production volumes. In some organizations, market limitations may preclude the use of this availability improvement, but ensuring the assets can run when needed will improve the organization's ability to capture a greater share of the market.

Stable production processes within statistical control inherently produce consistent quality products. Unreliable equipment that frequently fails introduces "special cause" variation into the process that leads to quality problems. If these special causes can be eliminated, it enables the organization to research and address the sources of common cause variation, leading to quality improvement. Consistently higher quality products than the competition enables the organization to command premium prices, or at least the ability to maintain pricing in the face of a market downturn.

Cost Effectiveness

A reliable manufacturing process helps ensure that the products can be produced at a minimum unit cost. In most commodity businesses, the low cost producer wins – it is in the best position to ride through a potential market downturn while remaining profitable and providing an acceptable return on assets. Referring to Figure 4 below, a good reliability program can have a significant impact on Costs of Goods Sold (COGS) through efficient resource utilization and the ability to eliminate unnecessary work.

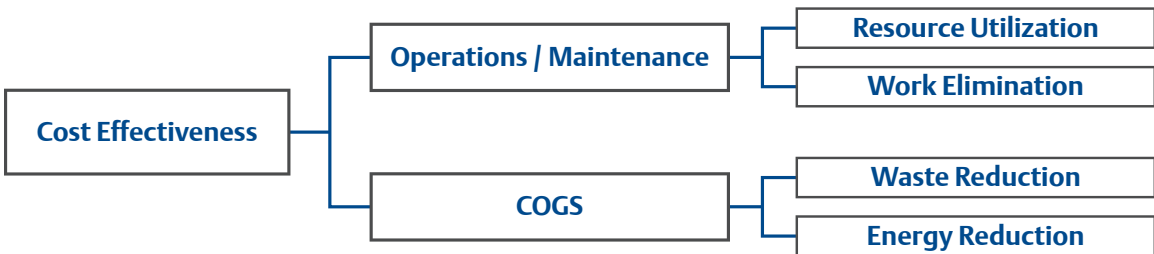


Figure 4

Operations and maintenance costs are optimized through ensuring that the labor and material resources are efficiently deployed in the manufacturing process. It takes less operating labor for a manufacturing process that is stable and operating well than it does for one plagued by equipment problems. Likewise, properly planned maintenance work ensures that maintenance labor resources are used at maximum efficiency with as few delays and as little wasted effort as possible. Ensuring that proactive maintenance tasks are linked to anticipated failure modes prevents unnecessary scheduled maintenance, and a sound predictive maintenance program that allows the maintenance function to respond to equipment problems at the first sign of distress avoids the potential for collateral damage to other areas of the machine or process. This has the effect of eliminating work that is unnecessary; after all, we don't have to repair a failure that doesn't occur!

Waste and energy reduction are also areas for cost savings. Higher quality as mentioned above means that there is less "non-saleable" product to rework or for disposal. Fewer repairs means there is less potential hazardous waste to dispose of. Energy costs are reduced because well maintained equipment operates more smoothly; there are also fewer steam and compressed air leaks and insulation systems are maintained in good repair.

Asset Efficiency

One of the key measures of any business is the return on assets – how much money is the business earning relative to the investment in assets. It is a measure of how efficient management is at using its assets to generate earnings. From an investor's perspective, they want to see maximum returns for minimum investment.

For the purposes of this discussion, assets can be divided into two categories: fixed assets and current assets (refer to Figure 5). Fixed assets are the property, plant and equipment used to manufacture products. Current assets are those assets that are expected to be turned into cash within one year; inventories, including spare parts inventories, fall into this classification.

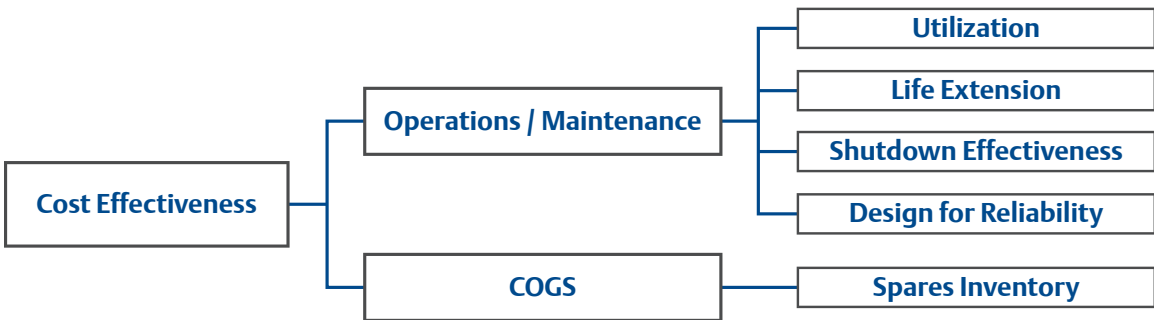


Figure 5

A reliability program assists with asset efficiency by helping to maximize output with a minimum of investment. As we increase reliability we would be able to increase asset utilization without investing in additional capacity (more capital assets). Also, if we clearly understand the operating condition of the equipment (its "health", so to speak), we have less uncertainty and therefore less of a need to have redundant spare equipment. Additionally, if the equipment is appropriately cared for, its useful life is extended and there is less need for replacement capital (this also has the effect of reducing costs due to a reduction in depreciation expense). The business has the option to deploy that capital on items that will increase productivity or reduce operating costs.

One major expense in some industries is the scheduled turnaround (also referred to as shutdowns or outages in some industries). A good reliability program helps to maximize the efficiency and effectiveness of the turnaround by ensuring that the scope of the turnaround is known (the predictive maintenance program provides information on asset health and there are fewer "surprises" when equipment is opened). Advanced notice of issues and effective planning of the corrective actions can help minimize turnaround duration.

Another way that a reliability program helps increase asset efficiency is through the “design for reliability” process. Tools such as Reliability Centered Maintenance (RCM) used during equipment design can enable small design changes to be made before equipment is purchased to eliminate some failure modes, and thus eliminate the need for maintenance to mitigate those failure modes. Maintainability reviews in the design stage can incorporate ideas to increase the speed and efficiency of maintenance actions to reduce ongoing maintenance and repair costs.

In a reliable plant, spare parts inventories are minimized for a number of reasons. There is a lower demand for parts in a proactive organization because there are fewer repairs needed. Since the purpose of inventory is to protect against risk and uncertainty, lower inventory levels are required in proactive organizations because there is less uncertainty – the predictive program provides information concerning developing problems. Also, because the predictive program provides advanced warning of problems, many parts can be procured “just in time” instead of needing to be stocked. Lower inventory levels also impact COGS due to reduced carrying costs and frees working capital for other uses.

Market Expectations

If we consider a discounted cash flow model for a business, we have forecasted costs and revenues and a discounted rate (or risk-adjusted rate) of return. Market expectations addresses implicit market perceptions on the magnitude of those cash flows as well as the perceived risk (uncertainty and variability). The more confidence the market has in a particular organization, the less of a risk “premium” it will demand relative to others in the same industry and a higher stock price should result. The factors that a reliability program should influence are somewhat intangible in this area and are shown in Figure 6.

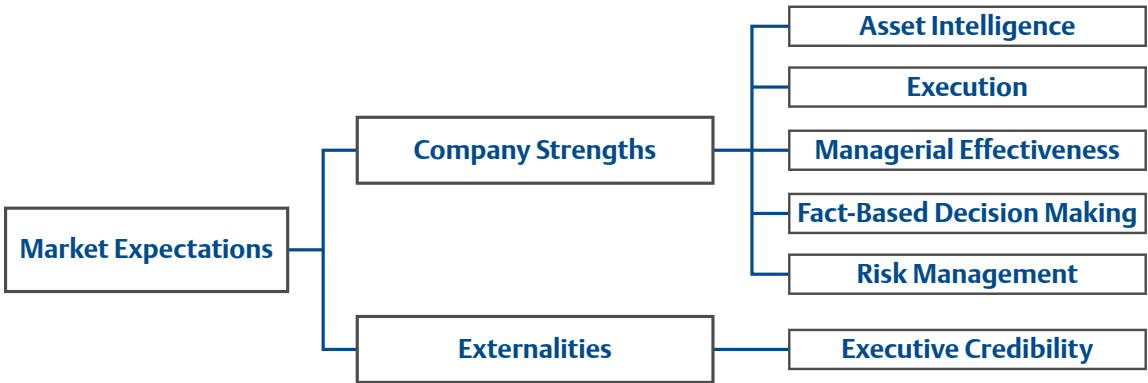


Figure 6

Reliable physical assets enhance the market’s perception of an organization in several ways. If an organization is better at producing asset information, leveraging that information to make better and timelier decisions, and ultimately improve their ability to execute, they will be more flexible and adaptable to changes in the marketplace. With those strengths, and in all likelihood a better cost structure as a result of those strengths, they will be better able to position themselves for market opportunities. This can amount to significant value reflected in the stock price.

Organizations with reliable assets inherently have better knowledge and information about those assets; it is a byproduct of understanding how the equipment is supposed to operate and how it can potentially fail. They understand both the capacity constraints of the equipment and the potential consequences of exceeding those constraints. They also, through effective condition monitoring, understand the operating condition and the general asset health at any point in time so mitigating actions can be taken with minimal disruption to the operation.

The market values consistency and nimbleness in an organization; consistently being able to deliver on promises and guidance enhances management's credibility. Having the necessary information coupled with disciplined processes to be able to act on that information enhances management's effectiveness and ability to execute. Decisions can be made on the basis of solid facts and tangible information versus experience or "gut feel". Well-defined systems and work processes serve to reduce the riskiness in a company and can lead to reduced uncertainty in the company's performance and financial outcomes.

Risk management is a key capability that is augmented by good asset reliability. The more it is integrated into other functions, the more effective an organization will be at identifying and mitigating risk. For asset intensive industries it's only logical that asset performance represents the biggest risks. The key to risk management is information – data and analytical capabilities. Organizations that do not leverage asset information have to suffer the consequences or operate with a costly safety net – excess capacity – which leads to higher operating costs, a higher fixed asset base, and ultimately lower margins.

There is a great deal of attention that gets placed on corporate presentations to the analyst community, and meeting or beating commitments and quarterly guidance. Only information in the Market can impact market price, so executives share some of the information in an effort to positively influence share price. The more credibility the company and executive team has, the more those announcements will have their intended effect. An organization can develop credibility by being very conservative, but that doesn't do much for share value growth. If an organization is going to be aggressive it has to have disciplined processes and accurate data. The company has to be able to forecast improvements and then deliver against them.

Measuring Shareholder Value

Arguably the best measure of shareholder value is Return on Assets (ROA). According to Investopedia, it is "an indicator of how profitable a company is relative to its total assets. ROA gives an idea as to how efficient management is at using its assets to generate earnings." It is calculated by dividing a company's annual earnings by its total assets and is depicted in Figure 7 below.

$$\text{Return on Assets (ROA)} = \frac{\text{Net Income (Earnings)}}{\text{Total Assets}}$$

Figure 7

Potential investors often use ROA as a comparative measure between companies in a similar industry to determine which has the best value. The assets of the company are comprised of both debt and equity. Both of these types of financing are used to fund the operations of the company. The ROA figure gives investors an idea of how effectively the company is converting the money it has to invest into net income. The higher the ROA number, the better, because the company is earning more money on less investment.

As with any ratio, ROA is increased by either increasing the numerator or decreasing the denominator (or both). Good asset reliability drives each factor in the correct direction to increase ROA. Net Income is calculated by subtracting annual operating costs from revenue generated by the business. As we have seen, a sound reliability program increases revenue by both volume growth and by the ability to increase pricing. It also reduces operating costs by increasing the efficiency of resource utilization and eliminating waste, so both factors are driven in the correct direction to increase the numerator in the ROA equation.

Total assets are made up of a combination of fixed and current assets. As we have seen above, with a good reliability program the fixed asset base is lowered by reducing the need to recapitalize the machinery and equipment used in production. Current assets are reduced by minimizing spare parts inventory. Again, both factors are driven in the correct direction to reduce the denominator in the ROA equation (refer to Figure 8 below). There are few other initiatives that an organization can implement that drive each factor in the correct direction to maximize ROA!

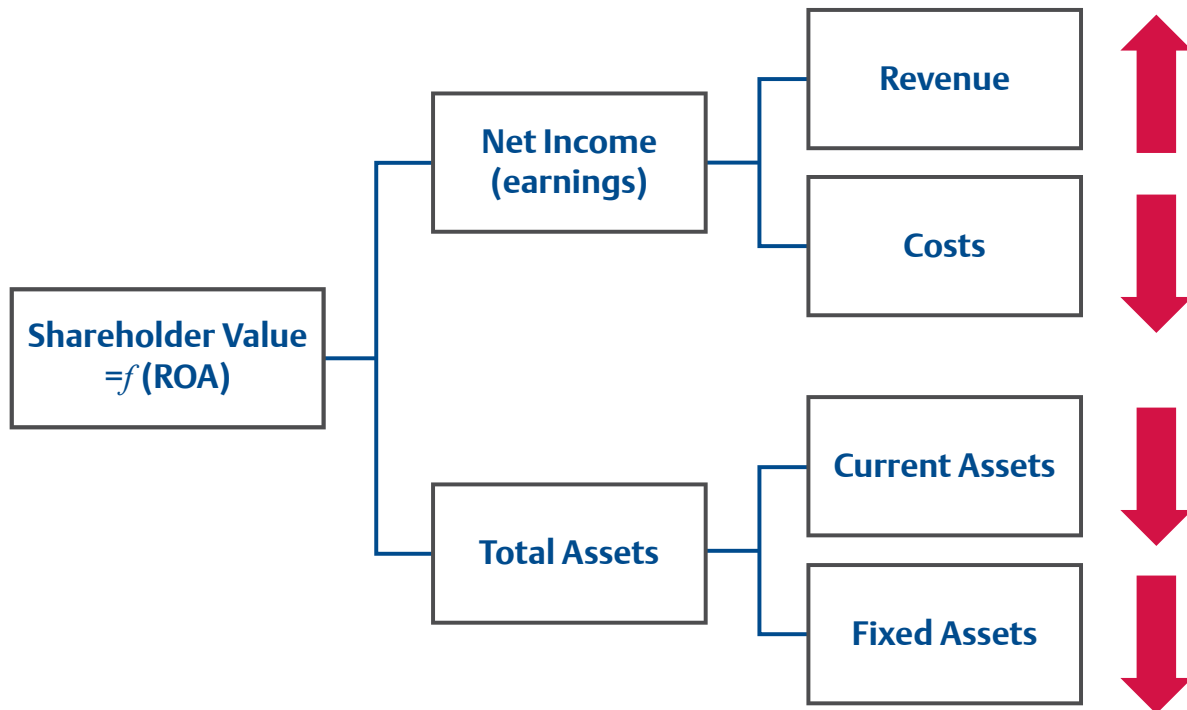


Figure 8

Summary

Organizations that embrace asset reliability and focus on implementing the tools, techniques and technologies necessary to enhance and sustain it nearly always find that the returns are much greater than anticipated. When reliability becomes an integral part of an organization's culture, the discipline and rigor necessary to launch and sustain it tend to permeate throughout the organization and drive benefits in all facets of the operation. It is doubtful that an organization can embark on any other initiative that can have such a far-reaching impact on the entire business.

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