

Chapter 11

Managing to Maximize Firm Value

Learning Objectives

- To identify the key aspects of maximizing value
- To enact processes that will help create value
- To recognize and minimize risks to value creation

Case: Uni-Net

The year was 1992, and the company, Uni-Net, was just beginning to develop its strategy to grow and prosper in the long-distance communications space. There was substantial competition, with the largest competing firms being MCI, Sprint, and Williams Communications. But management at Uni-Net thought they had a winning strategy. Uni-Net management believed that they should not compete head-to-head with the major players in the industry but would focus on overlooked markets: markets in rural areas and markets where the large

players were not active and did not have switching stations to aggregate customer calls and connect to the AT&T long-distance system.

In 1984, the monopoly that AT&T had on the U.S. telephone market was ended via a consent order in the U.S. District Court. AT&T was broken up into Regional Bell Operating Companies, Bell Labs, and a few other subparts. Among other things, the impact of this deregulation was that it opened up the long-distance market to anyone who could aggregate customer traffic by routing it to a local switching station and then, using that switch, to connect to and transmit over the AT&T national landline system to the final destination. This provided the opportunity for many to be a long-distance company and the impetus for many companies to enter the long-distance business.

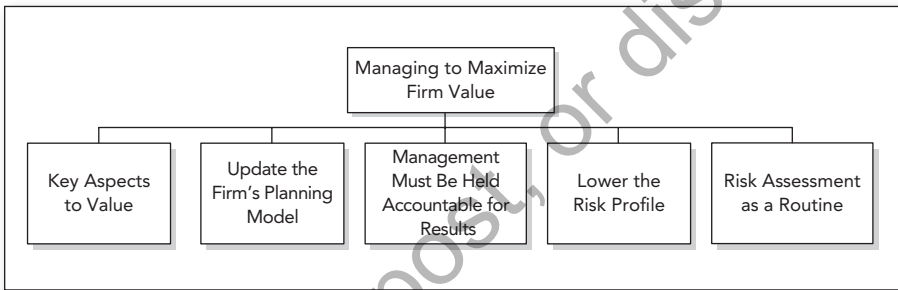
These new entrant companies could provide long-distance service via their own local switching stations. If a customer wanted to make a long-distance call, then the customer would dial a local access number, be connected to the local switch, and then have the call sent to its ultimate destination via whichever long-distance network was available (usually AT&T). Such long-distance service was cheaper than sending the call directly over the old AT&T system because AT&T was now required, by terms of the consent agreement, to act as a common carrier and accept traffic from all competing service providers.

The value of being a long-distance aggregator was wholly dependent on getting as many customers as possible. The more customers the company had, the more value the company had to a strategic buyer. The largest companies in the industry were focused on the largest urban areas, where the bulk of the national market was. Uni-Net marketed itself in small-town environments, usually where there was a university or college. College students were both target customers and excellent part-time salespersons. It was a conscious strategic choice of management that once the customer base was built, the company would be very attractive to one of the big national resellers like MCI, Sprint, or Williams Communications.

However, during the build-up phase, management wondered what additional considerations they should be giving to both operational and financial issues to maximize firm value.

Whether the entrepreneur's goal is to exit the business, make a potential merger or acquisition, or simply expand the firm through steady growth, a continuous objective should be to maximize the value of the firm. Producing maximum value ensures that the entrepreneur does not leave anything on the table and that he or she is able to get the most for his or her efforts. In this chapter, we look at ways the entrepreneur can implement strategies to increase and maintain value and identify and control the risks that can be detrimental to value creation. Chart 11.1 presents a schematic representation of the material covered in this chapter.

Chart 11.1 Schematic of Chapter 11



Key Aspects to Value

While there isn't a "one-size-fits-all" approach to maximizing the firm's value, there is consensus in the academic as well as in the business community about measures that entrepreneurs can take to ensure the firm takes advantage of its full potential. The following are some key variables that entrepreneurs should pursue.

Certainty of Cash Flows

The certainty of cash flows takes risk into account. What is risk? In terms of modern finance, risk is the "volatility" of returns over time. By this standard, "risk" can be statistically determined. It is the measured probability that a company will not achieve the results expected. Remember that risk is not uncertainty. Uncertainty is not amenable to statistical determination. There was no way for Tokyo Electric Power to statistically forecast the

tsunami of 2011, nor was there a way for Johnson & Johnson to predict the Tylenol murders of 1982. These events represent events that are classed as uncertainties, not risk. Despite the classification, both of these events had lasting impacts on the two firms.

According to financial theory, the value of any risky asset is the present value of its expected future cash flows. To find the present value of those cash flows, they are discounted by the appropriate cost of capital given the risk of the company, as discussed in Chapter 7. Given this concept of value, it follows logically that given a fixed level of cash flow, if we can lower the risk-adjusted required rate of return at the firm, the higher its value will be. To maximize firm value, it is crucial to lower the firm's risk profile.

Inherent in the financial notion of risk is the concept of variability of returns over time. In the case of an entrepreneurial firm, given more variability in expected cash flows, in the eyes of investors, the firm will appear riskier. This higher perceived risk will in turn increase the required rate of return and decrease the value of the firm. An entrepreneur can reduce this risk and maximize firm value by consistently meeting cash flow projections.

A history of meeting cash flow projections will establish that the company has lower volatility than it may first have appeared to have. This technique is effective at enhancing firm value because of the measurable impact that meeting the firm's cash flow projections has on the variability of financial outcomes. Outcomes that are close to expectations are considered less variable if they closely adhere to projected results. While variability may occur, if outcomes are close to projected values, the variability will not be significant compared to management's and investors' expectations.

Grow the Firm

With the advent of social media, growth has taken on a new meaning. Sometimes investors are willing to overlook growth in the top (sales) and bottom line (net income) and focus instead on growth of the firm's user or customer base with the intention of monetizing the client base in the future. This is the case of the mobile messaging service WhatsApp. While sending instant messages within the United States has always been easy and inexpensive, messaging internationally has historically presented challenges. Cell phone providers usually have a presence in just a few countries, and in the past, communicating between platforms has been nearly impossible and expensive.

In 2009, WhatsApp founder Jan Koum created a cross-platform messenger service that allows users to communicate via the app for 99 cents *per*

year, bypassing wireless carriers that may charge users 99 cents or more per message to use their networks. WhatsApp technology proved especially beneficial in places with a high degree of international communication and fragmented cell phone service like Europe, Asia, and Latin America. As anticipated, the WhatsApp's user base grew exponentially, at times adding 50 million people every 2 months. Its user base reached 200 million in April 2013 and grew to 400 million just 8 months later (Winkler, 2013). Despite its tremendous user base, Mr. Koum sacrificed immediate revenues and earnings and focused instead on building a robust client base. In February 2014, Facebook agreed to buy WhatsApp for \$19 billion, a record for any startup. The motivation behind Facebook's acquisition is not WhatsApp's relatively small earnings but the exponential growth of its user base that it expects to monetize in the future.

While revenue and earnings growth are important for the success of an entrepreneurial firm, growing the customer base is critical to maximizing the value of the firm. Virtually all valuation models favor growth. As was the case at Uni-Net and WhatsApp, customer base is extremely important when building and maintaining value. Often startups and early stage firms have not yet had time to build the other accepted measures of firm value, such as customer growth, positive cash flow, and EBITDA (earnings before interest, tax, depreciation, and amortization). Because these other determinants of value are lacking, it should be remembered that growing a customer base is one firm-specific characteristic that is available to all firms, even early stage ones.

Market Position Is Important: Document and Publicize Your Success

Some firms use their market position to command premium valuations. While the firm's revenues might not be impressive, the market's view of the firm's market share, brand, and growth create a positive view of the firm's ability to produce superior profits in the future. Facebook is an example of a firm that used its market position to receive a premium valuation. Facebook started in 2004 as a social media site intended for universities in the Boston area. Facebook gradually increased its presence to universities and high schools throughout the United States. In 2006, the company allowed anyone older than 13 years to open an account. By promising to keep its services free, the company gained a huge market share from other social media sites that charged a fee for its premium services. At the end of 2006, Facebook had 12 million users.

Facebook repeatedly publicized its market share to businesses as a way of attracting them to advertise on the site. In 2007, the company created an ad platform to attract businesses to market on their site. The site's technology allowed for targeting of customers by characteristics like age, gender, and geography. Facebook reached 100 million users in August 2008. By July 2010, the site had reached 500 million users and had surpassed Google as the most popular Internet site. Despite its vast user base, the company's revenue was far behind that of Google. In 2009, Google's revenues were \$24 billion, while Facebook's revenue was only \$800 million.

The company focused on gaining market share, and by the time the company went public in May 2012, Facebook had gained over 900 million users. Prior to the initial public offering (IPO), the company reported revenues of just over \$1 billion while net income was \$205 million. The original IPO price was \$38 per share, which translated into an extremely high price to earnings (P/E) ratio of 107 (Raice, Das, & Letzing, 2012).

Build Intangible Value and Organization

Key to any organization's value is the worth of its intangible property and the value of its organizational structure and style.

Intangible Property. As indicated in the chapter on valuation, *intangible property* is valued differently and separately from the other parts of the firm. Because the value of intangible property is independently derived, it is worth the firm's effort to document and develop any intangible property it might have. It is also significant that intangible property often has value that can immediately be realized outside the context of the firm's current ongoing activity. Patents, proprietary processes, customer lists, and unique service capabilities may have value to outside firms that will pay to license the capability to use in activities that are noncompetitive to the licensor (i.e., firm that owns the intangible property).

A good example of this kind of secondary use of intangible property involves Strum Ruger & Company. This firm is a well-known sporting firearms company. The company has unique patented processes for performing certain CNC (computer numeric controlled) machining processes. The company has established a separate subsidiary to take advantage of these processes and will license or do CNC work for third-party firms.

Firms that have any form of intangible asset should be looking for ways to document and use the value. Following is a list of procedures that a firm with intangible assets can use to do this:

1. Patent patentable processes.
2. Register copyrights and trademarks.
3. Document all proprietary processes.
4. Keep customer lists in usable and updated form.
5. Have all personnel execute confidentiality agreements.
6. Do periodic searches for third-party misuse of firm intangibles.

A Flat, Flexible Organization With a Productive Workforce Is Valuable

The importance of a flat and flexible organization cannot be overstated. A firm with these attributes is able to recognize trends and adapt quickly to take advantage of them while delivering the highest returns possible. Key to achieving this is having a flexible workforce and cost structure. Not only does this keep material and payroll costs down (and profits up), but it also allows firms to be early market entrants responding to opportunities to take advantage of growth.

A flat organization is one that strips away layers of middle management, removes complex business structures, and gives greater responsibilities to lower-level employees. Firms that limit the unneeded layers of management (and the bureaucracy that comes with them) are more capable of listening to the needs of the customer. A flat organization helps ensure that lower-level employees, who communicate most often with customers and who are in the best position to understand market trends, quickly make customer-related decisions. Importantly, research has shown that employees in flat organizations are more satisfied with their jobs (Willems, 2014). It is important to make a distinction between a manager-less firm and a management-less firm. Although there may be a reduced need for managers under this approach, there will always be a need for some more democratic form of management.

Have a Competent, Productive Workforce. Ideally, entrepreneurial firms will hire only the most essential and capable employees needed to grow the business. The firm cannot afford to have incompetent people handling the most critical decisions at this vital stage of firm development. Nothing is more frustrating to potential investors than looking at the management of the firm and realizing that all key positions are held by family and friends of the owner. Investors are usually looking to have the best qualified

persons with expertise in the relevant fields in key roles. Showing nepotism indicates a motivation to serve personal interests and not the interests of the company.

Make Costs Reactive to Sales. One approach to creating an adaptive cost structure is to have more variable costs and fewer fixed costs. Because variable costs are incurred only when there is actual production, a firm is able to limit unnecessary expenses if sales become a problem or decline. Since fixed costs are incurred regardless of sales or production, having more fixed costs impedes the firm from lowering costs in times of declining revenues. While it may seem logical for the firm to use variable costs to the greatest extent possible, fixed costs offer the benefit of operating leverage, which can greatly improve the firm's bottom line. The trade-off between more operating leverage and its risk is explained in detail later in this chapter. However, at least in the early stages of development, keeping operating leverage low is usually a good idea.

Entrepreneurs should be aware of any impact technological advances have on their operations. One of the consequences of rapid technological advancement is the shrinking product life cycle. It is estimated that 50% of annual company revenues across a range of industries are derived from new products launched within the past 3 years (Horn, 2014). This suggests that long-term product "cash cows," which stay in a company's portfolio for many years, are becoming less and less relevant. A firm can no longer afford to invest too heavily in profitable ventures, as these may become obsolete very quickly. By limiting investments to purchasing only enough capacity to meet customer demand and keeping up with technological advances, the firm is able to create a flexible organization with adaptive costs.

On the plus side, advances in technology enable firms to create more adaptive supply chains that rapidly adjust to changing requirements based on real-time demand signals. Automation of any supply chain task is likely to produce a more efficient and less costly process of meeting demand. New technology also allows firms to continually revisit sourcing strategies for new, lower-cost supply sources.

Update the Firm's Planning Model

As previously mentioned, technological advances are reshaping the competitive landscape. This changing environment means that accurate demand planning and forecasting have never been more imperative. Reacting to new information more quickly than competitors allows the firm to quantify the

impact and react accordingly. The output of any projection model is only as good as the inputs that go into it. In order for the firm to make better projections on sales, costs, and cash flows, it must continuously adjust the planning model to reflect new information, such as changes in trends or unanticipated costs. In addition, firm projections should “work” the way the firm works. So if a firm’s policies or procedures change, so should the firm’s model for making projections.

Develop a Useful Historical Database

Developing a planning model that functions like the firm is initially difficult due to the lack of historical data. The entrepreneur is faced with having to make many assumptions that often are guesses, at best. As the firm progresses, it can rely on its own historical performance to update the planning model. Developing a historical database allows the entrepreneur to mine the data for information. This new information can help entrepreneurs identify patterns such as seasonality or preferences among various demographics based on empirical evidence. As more historical data are integrated into the planning model, the entrepreneur can produce a more accurate planning model that has improved power to project results and be the basis for estimating firm value.

Management Must Be Held Accountable for Results

In conjunction with good operating and financial processes, the entrepreneur will need to assemble a capable management team to assist in maximizing firm value. Whether intentionally or not, managers sometimes use the resources of the firm to maximize *their own* self-interests at the expense of the firm. This problem is referred to as **agency risk**. Leaders and boards of directors at entrepreneurial firms need to understand that solving this problem is one of their most important tasks. The problem is best solved by instituting a system of accountability and pay that aligns the interests of the managers with the rest of the stakeholders of the firm. While simple in theory, in practice the task can be arduous.

1. The entrepreneur must assign identifiable and measurable objectives and responsibilities that contribute toward the value of the firm. The board should seek managers’ commitment to these goals. It is easier to get commitment when managers understand two things: how the goals benefit them personally and how the goals benefit the firm.

2. Progress needs to be measured periodically and continuously to discover any deviations, whether positive or negative.
3. Feedback needs to be provided on ways to improve performance when it is falling short of management's expectations. It's important to remember that feedback is not only for problem areas; praise for good performance is also a valuable feedback tool. To be effective, feedback should be as close to the measured event as is possible.
4. Linking consequences to results provides external motivation for managers to meet their commitments.
5. Evaluating the effectiveness of the overall system in maximizing firm value usually reveals areas for improvement at the organizational level.

Tailor Pay and Incentives to Results

Linking a manager's compensation to meet the firm's objectives has been a popular strategy for aligning interests; managers will be financially motivated to perform if their results support the long-term interest of the firm. This can be accomplished by setting manager salaries at relatively low levels while giving bonuses based on milestones reached. While salaries should be only a small percent of total potential compensation, bonuses and stock options need to be structured to make up the rest. If certain results are met, such as a certain percent increase in earnings or reaching a threshold in the value of the firm, then managers are entitled to a bonus or additional shares. Zingheim and Schuster (2000) describe this "total rewards system" in their book *Pay People Right!*

Entrepreneurs need to carefully address potential conflicts of interest that pay-for-performance systems can create if the goals are not properly considered. Performance goals that focus on short-term results can lead managers to create unsustainable growth that allows them to reach their goals while not benefiting the firm in the long run. Goals should be set so that the quality of firm performance remains high. This means that results will not come from measuring leverage or manipulating costs but from sound fundamental achievements, like higher margins or better turnover rates. Otherwise, managers may be tempted to manipulate variables to make it seem like results are being met. Some companies now defer payments of bonuses or other incentives by up to 5 years to make sure that the results achieved are sustainable.

Lower the Risk Profile

Maximizing firm value can be divided into three components: maximizing growth, maximizing profits, and minimizing risk. In the first part of this chapter, the focus was on ways of achieving growth and profitability. We now turn our attention to minimizing risk as a source of value creation. While strategies for minimizing risk are not considered as “exciting” as growth strategies, they are nonetheless just as important.

As mentioned previously, risk is commonly defined as the variability of outcomes over time; the greater the variability, the greater the probability that the firm will not achieve results. Risk is a statistical concept. While having a robust planning model can help the firm minimize risk, it is impossible to incorporate all possible outcomes into a projection based on a statistical perspective. This often leads entrepreneurs to underestimate the range of outcomes. An entrepreneur’s view of future events tends to be incomplete and slow in adapting new information (Courtney, Kirkland, & Viguerie, 1997). Making sound strategic decisions under conditions of risk argues for analytical rigor with respect to the planning process. Rarely do managers know nothing about their risky environment, even in the most volatile environments. The models of risk assessment described below are powerful tools to incorporate into the firm’s planning process.

Liquidity Risk

In Chapter 4 on financial ratio analysis, liquidity was described as the extent to which a company is able to meet its short-term obligations by using its short-term assets (i.e., assets that can be readily transformed into cash). Working capital management refers to the ability of a firm to generate cash when and where it is needed. The goal of effective working capital management is to ensure that a company has adequate access to the funds necessary for the day-to-day operating expenses, while at the same time making sure that the company’s assets are invested in the most productive way.

Liquidity contributes to a company’s creditworthiness, or the perceived ability of the borrower to pay what is owed in a timely matter. Creditworthiness allows the company to lower borrowing costs and obtain better terms for trade credit. Because debt obligations are paid with cash, the company’s cash flows will ultimately determine solvency. Liquidity risk is the risk a company may fail to meet its short-term obligations.

A firm’s liquidity risk can be measured by calculating its liquidity ratios. Recall from Chapter 4 that the two most important liquidity ratios are the

current ratio and the quick ratio. A firm with low liquidity ratios risks is usually able to cover its working capital needs. The following are some steps that can be taken to minimize liquidity risks:

1. Where possible, appropriate discounts for early payment on accounts receivable invoices should be given.
2. Collect accounts receivable with the highest possible efficiency.
3. Pay collections personnel bonuses based on how well they maintain a low days-sales-outstanding ratio.
4. Where possible, ask suppliers for more moderate terms with respect to making payments on accounts payable.
5. Keep inventory as low as possible.
6. Consider using a just-in-time approach for maintaining inventory.
7. Pay production personnel bonuses on how well they maintain a high inventory turnover ratio (and thus a relatively low inventory turnover ratio).

Operating Leverage

Operating leverage is a type of risk that is attributed to the operating cost structure of the firm. In particular, it is the use of fixed costs as opposed to variable costs in its operations. A firm's total costs are made up of variable costs and fixed costs. **Variable costs**, which are costs that change in proportion to the producing and selling activities of a business, are incurred only if there is production or sales activity. **Fixed costs**, on the other hand, do not vary directly with the production or sales process. Examples of fixed costs include rent or lease payments on machinery or equipment, rent, and salary expenses of supervisors. The greater the fixed operating costs relative to variable operating costs, the greater the operating leverage.

As an organization employs a higher degree of fixed costs in its cost structure, its operating leverage will increase. Operating leverage is greatest in firms where total costs are a function of a relatively large proportion of fixed costs and a relatively low proportion of variable costs. The result of having a high operating leverage ratio is that the firm's break-even point rises. Operating leverage acts as a drag on the firm's ability to generate an increase in net income when sales revenue increases; the greater the proportion of fixed costs versus the firm's variable costs in the firm's cost structure, the greater the impact on profit given a percentage change in sales revenue. With

relatively high operating leverage (and thus low variable costs), each unit of sales will provide a higher contribution margin.

A measure of operating leverage is *degree of operating leverage (DOL)*, which may be calculated as follows:

$$\text{DOL} = \frac{\% \text{ change in operating income}}{\% \text{ change sales}}$$

The easiest way to calculate this is as follows:

$$\frac{(\text{Price} - \text{VC}) \times \text{Units}}{((\text{Price} - \text{VC}) \times \text{Units}) - \text{FC}}$$

where

Price = price per unit sold;

VC = variable cost per unit sold;

FC = total fixed costs;

Units = units sold.

If the DOL is high, then even a small percentage change in sales can produce a big change in operating income. While a high DOL is beneficial if sales are increasing, it can be detrimental if sales are falling. Managers should remember that high operating leverage creates high volatility of net profit, especially at sales levels near the firm's break-even point.

As mentioned, a firm's operating leverage also affects its break-even point (i.e., the number of units that must be produced and sold so that the company's net income is zero). The break-even point can be thought of as the point at which revenues are equal to total costs. It may be calculated as follows:

$$\text{Quantity breakeven} = \frac{\text{Total fixed costs}}{\text{Contribution margin per unit}}$$

where

Contribution margin = (price per unit – variable costs per unit).

Managing cost structure and operating leverage is a cost-benefit issue. A company with high fixed costs, and therefore high operating leverage, can generate a large percentage increase in net income from a relatively small

percentage increase in sales revenue. On the other hand, a firm with high operating leverage has a relatively higher break-even point, or operating risk. The optimal cost structure for an organization involves a trade-off. Management must weigh the benefits of high operating leverage against the risks of large committed fixed costs.

Financial Risk

Financial risk refers to the use of debt to finance a firm's operations. Debt allows equity holders to generate a greater return on their investment by being able to increase income-producing assets with the same level of equity by borrowing additional capital. Remember the accounting equation:

$$\text{Assets} = \text{Liabilities} + \text{Shareholder's equity}$$

While adding debt to the capital structure of the firm has benefits, such as a lower cost of capital and tax deductions on the cost of debt (i.e., tax deduction on interest), adding too much debt poses risks. The more debt the company has, the higher the risk that the firm will not be able to pay its debt obligations. Given the nature of debt, payment of debt has the first claim over the firm's income and assets.

A measure of financial risk is the *degree of financial leverage (DFL)*. DFL explains the impact that a change in operating profit will have on earnings, and EPS is the earnings per share.

$$\text{DFL} = \frac{\% \text{ change in EPS}}{\% \text{ change in operating income}}$$

The easiest way to calculate this is as follows:

$$\text{DFL} = \frac{\text{EBIT}}{\text{EBIT} - \text{Interest}}$$

where

EBIT = earnings before interest and tax (CFA Institute, 2012).

A high DFL indicates that for a given change in operating income, there will be a relatively large change in EPS. The benefits of having high financial leverage when operating income is rising is, to a large extent, offset by the risks of having high leverage when operating income is falling. As with

degree of operating leverage, a firm must balance the goal of increasing returns on equity by using debt and the risk of incurring too much debt and thus increasing the risk of lower credit scores or even insolvency.

Worst-Case Scenarios

Although it's difficult to expect the unexpected, the entrepreneur must consider the whims of nature along with the risk and consequences of a catastrophic event. A firm that is unprepared for dealing with worst-case scenarios can see its operations brought to a halt in an instant, sometimes to the point of failure. A firm can lessen the impact of such events by undertaking systematic analysis of its status in the industry and community and attempting to build firm capabilities that are robust enough to withstand unexpected events. Some industries, like investment advising, are required by law to have disaster recovery plans. In general, such recovery plans include the following:

1. Routine backup and offsite storage for business records
2. Proper insurance for the various business assets of the firm (including business continuity insurance)
3. Preidentified alternative locations from which to work or produce
4. Preidentified means of shipping and receiving product
5. Employee training with respect to the implementation and execution of contingency plans
6. Preplanned method of notifying customers, regulators, and suppliers of the firm's status

This type of planning, while important, does not create immediate value, but it does tend to preserve value in the face of external events that would otherwise serve to diminish or destroy firm value.

Risk Assessment as a Routine

Risk assessment provides a mechanism for identifying which risks represent opportunities and which represent potential pitfalls. Done correctly, a risk assessment gives a firm a clear view of variables to which it may be exposed, whether internal or external, retrospective or forward looking. A

robust risk assessment process, applied consistently throughout the life of the firm, empowers management to better identify, evaluate, and accept risk in the daily course of business, even while maintaining the appropriate controls to ensure effective and efficient operations and regulatory compliance.

For risk assessments to yield meaningful results, certain key principles must be considered. A risk assessment should begin and end with specific business objectives that are anchored in key value drivers. For example, should the firm enter a new market, should the firm invest in a new production process, or should the firm expand its capacity? These objectives provide the basis for measuring the impact and probability of adverse impacts on the firm. Governance over the assessment process should be clearly established to foster a holistic approach and a portfolio view of the organization's overall risk appetite and tolerance. Finally, assessing leading indicators enhances the ability to anticipate possible pitfalls and opportunities before they materialize. With these basic principles in mind, the risk assessment process needs to be periodically refreshed to deliver the best possible insights.

Models, such as back testing and simulation, estimate both the likelihood and impact of events, whereas nonprobabilistic models like stress testing measure only the impact and require separate measurement of likelihood using other techniques. Nonprobabilistic models are relied on when available data are limited. Both types of models are based on assumptions regarding how potential risks will play out.

Back Testing

Back testing is the processes of using a model or technique developed today that uses historical data to help understand the range of potential outcomes. Back testing uses historical data to evaluate how a projection designed for use now would have explained past results. A key element of back testing that differentiates it from other forms of historical testing is that back testing calculates how a strategy would have performed if it actually had been applied in the past.

Back testing requires building a model with sufficient detail so as to "work" the way the firm works. Back testing, like other modeling, is limited by potential overfitting. That is, it is often possible to find a process that would have worked well in the past but will not work well in the future. Despite these limitations, back testing provides information not available when models and strategies are tested on data that themselves are not historical in nature.

Sensitivity and Scenario Testing

Sensitivity and scenario testing is another tool a firm can use to assess risk. In this type of test, key risk factors such as price, volume, and quality level are “stressed” or given values beyond their normal operating ranges, or they are given values based on an expected future set of conditions. One variable at a time is changed to assess the impact of that single variable on the firm; the technique is called a **sensitivity analysis**. When the analyst varies a number of variables so as to approximate a particular business condition, then the technique is called a **scenario analysis**. The goal is to discover the impact on the firm if the selected risk factors hit abnormal levels. The test may also uncover deficiencies in processes and systems that may cause unexpected problems.

Sensitivity and scenario testing has several strengths. It is easy to set up—one only needs to give extreme or expected values (given a specific scenario) to inputs in the firm’s planning model and analyze the results. It exposes hidden problems that can be dealt with early. It reveals the inherent structural limitations of a system that allows operating parameters to be set more realistically or the system to be redesigned. It can also be used by audit and internal controls to evaluate existing controls.

Sensitivity and scenario testing does have limitations. This type of test estimates the impact of an event, not its frequency, and therefore captures only one dimension of risk. It is usually focused on an extreme event or a set “scenario.” This technique considers complex effects of combinations and relationships between variables to the extent they are understood. The choice of factors to stress or vary and the linkages between these factors are subjectively but logically assigned. It is critical to the scenario technique that input variables be varied logically in a manner calculated to produce results that are descriptive of an extreme event or sets of circumstances.

Simulation

Simulation is an iterative process that allows testing for many scenarios without requiring the construction of or experimentation with the real system. Simulation is the process of creating a model where each variable varies within a selected range of outcomes and with a specific standard deviation. The purpose of simulation experiments is to understand how a system would react to changes in its variables if the changes in each variable were independent and disconnected to the movements in every other variable; they vary based on the probability of their independent distributions.

Simulation offers several advantages. The simulation model is interesting in that it allows for simultaneous and independent changes to multiple variables

to study the results. It can also be used to reproduce large and complex situations that may affect the integrity of the firm. The disadvantage of simulation is that it is not connected directly to any specific real-world event or sequence of events. The simulation requires a specialized computer program and knowledge of the historical distribution levels of various input variables.

Summary

The single most important thing about managing to maximize firm value is to pursue excellence in the creation, production, and delivery of the firm's products and/or services. It is important that the firm view value through all the lenses that it has available. Viewing the various key aspects of value beyond the product creation and sales cycle will provide management with an additional edge when it comes to maximizing the firm's overall value. The act of considering these additional key aspects of value will help prepare the firm and its personnel to weather turbulent future conditions.

Do not copy, post, or distribute