Knowledge management activities can't operate in a vacuum. The pressures of corporate finance directors make it critical to understand how knowledge management activities impact the firm's economics. Here, Mark Clare, author of *Knowledge Assets*, shows us how to discover value by using financial concepts of measuring returns with discounted cash flow models.

SOLVING THE KNOWLEDGE-VALUE EQUATION (PART ONE)

How to estimate the value of the intangible benefits of KM

By Mark Clare, Kanisa, Inc.

The essence of knowledge management is making the link between knowledge and value visible and finding ways to protect and leverage it. To do this most effectively we need productive definitions of knowledge and value. Narrow definitions tend to produce KM efforts that look just like information technology or human resource interventions, leaving the unique value that KM has to offer on the table. On the other hand, broad definitions are too abstract to be actionable and lead to a blizzard of metrics that are poorly understood and don't hold weight in the traditions of corporate finance. Despite good intentions, these broad approaches to valuing knowledge are frequently neglected or dismissed by financial managers.

We need definitions that are not too broad and not too narrow, but ones that are just right. That means we need theories of knowledge that differentiate knowledge from information and people so as to produce new management approaches and decision frameworks. This also means adopting theories of value that respect the fundamentals of corporate finance, while providing the tools for linking soft but important KM benefits (e.g. accelerated learning or improved knowledge sharing) to hard dollars.

I have worked with colleagues and clients on the problems of knowledge and value for the last 14 years from a theoretical and practical perspective. In this article and my next in the July/August issue of *KM Review*, I will share some of my experiences at Lincoln Re and Kanisa in solving the value problem in KM. This first article will cover the basics of solving the knowledge-value equation and the next will offer several case study examples of how it works in practice.

Speaking the language of finance

Making an investment in KM means taking on subtle risks, worrying about hidden costs and shooting for intangible benefits. KM programs often take considerable time to produce results; rapid payback is not the hallmark of efforts that attempt to change social practice in business cultures or modify deeply-ingrained cognitive behaviors. KM requires an approach to value that reflects these characteristics but also one that's grounded in the well-established principles understood by finance professionals. The approach presented in this article can be summarized in a statement called the knowledge-value equation:

KM Value = F (cost, benefit, risk)

= Total DCF created over life of KM investment

The equation states that the value created from managing knowledge is a function of the costs, benefits and risks of the KM investment (project or strategy) in leveraging and protecting the knowledge. Such value can be estimated by calculating the total discounted cash flow (DCF) that's generated over the lifetime of the KM investment.

The knowledge-value equation is both boring and exciting. It's boring in the sense that it offers no startlingly new concept of value, but instead draws on

KEYPOINTS

- Assigning value to KM efforts requires more than simple ROI figures.
- The value created from managing knowledge is a function of the costs, benefits and risks associated with the KM project in leveraging and protecting the knowledge.
- Solving the knowledge-value equation requires familiarity with the concepts of the time value of money and discounted cash flow (DCF).
- Intangible benefits of KM projects must be tied to one of the six DCF drivers to make any impact on the operations of a company.
- Building knowledge-value trees makes the connection between knowledge and value in an organization more visible.
- Discovering knowledge-value drivers is one of the central tasks of KM.
- Understanding, leveraging and protecting the link between knowledge and the economics of a firm is the unique purpose of knowledge management.

the well-established (and some would say well-worn) concept of DCF. It's exciting because it claims that the intangible impacts of KM, such as improved problem solving, enhanced creativity, better relationships with customers and more meaningful work, can ultimately be tied to real cash flows. To see how this works in full form we need to build on this equation considerably, introducing ideas from value-based management, transaction cost economics, increasing returns and real option theory. But we'll focus our discussion on the basics. As you'll see, combining the basic concepts of what drives the creation of DCF with a productive theory of knowledge goes 90 percent of the way to giving us a theory of value for KM that's not too narrow and not to broad, but just right.

Time is not money

To work with the knowledge-value equation, it's necessary to review some basic concepts of corporate finance, including the time value of money and DCF. The value of money (or more generally an investment) changes over time. Time is not money or even money squared, but the amount of change in the value of money depends on the rate of return the investment earns over the time period in question. See sidebox, right, for details of this reality.

Unfortunately, this isn't nearly enough to solve the knowledge-value equation. For one thing, KM projects don't produce a single benefit at a given point in time. They produce a stream of benefits and costs over time. To model this we can turn to the idea of cash flows. Value, or cash, flows in (revenue) and out (expenses) of an active business over time. Likewise, cash flows in and out of a KM project as benefits and costs. This means we can model the economics of a KM project as a series or stream of cash flows.

For instance, consider a KM project that requires an initial investment of $400K and produces a benefit of $150K per year for five years. If the ongoing cost of the project is $50K per year, what is the total value being created by this investment over the five years? We might be tempted to subtract the $50K ongoing cost (cash outflows) from the $150K recurring benefits (cash inflows) to get $100K netflow per year, but that would be misleading. To get a more accurate picture, we need to treat NetFlow as a future value and discount it back using the present value equation.

Let's look at one calculation in detail. Assuming the required return is 10 percent, the present value of the NetFlow from year five is:

*PV = FV*1/(1 + r)t = NetFlow*1/(1+0.1)5 = 100*0.62 = 62*

If you do calculations for each year, and then add them together and subtract the $400K start-up costs, you'll see that the total NetFlow makes it look like we'll make $100K, but discounting the cash flow indicates that we'll lose $21K. Why? We require a rate of return of 10 percent from our investment and, unfortunately, this project doesn't produce one. See below for the illustration of cash flows:

Year	InFlow	OutFlow	NetFlow	DCF
0		400	–400	–400
1	150	50	100	91
2	150	50	100	83
3	150	50	100	75
4	150	50	100	68
5	150	50	100	62
Total	$750	$650	$100	–$21

Climbing the knowledge-value tree

The easy part of the problem is understanding the concepts of time value of money and DCF. But how are we going to take the intangible impacts of KM and turn them into a series of cash flows that can be discounted by the cost of capital? For a start,

Time value of money

The equation that governs the time value of money is:
$FV = PV * (1 + r)^t$, where FV is the investment's future value after "t" years, PV is the present value, and "r" is the rate of return on the investment.

If we invest $0.75 for three years and can earn a rate of return of 10%:
$FV = \$0.75 * (1 + 0.1)^3 = \$1$
The reverse is true as well. If we make an investment that's expected to produce a benefit of $1 in three years and my required rate of return is 10%, the present value isn't $1; it's only 75 cents.

We must discount future benefits using the expected rate of return with a factor called the discount factor: $1/(1 + r)^t$
It tells us how much we should discount future benefits to determine their present value. Notice the farther out the benefit, the smaller the factor and therefore a smaller present value for the benefit. Same thing for the rate of return – that's why it's called the discount rate: $r=(FV/PV)^{1/t} - 1$

The required rate of return for a project in many firms is set to the cost of capital for the firm. It can also be adjusted by the level of risk associated with a project, with riskier projects required to produce a greater return.

Mark Clare has over 15 years of experience in KM, business strategy, IT and related fields with Kanisa, the Lincoln Financial Group, Navistar International and 3M. Before taking a position as a knowledge architect at Kanisa, he was an officer and vice president at the Lincoln Financial Group.

we can increase the power of our approach to KM value by drawing on more concepts from corporate finance. Specifically, we can borrow an insight from value-based management that reveals the six ways you can increase DCF:

1. *increase revenue* by selling more products or by introducing new products and services;
2. *lower expenses* by decreasing quality, transactional, administrative, production and other costs;
3. *improve margins* by increasing operational and economic efficiency to improve profit;
4. *lower taxes* through smart strategies that minimize the tax liabilities of the firm;
5. *lower capital requirements* by decreasing the amount of capital needed by regulation to run the business;
6. *lower cost of capital* by decreasing the cost of loans, equity and other forms of financing.

To model the intangible benefits of KM as cash flows, we must tie them to one or more of the DCF drivers listed above. This insight from corporate finance has an important consequence for KM practitioners: to monetize (i.e. assign a cash value to) the intangible benefits of KM, we must understand how the new functionality and capabilities delivered by a KM project transform business processes and practices to improve operations and generate DCF.

For example, consider an investment in a customer-service portal. The new functionality delivered is a repository of past solutions that can easily be searched by support staff and customers alike. Assume that this repository also supports e-learning, personal home pages and intelligent escalation of problems. With some customers solving their own problems, fewer calls will be made to the support center. Fewer support calls could mean the need for less support staff and, therefore, decrease expenses. It could also mean less pressure on existing staff, greater productivity and lower turnover. Another way the KM functionality could transform the business is by increasing the percentage of customer problems that are solved during the first call. This avoids the frustration and expense of calling customers back to resolve an issue. Increasing first-call resolution leads to improved customer satisfaction and higher rates of cross-selling or up-selling and, therefore, brings in additional revenue.

Figure 1: Knowledge-value tree

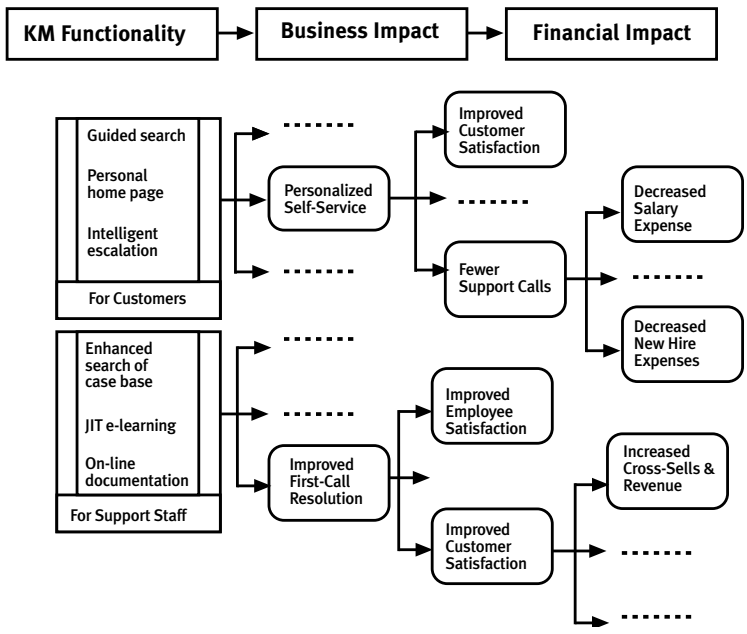

Figure 1, left, depicts a tree-like structure that I call a knowledge-value tree. Building them is an excellent way to make the connection between knowledge and value more visible. The method works for any area and requires mapping:

KM functionality→business transformation→DCF→value

The magic happens during the business transformation. Thinking of it as a two-part story, the first part explains the connection between the new KM functionality and a change in business processes and individual practices:

KM functionality→processes and practices→change in business metrics

In our customer service example, the easy-to-search repository of past solutions created a new process (customer self-service) and increased the speed and quality of the initial phase of the support process. This creates a measurable impact on the metrics of first-call resolution, customer satisfaction and total calls. What's needed is a clear story of how this works that's believable to customer-service management and the representatives.

The second part of the story is about the link between the change in business metrics and one or more of the drivers of DCF:

Change in business metrics→driver of DCF

In our customer-service example, increased first-call resolution and customer satisfaction results in increased sales and revenue; decreased calls lead to lower expenses. The story told here must be convincing to customer-service management and the CFO or financial managers. Putting the two parts of the story together, we have a way to monetize the intangible benefits of KM investment:

KM functionality→processes and practices→business metrics→DCF drivers→value

Building knowledge-value trees in this way is hard work. To ease the burden, a well-differentiated model of knowledge combined with a very strong understanding of the business will help. A robust theory of business knowledge provides the lens to tell a compelling story about the relationships between

KM functionality, business practices and the creation of economic value in your firm.

Real links and key value drivers

Building knowledge-value trees for business problems presents a serious challenge and an exciting opportunity. The challenge is being able to dig in deep enough to find the causal connections operating within the firm. It's easy to skim the surface and not dive in deep enough to deduce the proper linkages. On the opportunity side, knowledge-value trees provide a context for discovering where and how real economic value is being created. In the ideal case, they help identify the strongest drivers of value in your application area and avoid making investments that sound good, but produce very little value. Discovering key knowledge-value drivers is one of the central tasks of KM. They not only help us forecast the economic benefits of a proposed KM investment, but also help us understand how to implement projects to maximize a return.

More dramatically, discovering the firm-wide value drivers provides an economic basis for enterprise KM strategy. Take an insurance company for example. For many traditional insurers, the firm's loss ratio (premium collected compared to benefits paid) is the strongest generator of DCF. Loss ratio is determined by which risks the insurer accepts (underwriting) and how much they charge for these risks (pricing). Underwriting and pricing are very knowledge-intensive functions. In this case, an insurer seeking maximum economic impact would want a KM strategy focused on improving loss ratio by enhancing the consistency and quality of pricing and underwriting decisions. This example oversimplifies the formulation of knowledge strategy, but it does show the importance of considering the knowledge-value link. We can learn a lot about the sweet spots for KM by reverse engineering the important financial measures to the decisions, learning and knowledge assets that drive them.

Discovery and risk

Building and using knowledge-value trees result in hybrid frameworks – part financial models and part knowledge models. These models include graphic views of causal relationships and the math of DCF in spreadsheets. Spreadsheets can offer a more detailed picture of knowledge-value trees and are filled with specific assumptions about the causal relationships among KM functionality, business metrics and financial measures.

But how do we know that these assumptions are accurate? How do we know, for example, that a natural language search facility on our Web site will improve document retrieval by 2 percent? How do we know that our spreadsheet captures genuine insights into the knowledge economics of the firm? With so many assumptions, some might say we can do anything with the numbers and make the DCF forecast for an investment come out any way we like. It's true that even with the best intentions, the assumptions behind knowledge-value trees can be inaccurate and lead to poor KM investment decisions. See sidebox, above, for advice on managing this risk.

Solving the knowledge-value equation is much more than developing a business case or doing an ROI calculation for a KM project. It's a push to discover the knowledge economics and strategy of the firm while doing value-creating KM projects. It provides a way to see and quantify key risks while refining theories in use for knowledge managers.

In short, solving the knowledge-value equation gives us not only a philosophy, but also the math for doing knowledge management. Many authors stress the relationships between KM and IT or HR. Certainly such connections are important, but by placing value creation at the heart of the KM, this article reveals the importance of the relationship between KM, corporate finance and economics. In my next article, I'll discuss how to apply these equations to a Web self-service project designed to improve customer service.

Ways to manage KM risk

Knowledge-value trees and their associated calculations involve assumptions. Here are some tactics to reduce your risk in assuming too much or too little:

- Use whatever data is available in the form of financial reports and other summary documents to make educated judgments.
- Review assumptions with the appropriate business experts, but be sure to manage expectations – remember, you don't have absolute answers.
- Quantify risks associated with assumptions by calculating how a change in the assumption impacts the total DCF of the investment.
- Use comparative, rather than absolute evaluation. Develop a set of scenarios that look at a range of assumptions. By looking at scenarios comparatively, you lessen the risk of making poor KM investment decisions based on misleading assumptions in your models.
- Use models to frame assumptions whenever possible. The assumptions that go into knowledge-value trees should be based on the best business data and experience available. What's needed at minimum is an explicit model that can be tested and refined through the implementation process. Good models are based on principles and principles provide testable justification for the assumptions you make in crafting knowledge-value trees.

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Contact
Mark Clare
Kanisa
E-mail: mark.clare@kanisa.com

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