How a knowledge-based approach might illuminate the notion of human capital and its measurement

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Abstract

Human capital measurement and accounting has been under discussion for years without any satisfactory methodology emerging. The economic significance of today’s knowledge-intensive organizations makes better HC measurement more pressing. We draw on insights from the knowledge-based theory of the firm and conclude we can only make sense of its human capital by looking in detail at its practices. Human capital is the value added at the level of the work practice—as traced by activity-base accounting. Overall the firm’s human capital totals into its goodwill. The human capital can be estimated and then managed by allocating the goodwill to the activities taking place, a complex distribution process but one precisely complementary to that of activity-base accounting.

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1. Introduction

The widespread enthusiasm for a knowledge-based (KB) approach to understanding the nature of the firm and the possible basis for sustained competitive advantage has renewed interest in human capital accounting (Chen & Min, 2004). Training typically costs money and educated people are important corporate resources (Adner & Helfat, 2003). Indeed, it is estimated that the level of US corporate investment in intangible assets, around $1 trillion annually, almost matches investment in tangible assets (Lev, 2002). But how can such assets be valued and brought under the normal mechanisms of managerial control? The question has been raised often in recent years (Dekker & De Hoog, 2000; Liebowitz & Wright, 1999; Wilkins, Van Wegen, & De Hoog, 1997). While many attempts have been made to develop structured ‘objective’ methods for addressing intellectual capital (Petty & Guthrie, 2000) none have been widely adopted in the business world. Does the KB approach offer new possibilities? In this paper, we answer with a tentative yes, but in ways that leave much work undone, not least on our expectations of what can be achieved.

Our argument follows from the observation that whatever human capital means, it must ultimately be evident in skilled predictable performance. Even this is only a first level of analysis, since human capital should also include the potential for skilled performance under circumstances, which have not yet arisen—a sort of second loop or level of analysis. A great deal of training, for rapid response in the event of a bio-terrorist attack, for instance, is undertaken in the hope that it will never result in performance. Nor is its exercise anything other than training. Performance is not elemental, in the sense of being constituted separately or standing apart from its context. It needs to be understood in the context of its being integrated into, and as a constituting part of, the production function. Hence, performance measurement and human capital must be based on the specific system of practices internal to the firm.

Our central point is that in important ways, the sum of these practices constitutes a significant part of a firm’s identity—on which the value of the human capital is thus contingent. This internally oriented view is quite different from the externally oriented basis of conventional accounting which looks outwards, depending on the existence of markets in which resources are accounted for in terms of the price paid to acquire them. Clearly, the externalist and internalist bases for valuation are different, as are the purposes in performing the evaluation. We might also consider a third more pragmatic valuation basis, the future...
revenue stream that might result from the ownership and deployment of particular assets. To expect that human capital can be measured and added into a balance sheet showing the prices paid as if they were tangible assets is to doom the project to immediate failure. It would be to mistake gravely the differences in the natures of the assets involved. But this argument cannot go anywhere without a complementary understanding of practice and its place in a theory of the firm, for it is only through the presentness of practice that the potential of all resources becomes of value. Here, the emerging knowledge-based insights into practice may be helpful.

For at least a century, economists and accountants have pondered the implications of the difference between the value of the firm as a ‘going concern’ and its ‘book value’ (Petty & Guthrie, 2000; Veblen, 1965). Many presumed this was a failure of accounting, or of market perception, especially since the gap seems to have widened markedly in recent decades—to which Tobin’s Nobel-winning work drew attention (Lindenberg & Ross, 1981). Accounting dismisses the matter rather arbitrarily by adding in a balancing item as the firm’s ‘goodwill’ (Seetharaman, Balachandran, & Saravanan, 2004) thus overcoming the ambivalence of a market system that on the one hand prices the sum of the resources going into the firm at X and on the other the value of the integrated outcome at Y. Goodwill, portending profit and the return to the entrepreneur integrating these resources, is Y = X. Which leads directly to the puzzle of how value and wealth are, in fact, added, a matter on which, as we all know, both Smith (1986) and Penrose (1995) had much to say.

In addition, the notion of goodwill aggregates the value of a wide variety of relationships between the firm and its environment. The knowledge implied is both of the firm as a whole, but also that in the minds of the individuals, firms, suppliers, customers and other communities that interact with the firm. Goodwill is a complex concept in the sense of our explaining precisely how such a gap between the tangible assets and the valuation might arise. It reflects the firm’s past performance, of course, but also outsiders’ expectations of the firm’s future behaviour. Since these are perceptions of future events and potentialities rather than simple evaluations of what has already occurred, it is also a matter of the trust existing between these actors, and an indicator of the state of the local node of the network of economic and social relationships in which the firm is embedded.

At first sight, goodwill seems aggregated and outwardly focused on others’ views of the firm, while the idea of human capital (HC) seems disaggregated to the individual level and thus inwardly focused. Training, for instance, produces competencies that can be understood as expectations of future performance within the firm’s systems of practice that are not directly observable in the market, reiterating the point that measures of HC assets need to be grounded in the firm’s internal practices and problems rather than in the world beyond the firm’s boundary. But intentions and purposes also come into play, and in the complex network of the firm and its relations there are many of these. One of many reasons to measure HC is that managers might thereby objectify their anticipations of individual or group performance; just as some try and rate a sports team’s chances. They might then be able to anticipate the results of investing in an individual or a team’s knowledge.

2. What is knowledge anyway?

Most writing in this area, now seen as distinct part of the knowledge management (KM) literature, makes profound and sometimes heroic assumptions about the term ‘knowledge’. We presume managers are interested in knowledge because getting more of it gives them more power over the situations for which they are responsible. Better knowledge enables them to frame and grasp experience and develop and evaluate alternative actions. It enables better planning, leading to better performance and execution (Spender & Marr, 2005).

Many KM writers see several types of knowledge. They often distinguish explicit or declarative knowledge (Singley & Anderson, 1989), which can be stated and tested in the manner suggested by the scientific method, from knowledge, which is tacit or performative (Nonaka & Takeuchi, 1995). The latter is readily evident in successful practice but is tough to define or spell out in language. We cannot measure what we cannot describe, so this makes for difficulties not only in accounting but also in managing the acquisition, transfer, and application of performative knowledge. On the other hand, many argue tacit knowledge is not so much of a different type of knowledge as undercodified explicit knowledge, a condition potentially resolved by further research (Boisot, 1998).

Knowledge, we assume, is held by individuals who use it to shape or determine their performance. More and more employees are involved with ‘knowledge work’, the manipulation of symbols conveying data, information, ideas, and so forth, rather than the manipulation of materials (Reich, 1992). Knowledge can also be collective, held by teams and communities as shared ideas and values, interlocking collective practices, common language and so forth (Brown & Duguid, 2001). Sometimes knowledge can be bought and sold, for instance, as the rights to manufacture a drug, in which case it has been made explicit, institutionally ‘fixed’ as these legal rights (Teece, 2000). Human capital is seldom like this. At best it might be fixed with a contract to perform a specific service such as writing a program or wiring a house. The purpose of measuring knowledge more broadly is to make better economic sense of one’s expectations of future performance. That way we can approach the goal of managing all of its determinants rather than being obliged to restrict ourselves to only those
which have been externally priced while the rest are left open, unpriced. The analysis needs to extend beyond the purchasable assets that become factors of production to include such strategically important unpriced assets such as skills and mutual trust and understanding.

Many economists suggest one of the reasons for the existence of firms is as an apparatus for handling and managing the unpriced and unallocated benefits (Alchian & Demsetz, 1972) and the ‘incomplete contracts’ of which employment contracts are typical (Williamson, 1975). In a sense, the profit sharing and services yet to be performed are conceptually complementary; they are what is left open, to be resolved later. Meanwhile the firm rather than the employees holds the profits or bears the residual responsibility for effective performance. Thus, much of the interest in human capital arises because managers look for ways of better allocating the rewards as well as for support in bearing the residual responsibility that comes from such incompleteness. The hope is that some form of intellectual or human capital accounting will enable them to value more precisely what their employees know, individually and collectively, where that knowing extends beyond the explicitness of complete service contracts to embrace their potential for successful practice under as yet incomplete conditions. The procedure under which profits are automatically allocated to shareholders while they are not at the same time responsible for the undelivered services is clearly arbitrary and historically contingent.

Here, we focus on some knowledge-based differences between the ‘machine model’ of classical management, which presumes employees can be directed so precisely that their skills and creativeness can be ignored, and everyday organizational experience that shows how managers depend on their employees to bridge the inevitable gaps between managerial direction and workplace performance. We can ponder whether the resulting ‘problem’ lies in the incompleteness of the manager’s knowledge and direction, or in the employee’s understanding of what is being required, or in her/his abilities to meet those goals (Simon, 1958).

Deeper reflection on the knowledge management literature suggests that it should, perhaps, be less about the management of organizational knowledge and other such intangible assets, a conventional positivist view, than about how managers are to deal with the shortfalls, gaps, incommensurabilities, contradictions, and incompletenesses in their organization’s knowledge. To get a sense of how such a knowledge-based approach might work we can turn to Veblen or, more immediately, to Penrose.

3. Penrose’s two insights

Penrose’s theory of the growth of the firm is rich and complex, and turns on her particular interpretation of organizational practice and its consequences (Penrose, 1995). Obviously learning is key, but unlike many writers who simply assume that practice necessarily leads to additional knowledge, Penrose has a more nuanced notion. Along with Veblen (1965), she lays out some of the possibilities at the core of a KB approach. Her theory stands on two specific insights that differentiate her sharply from most others writing about the nature of the firm (Foss, 2003; Spender, 1994). First that the services resources provide the firm are only partially determined by their external ‘objective’ or market definitions. She argues these services are substantially mediated by the management team’s knowledge of how to use these resources. A resource that to one firm may seem without value, another might regard as highly valuable—land development is a typical example.

It is important to see this is not a matter of differences in the relative degree of understanding of some ‘real’ determinable or objective value. For instance, an art dealer may see significant market based value in a painting overlooked by another person, ignorant of the art market, who happens to find the painting in a newly purchased house. Rather it is the pragmatic observation that what we mean here by value is inevitably in combination with other resources. Our assertion is that a resource, even when it commands a price, has no organizational value in and of itself, only that generated by the uses to which it can be put—and different firms might put the same resource to work in very different ways. Thereby the resource’s organizational value becomes contingent on the processes of integration (Grant, 1996) and resource use. Penrose places great weight on the firm’s internal practices as the basis for valuing the assets it has acquired, and she has been criticized for overlooking external relations (Richardson, 1972). She also points to the strategic and dynamic nature of the knowledge mediating between the external and internal valuations, knowledge that is held by the management team and generally built up, maintained, and adapted through the firm’s practices. She also noted that the pace of the growth of the firm would be constrained by the rate at which the management team could build up its knowledge.

If we build on Penrose, an appropriate accounting approach to the acquired asset might be to say its full value $F_i$ to the firm $F$ is not simply the asset’s price $P_i$, but $P_i$ times a factor relating to the relevant components of the management team’s mediating knowledge. Thus, the factor $K_i$—for $K_i>0$—is a knowledge-product of the practices yielding the relevant knowledge. Learning is often costly so $F_i$ needs to be corrected by the cost of gaining the relevant experience $E_i$.

Thus,

$$ F = \sum F_i = \sum (P_i \cdot K_i) - E_i $$

Penrose’s second insight is that $F_i$ may well seem less than $P_i$ because $E_i > P_i \cdot K_i$—as if the knowledge has been too costly to acquire, worth less than the cost of the experience of gaining it. But she still sees the relationship
introduces a new dimension into the theory of to a firm’s growth because $K_i$ is non-rivalrous while the other terms are rivalrous. In other words, the value $K_i$ cannot be accounted for in the same way as the values of the other terms—which are presumed to be rivalrous. As a result of knowledge’s extensibility the firm, having developed $K_i$ in project $I$ can apply it at marginal cost in project $J$, thereby finding itself in a commanding position relative to other firms who have yet to undertake such a project. Thus, the values of learning reach beyond their immediate return to embrace the results of additional time periods and projects. Here we see Penrose’s theory as a fundamentally knowledge-based approach that embraces both rivalrous and non-rivalrous assets, and which consequently transforms our understanding of what managers do and of how firms might compete.

But it also indicates some of the deeper complexities lying in the path of any attempt to account for the employees’ skills or the firm’s other forms of non-rivalrous knowledge. While we can measure individual employees in terms of the cost of their training, we cannot ignore the problems of valuing the resultant knowledge that is (a) near costlessly extensible to other projects, and (b) mediated by the managers’ ability to present the employees with tasks appropriate to the skill-bases identified and measured. What seems to cripple our efforts to account for human capital is that we have to determine the net present value of the yet-to-be-recovered consequences of their application of that knowledge, and this is plainly to deny its non-rivalrous nature.

4. A different way of thinking

The principal challenge seems to be to develop ways of understanding intellectual capital that account better for the cost of establishing the ‘going concern’ without, at the same time, having to rely on fully anticipating its future returns. This is because the going concern includes non-rivalrous forms of human capital that are not currently shown on the balance sheet, yet contribute significantly to the firm’s capabilities, as measured by the market. These are often expensive to acquire or generate. Inasmuch as the market valuation extends its view of the past and thereby anticipates the net present value of revenue that might be produced by the firm as a combination of both rivalrous and non-rivalrous assets, it must always lie beyond the reach of what we mean by accounting, for were there really an effective way to measure both past costs and future revenues, it would constitute an economic ‘theory of everything’.

We need to modify our expectations of human capital accounting to bring some measure of the costs of creating non-rivalrous resources into a framework that currently does not handle them well. Of necessity, the analysis must be backward looking because we cannot know the ultimate purposes to which non-rivalrous knowledge might be extended in the future and thus lead to new and unanticipated value. We must leave this murky conceptual space—that lying adjacent to but nevertheless outside our account of creating the going concern—to the imaginations of those entrepreneurial managers whose function it is to project their thoughts into the future and take decisions on the basis of their anticipations of how things might turn out.

If we redefine the human capital problem as one of better accounting for the costs of creating the going concern, for animating, so to speak, the firm’s tangible assets, then interesting possibilities emerge from the KM discourse. Obviously the cost of the training, both that borne by the firm providing the training and that acquired by the firm when an employee is hired, so free-riding on what others have provided, seems to be not currently accounted for. But what if the training is of no value in the firm’s actual operations? Likewise the costs of setting up the systems that bring the employees’ knowledge together with the tasks that generate revenue seem important. But again, they are only of value when they are actually used. This is to shift attention from the intangible assets held by individuals—the assets that ‘go home in the evening’—to those that are communal. These are systemic aspects of the firm, or its subsidiary ‘communities of practice’, and are often considered to be key to sustainable competitive advantage because they are relatively unique, inimitable, and, being embedded in the firm, immobile (Barney, 1991; Brown & Duguid, 2002).

At the same time, depending on the firm’s internal practices means that all such accounting is contingent on them remaining more or less similar, and consistently ‘related’ in the language developed by Rumelt (1974). Likewise, the key to Penrose’s work is its focus on the practices that generate intangible resources that are relevant to the firm now and into the future, for as long as the work relies on the same body of knowledge. Her theory cannot explain growth into unrelated activities. Likewise, our human capital accounting must collapse as the firm changes into something quite different. This implies a relationship between a practice-grounded system of accounting and the firm’s identity—just as goodwill is an indicator of the market’s sense of the firm’s identity.

The level of analysis issue is not only about individual versus collective assets, it is also a shift from the identifiable and potentially tradable to the systemic and infrastructural which cannot be separated from the firm and traded. Thus, human capital accounting reaches to consider both the intangible resources individuals bring to the firm’s practices, and those features that make the firm into a community or ‘community of communities’. This reminds us of the distinction between the direct and indirect costs. Again the challenge is to better account for the indirect costs of developing those resources that the employees need available to them if they are to be able to apply and combine their individual and separable resources. The analytic anchor must be the firm’s complex of practices, including
its ‘organizational routines’ (Nelson & Winter, 1982) and the value system associated with those, rather than being contingent on any external or market based valuations or estimates of future returns.

Our argument is that to make any sense of the attempt to account for human capital we should abandon the notion that we can account in ways consistent with our current accounting approaches for they are oriented externally towards the market’s pricing of rivalrous assets. Instead we must turn and refer to the system of practices which comprise the firm—so recalling some of the debate about the divergence between financial and managerial accounting (Johnson & Kaplan, 1987). Employee’s knowledge resources must be valued in that context, not in terms of the money spent to train them. A gap, analogous to goodwill, opens up between what was spent on resources and what their internal value has become. Management’s mediating impact Ki may be less than 1. The market’s multiplier—the valuation for the firm as a whole over the cost of its tangible resources—may be complemented by a similar ‘multiplier’ Si reflecting the management’s inability to spend wisely, purchasing assets Wi which cannot be integrated into the production function. These resources remain priced at their cost, provided they are not perishable.

This suggests something along the lines of \( F = \sum F_i = \sum ((P_i \times K_i) - E_i) + \sum W_i \), where \( P_i \) applies to resources \( R_i \) through \( R_j \).

5. Infrastructure versus individual capabilities

Our argument, following Penrose, is that the experience of practice opens up a gap between the market’s pricings, currently totalled as goodwill. But, following the knowledge-based approach, we can disaggregate the firm’s experience into that of its individual members or sub-communities of practice. We see the ‘human capital’ at this subsidiary level as a goodwill-like component indicating the value added to the tangible factors of production consumed, representing the value of the experience gained. The added value totals, in the broader run, to the goodwill. The human capital is the source of the value added in each accounting period. The added complication here is that value is added both by the individuals involved but also by the fact that their work is taking place in a context supporting that activity with a costly infrastructure. In this sense, the infrastructure becomes a factor of production, and may be consumed in production, or as Marshall might have put it, be a ‘quasi-infrastructure’. The conveyor system on an auto production line eventually needs renewing and must be written off. But, as we know, the infrastructure of the knowledge-intensive organization is often comprised of information, the body of knowledge in the researchers’ library, for instance. Here costs and values are upset by positive externalities and returns (Arthur, 1996). Additionally, this kind of infrastructure may not be the planned result of investment, and may be no more than a ‘spillover’ from the firm’s practice.

Again the key to an effective analysis is to parse the rivalrous and non-rivalrous resources, which comprise the infrastructure. As the recent Editorial Introduction to the Special Issue of JIC reminds us, much of the IC literature conflates these (Guthrie, Petty, & Johanson, 2001; Marr & Chatzkel, 2004). Some will refer to individual skills, others to company reputation.

6. Human capital as a complement to activity based accounting

Activity based accounting (ABC) is sometimes seen as the most significant advance in accounting for over a century (Johnson, 1992). The effect is to re-orient thinking towards tracing the system of activities comprising the firm, and then to get a good handle on what each of these activities consume (Brimson, 1991). To measure the human capital that adds value to the costs of these activities we need to (a) focus on the activities, and (b) value the outcomes. The tracing methods of ABC are exactly what we require to make sense of transferring the valuation basis from the market and onto the firm itself. Each unit of activity creates cost ‘objects’ as the ‘cost drivers’ associated with that activity are established. Our argument is that value is added in the same way, creating ‘value objects’. The human capital input is the difference.

To establish the value added at each level, the costs at the next level need to be understood, but not simply in terms of the cost drivers at that level. Resources consumed are measured in terms of the value added in previous steps of the firm’s processes. If there were intermediate markets available in which such work in progress could be priced, they would enable management to see precisely how much value had been added. Under these circumstances the valuation basis has shifted back into the market and the whole project abandoned. Human capital accounting is important because it requires an allocation of the firm’s
overall goodwill onto the subsidiary activities which
generate it. The problem is entirely analogous to the
distribution of overheads that is ABC’s main objective.
Instead of considering only the costing structure, which
neglects the value added at previous stages, the point of
doing a human capital analysis is that the firm’s total value
added is parsed down to the activity level. This identifies the
human capital contribution at that level.

We do not suggest this analysis is easy—far from it.
Overhead allocation has been a significant accounting
problem for centuries as the total overheads have
temselves grown relative to direct costs. As a consequence
the overhead allocation process is likely to be entirely
arbitrary and essentially out of strategic control in knowl-
edge-intensive situations. Managerial attention must shift
from the measurable costs associated with the rivalrous
resource cost drivers, and onto the value added by the non-
rivalrous human capital being brought into the process.
At the same time this contribution needs to be classified and so
separated in terms of the individual or work-group
contribution versus that coming from an infrastructure
created in previous periods. Management must estimate
these distributions, hopefully wisely, when there are no
market processes to guide them. In as much as ABC is
significantly less arbitrary than traditional accounting, it
also provides a basis for a less arbitrary understanding and
management of the firm’s human capital.

7. Conclusions

The search for an accounting for the human capital
applied in organizations has accelerated along with the shift
towards the increasing strategic significance of the firm’s
knowledge resources. In this paper, we argue that to seek a
measure analogous to that of the firm’s tangible resources is
to miss the key point. Human capital is knowledge, and
knowledge is generally a non-rivalrous resource. Thus, it
cannot be accounted in the same framework as rivalrous
resources. However, managers, as they integrate the
activities comprising the firm meld its rivalrous and non-
rivalrous resources together, an integration goes well
beyond that suggested in Smith’s or Grant’s analysis. The
firm’s managers can get some sense of how well they are
doing by seeing how the market measures the firm’s
goodwill. But the market’s interests and time scales are not
those of the firm, so the result may be of little immediate
relevance to management’s actions.

Our argument is that the firm’s goodwill is, in an
important sense, a more direct measure of its total human
capital, since this is both individual, in the sense of deriving
directly from the employees’ direct contributions as they do
their work, and infrastructural, as they draw on the non-
rivalrous systemic resources developed in previous periods.
This is little more than a re-statement of Veblen’s
central theme in ‘The Theory of the Business Enterprise’
(Veblen, 1965). The accounting is complex since the firm’s
system of practice is complex, little understood outside the
firm and opaque even to insiders. There are multiple patterns of
production; as March has noted, some are oriented
towards exploitation of the firm’s knowledge, others
朝着husbanding it (March, 1991). Likewise there are
multiple time periods to be considered. Management’s
strategic impact on the firm is shaped as they split the
overall value-added between (a) the products and services
which move on to the firm’s customers and (b) the
infrastructural resources applied in subsequent periods and by
different work processes.

This paper, therefore, extends the argument put forward
by Liebowitz and Wright (1999) that an activity-based
analysis could be the foundation of measuring human
capital. Our central premise is that only by looking intently
at the firm’s practices can we make sense of its human
capital. At the level of the firm this totals into its goodwill,
though we can see human capital adding value at the level of
the work practices traced by activity-base accounting. So
human capital measurement becomes precisely complemen-
tary to ABC.

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