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Measuring Intangible Investment

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Abstract

Recent years have seen a growth in the literature on a variety of aspects of intangible investment, the complement of the more familiar investment in tangible assets such as buildings, plant, and equipment. For economic and business analysts this change in emphasis necessitates the selection of a meaningful metric for intangible investment and the firm's total capital stock of tangible and intangible assets, which is not provided by conventional accounting systems. This gives rise to a deficiency of information for two principal audiences: shareholders and external stakeholders in the firm and the internal management of the firm. Information to know and understand the level of returns to past investments; and to form expectations about future investments, their returns, and risk profiles is accordingly missing. This paper builds on recent studies focusing on this problem to (1) characterize the nature and implications of the information deficiency; and (2) develop an intangible metric that illustrates what can be achieved with suitable accounting data.

1. Introduction

Recent years have seen a growth in the literature on a variety of aspects of intangible capital¹, the complement of the more familiar tangible assets such as buildings, plant, and equipment. Relatively little attention has been paid, however, to the investment process leading to the creation of intangible assets, as opposed to the valuation and characteristics of these assets. Investment decisions in physical assets are conventionally subject to some form of rate of return analysis, dependent on expected income flows from the investment over future periods. While these flows are liable to risk and uncertainties, the measurement and valuation of asset values is well enough understood in business and accounting circles. In comparison, intangible capital and investment are much less obviously provided for, both in terms of selecting a suitable metric and obtaining the information to construct such a metric. This is because it is believed that intangible investment is inherently uncertain and is, consequently, systematically excluded in any explicit form from management and financial reporting (Wyatt and Abernethy 2004). This paper builds on recent studies² focusing on this problem to (1) characterize the nature and implications of the information deficiency; and (2) develop an intangible metric that illustrates what can be achieved with suitable accounting data and shows some effects of the information deficiency.

Systematic measurement and classification of this type is necessary in order to know and understand the level of returns to past investments, and to plan future investments and forecast the outcomes. Reward systems within the firm depend on the internal comprehensiveness and transparency of this process. Further, monitoring of their investment by the owners of the firm, the shareholders, is dependent on the “truth” of

¹ Capital and assets are used synonymously in this paper. See the comprehensive review in the Commission of European Communities study (2003).

² See Hunter et al (2005), Wyatt and Abernethy (2004), and Webster (2000).

this measurement process for providing public information in order to evaluate the risk-return profile of the expenditures. The extent of the information deficiency relating to intangible investment is unknown, as are the distortions induced in management decision-making and investor resource allocation. Given the importance of information for managing corporations and for ensuring investor confidence in capital markets, there is an imperative for a workable and mandatory system to measure intangible investment.

This paper is motivated by the present stand-off between the accounting approach to measuring and reporting intangible investment, and the desire by many—both at the level of the enterprise and the business unit, and their stakeholders—for a more transparent and explicit form of reporting. On the one hand, there is resistance from the Accounting Standards authorities, both nationally and internationally, against proposals that intangibles should be comprehensively accounted for as investments.³ Not only that, but there is likewise resistance from many managers and analysts to more explicit reporting of these investments as intangible assets on the balance sheet.⁴ The indications are that there would have to be very strong incentives to overcome this resistance. Against this, the extant literature suggests that improved specificity in

³ The United States' Financial Accounting Standards Board issued FAS No. 142 *Goodwill and Intangible Assets* in June 2001 along with FAS No. 141 *Business Combinations* after a long deliberation. Despite the significant effort applied to these projects, the issued statements carry over the "immediate expensing of intangibles" provisions that typified the preceding accounting standards, APB Opinion No. 17 *Intangible Assets* and FAS No. 2 *Accounting for Research and Development Costs*. Similarly, the International Accounting Standards Board accounting standard, IAS 38 *Intangible Assets*, issued in 1998 and preceding the United States deliberations, specifically prohibits recognition of most internally generated intangible assets on the balance sheet. The United Kingdom's Accounting Standards Board, similarly issued FRS 10 *Goodwill and Intangible Assets* in December 1997, which states that internally developed intangible assets should be capitalised only where they have a readily ascertainable market value.

⁴ For example, software companies in the United States campaigned for the removal of FAS 86 *Accounting for the Costs of Computer Software to Be Sold, Leased, or Otherwise Marketed* (Issued 8/1985) starting from the mid 1990s. Aboody and Lev (1998) suggest this is due to the negative earnings effect of capitalization under SFAS No. 86 now that the industry is in the maturity phase.

reporting on the full complement of the firms' investments—including tangible and intangible investment would improve capital market efficiency.⁵

Underlying this problem is an uneasy and complex relationship between the accounting and economic frameworks. Intangible investments have economic properties that for the most part do not fit into conventional accounting principles. Accounting treats these investments as long-lived assets only when the expenditures are expected to give rise to future economic benefits, the firm has control over the benefits because of a past transaction, and the benefits are probable and can be reliably measured. From an economic perspective, intangible investments are any expenditure not immediately embodied in physical matter, but which are intended to generate long-term benefits. The economic tension lays in the inherent property rights problem associated with the benefits from intangible investment: it is often difficult to obtain defensible property rights because the intangible asset is embodied in employees who cannot be owned. From an economic perspective, this problem does not change the “investment” nature of the expenditures. However, it does affect the firms' ability to appropriate the expected benefits.⁶ This uncertainty creates an obvious problem for accounting, which is charged with the responsibility of reporting accounting numbers that can be relied on to make investment decisions. Including uncertain investments (such as those with limited property rights) potentially increases the errors in current and forecasted measures of future performance. Admitting more uncertainty also decreases the effectiveness of accounting numbers for contracting, and increases the scope for financial misrepresentation or fraud.

⁵ For further elaboration see the Commission of European Communities report (2003).

⁶ Due either to problems protecting access to, and use of, the asset or due to the firm's inability to exchange the asset until such time as the benefits are embodied in a physical form (e.g., molecules discovered and used to produce drugs).

The counter-argument is that by being more explicit and clarifying rules, definitions and measurement practices, the quantum of investment along with the risk and return profile can helpfully be brought out in the open. In a choice between ignoring what has been shown to be an increasing source of a firm's value creation and including uncertain data, we will argue for the latter.

The paper is organized as follows. In the next section 2, we review three economic characteristics that distinguish tangible from intangible investment and the implications for measurement. Section 3 analyzes accounting rules and practices within the context of the economic characteristics of intangible investment. We then analyze the ramifications of the tension between economic attributes and accounting treatment for the internal management of the firm and for external investors (section 4). Section 5 critically reviews the emerging efforts to fill the information vacuum. In section 6, we develop a cost flows model for linking accounting and value creation processes which illustrate the type of classification system and data required to estimate returns to intangible investment. Section 7 sets out a new measure: an intangible capital metric, which is computed from a data formulation, derived from the cost flows model.

2. CHARACTERISTICS OF INTANGIBLE INVESTMENT

Investment expenditures represent outlays by the firm made in the expectation of *future* benefits (Fisher 1930). Capital or assets, which arise from these investments, have the ability to release (capital) services for production in future periods. Capital can be embodied in either tangible or intangible formats. Firm level intangible capital comprises all forms of capital not embodied in matter, that is, all assets that do not have a tangible form. While it includes enterprise level intellectual capital and

registered intellectual property, it also embraces access to distribution networks and markets, systems to optimise the rate of innovation, and structures and procedures that improve workplace and enterprise efficiency.⁷ As a subset, intellectual capital refers to the stored knowledge and cognitive abilities of the workforce. This includes investments in both the skills and knowledge of a firm's workforce and the invention and development of new products and processes. Registered intellectual property includes the rights embodied in patent, trademark and design titles, as well as copyright, plant and seed breeders' rights. The disciplines of accounting, economics, and management science all embrace similar definitions of intangible investment comprising "identifiable non-monetary assets without physical substance".⁸ However, there is no agreement on how to classify intangible investments or account for them.⁹

It is easy to argue deductively for the importance of intangible capital and its intellectual constituents. Intellect (or knowledge) and raw physical labour are the only two basic factors of production in existence. Since the amount of physical matter in the world is fixed, the creation of goods is simply a re-arrangement of matter. In general, the higher our level of knowledge or intellectual capital, the more we use labour saving devices and the less reliance society needs to place on physical labour for production. Intellectual capital is a prerequisite for all production processes, for even fishing with bare hands requires a level of skill and prior knowledge to succeed.¹⁰ However, the nineteenth century convention within the economic literature, that capital includes only tangible plant and equipment, has been enshrined in the accounting rules. While this emphasis on tangible production assets may have suited

⁷ Rent seeking behavior is also an intangible investment from the firm's perspective.

⁸ International Accounting Standard (IAS) 38 Intangible Assets, paragraph 8.

⁹ Accounting regulators have suggested items that would be considered intangible assets although no formal classification has been proposed (see IAS 38 Intangible Assets).

¹⁰ Marshall (1890). Menger also points out that without knowledge it is not even possible to distinguish between nutritious and poisonous berries (Loasby 1991).

the traditional nineteenth century firm, it is increasingly at odds with post-industrial organizations.

As summarized in Figure 1, production processes dominated by intangible investments, in contrast to those dominated by tangible investments, are characterised by three classic features—(i) Uncertainty in production, (ii) Limited appropriability and (iii) Non-separability—which means they fail in many cases to meet the accounting recognition criteria for assets.

(i) Uncertainty: The uncertainty of a production process depends first on how often the process has been undertaken before, and thus how *standardised* the process has become; and secondly, on the extent of *direct labour involvement*, since mechanised investments produce more reliable outcomes than those dominated by people. Over time, the commercial production of tangible capital has developed standards and processes so that most items of plant and equipment are mass produced and identical. Standardisation means that each piece of equipment can be produced at constant cost – or, with the benefits of experience and learning – at reducing costs. Investments in tangible capital tend to be predictable and subject only to actuarial risk. Investments in intangible capital by contrast are more heterogeneous, either because these investments (e.g., R&D and methods of training) have not evolved to a stage of mature mass production or because they are made deliberately idiosyncratic for strategic reasons. Since a considerable portion of intangible capital is embodied in employees, it is unlikely that intangible capital will ever achieve the same level of replicability as tangible capital. Thus, investment in intangible capital is intrinsically subject to greater non-actuarial uncertainty.

A further area of production uncertainty relates to the *type of knowledge* embodied in individuals and work-groups. The knowledge literature now distinguishes between explicit and tacit knowledge (Polanyi 1962: see Hunter 2002 for review). Explicit knowledge can be codified or articulated, relating mainly to ‘knowing about’: examples include blueprints, manuals, and specialised databases. Tacit knowledge on the other hand is “knowing how” and is not readily transferred between individuals but may be “revealed” through application, practice, and social interaction.¹¹ Whereas explicit knowledge is the ultimate non-excludable, indivisible and jointly consumable public good, tacit knowledge is subject to much more exclusion and the ownership rights as between the individual employee (or team) and the employing organization are often fuzzy. Overall, tacit knowledge has the highest probability of creating strategic value (Lane and Lubatkin, 1998) because it is more difficult for competing firms to imitate.

(ii) Appropriation: Turning to the appropriation issue, there are two main reasons why intangible capital is circumscribed in its ability to secure profits compared with its tangible counterpart. The first relates to its *dominance by people* compared with machinery, and the second relates to the ease of *copying* non-embodied forms of intellectual capital. The first limitation on appropriation arises because labour services are rented from employees in return for compensation. Although some of the employee’s human capital is likely to have been developed through training by the employer, ownership remains with the employee, who can transfer to other employment, taking that capital with him or her. The employer cannot be certain of appropriating the investment benefits because the property rights remain with the individual. Firms have responded to this problem by including penalties in labour

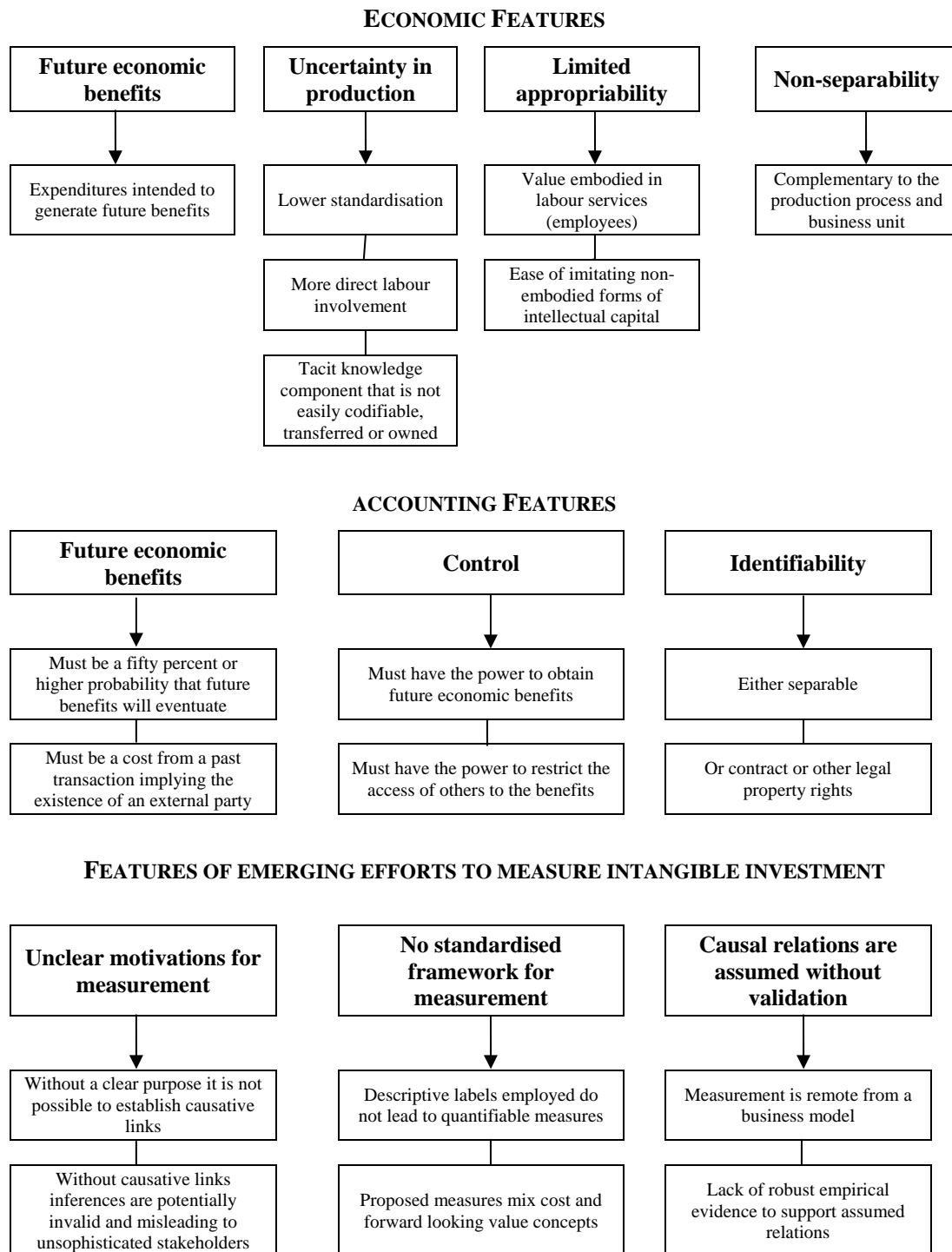
¹¹ Polanyi (1962), Maskell and Malmberg 1999, Dasgupta and David (1994), Brusoni, Marsili and Salter (2005)

contracts for early work-separation or by making the employee bear some of the investment costs of his or her own human capital development.

The significance of the second issue depends on the conditions of knowledge transfer. If the marginal costs of reproducing a piece of intangible capital are zero, because the technology can be costlessly transferred through blueprints and codified formats, or where reverse engineering is technically easy, then the appropriation of profits is severely restricted. Imitators have free reign and can successfully under-price inventors who will not be able to cover their fixed costs of invention. Various forms of protection (such as patents and copyright) can make free transfer more difficult, thereby, safeguarding the employer against copying. These rights however are still probabilistic and depend on detection and the efficacy of the intellectual property system.

(iii) Non-separability: The final characteristic of intangible capital is its tendency to be non-separable, that is, not capable of being separated and divided from the originating business unit without loss of value. This is essentially the property of being complementary in the production process. Most firm-specific forms of human capital fit into this category, as do marketing and organisational capital. Not only are many capital assets complementary in production but also they are only complementary to specific forms of capital from the same business unit.

Figure 1: Features of Production Processes Dominated by Intangible Investment



3. EXISTING ACCOUNTING STANDARDS AND PRACTICES

Accounting frameworks do not employ the term “capital” when referring to expenditures with expected long-lived benefits but use the term “assets”. Intangible investments are only recorded in the accounting system as assets if the items, first, meet the asset *definition* criteria and, second, meet the asset *recognition* criteria (IAS 38 Intangible Assets para. 18). As summarized in Figure 1, asset definition criteria for intangible assets comprise three attributes:

- (a) Identifiability: (i) the asset is separable, being capable of being separated or divided from the entity and sold, transferred, licensed, rented or exchanged, either individually or together with a related contract, asset or liability; or (ii) the asset arises from contractual or other legal rights, regardless of whether those rights are transferable or separable from the entity or from other rights and obligations¹²;
- (b) Control: “an entity controls an asset if the entity has the power to obtain the future economic benefits flowing from the underlying resource and to restrict the access of others to those benefits.”¹³
- (c) Future economic benefits: benefits flowing from an intangible asset that may include revenue from the sale of products or services, cost savings, or other benefits resulting from the use of the asset by the entity.¹⁴

Asset recognition criteria for intangible assets comprise two attributes:

- (d) It must be probable (presumably more than 50 percent probable) that the economic benefits embodied in the asset will eventuate; and
- (e) The asset must possess a cost that can be measured reliably.¹⁵

As summarised in Figure 1, one can immediately see from the previous section that the distinguishing characteristics of intangible assets render them in many cases outside this description. In particular, the tendency for intangible assets to be embodied in people renders attribute (a) the identifiability criterion, unlikely.

¹² IAS 38 Intangible Assets, paragraph 12.

¹³ IAS 38 Intangible Assets, paragraph 13.

¹⁴ IAS 38 Intangible Assets, paragraph 17.

¹⁵ IAS 38 Intangible Assets, paragraph 17.

Attribute (a) also leads to ad hoc recognition of intangible assets since identifiability rather than managements' intent is the definition criteria.¹⁶ The characteristic of uncertainty in production and limited appropriability affects attributes (b) the capacity to control the asset and (d) the probability of future benefits. While (c) is a prerequisite, under any definition of capital or an asset, failure to comply with (e) primarily arises from the "costs flow" focus of accounting rather than the alternative of a focus on measurement of investment and its return.

Our issue here is that unquestioning adherence to these asset definition and recognition rules, without consideration of the costs of so doing, is creating an information gap in both the balance sheet and the income statement. Moreover, considerable Type I errors in the accounting system have been growing with time and are likely to continue (Webster 2000). Type I errors occur when an expenditure that should be classified as an investment, is not¹⁷. Research suggests the costs of these errors include higher information asymmetry between management and shareholders and amongst shareholders leading to inefficiencies in markets and higher capital costs (see Commission of the European Communities Report 2003).

We argue that many of the current accounting practices commit this error primarily on the basis of attributes (a) and (e) – identifiability and the reliable cost rule (see Wyatt and Abernethy 2004). While internally created investment in brand development, workforce skills and new innovations is expensed, intangibles that are bought as a complete set, externally through the market, are included as assets since they are

¹⁶ The information deficiency is exacerbated by the lack of a classification of intangible investments as either assets or expenses. That is, intangible investments not giving rise to an intangible asset under the criteria in (a) – (e) are reported in the income statement as either cost of goods sold or sales, general and administration expenses. The only "line items" of individually reported "intangible" expenses are research and development and sometimes advertising expenses.

¹⁷ This point is further developed in Section 7 below

separable and have a verifiable cost. Similarly, capabilities that are required to implement the firm's strategy and can be bought through transactions including mergers and acquisitions are recorded as assets since they are valued in a market transaction (Von Hippel 1988). As they satisfy attribute (e), they are reflected in the balance sheet in a way that intangibles developed internally by the firm typically are not. Arguably, the same level of certainty or uncertainty, appropriability or non-appropriability, attends the valuations of these intangible assets irrespective of how they are acquired (internally generated or purchased). They will usually be integrated within a package of acquisition costs, subject to negotiation. No 'market price' is likely to be identifiable, each component being a unique blend of brands, reputation, management systems, and customer relationships.

The inference from these examples is that we will not know where value is being generated and lost with such ill-defined and selective coverage in the accounts. The book value of equity and current profits are understated and future profits are overstated, and this is not readily verifiable by outsiders. Treating intangible investments as current expense, amortising them at incorrect rates and failing to revalue when changes in value occur results in distortions and lumpiness in the firm's intertemporal accounts. Wyatt (2005) provides a stylised example of how the measured return on assets can quite easily be doubled, depending on whether an investment expenditure is expensed or capitalised, and if capitalised how it is amortised and revalued.

From the standpoint of standard economic theory, the accounting treatment of intangible investments is therefore arbitrary and *ad hoc*. Consistent with the "*ad hoc*" concerns raised above, a host of company-level studies indicate that there are

significant information gaps in relation to the firms' intangible assets. It is virtually a stylised fact that non-financial indicators of inventive output data, in the form of patent or R&D information, offer incremental explanation for company value over and above standard financial information. This development is also echoed at the macroeconomic level. Webster (2000) and Lev and Zarowin (1999) have both shown that the association between the book value of assets, and capital market variables like stock price and returns, has significantly declined over the last 50 and 20 years respectively. Lev and Zarowin also provide evidence that the deterioration in relevance is significantly higher for firms with a higher rate of R&D investment.

4. IMPLICATIONS FOR MANAGEMENT AND STAKEHOLDERS

Given the evidence that the importance of intangible capital and investment is increasing in contemporary business strategy (e.g., Teece, 2000; Granstrand, 1999), our concern is that in the vast majority of organisations, managers typically take decisions about intangibles expenditure with little information about the returns from past expenditures of this type or the likely future return from that particular expenditure. Because intangible investments relate to investment opportunities of varying risk and, it is believed, relatively higher uncertainty compared to tangible investments, managers face both economic and cognitive limitations in estimating the benefits able to be appropriated from their expenditures (Luft and Shields, 1999).

Organisations have traditionally designed their internal reporting systems to support the preparation of external financial accounting reports (Nathan et al., 1996). Because investment in intangibles is generally immediately expensed, there is a lack of differentiation between expenditure on current production and profitability and expenditure expected to generate future output and profits. By co-mingling

expenditures that are investments and operating expenses for the period, decisions about intangible investment are unlikely to be optimal and will not have a clear and measurable impact on future performance – defined as profitability over a defined period or market value of the business. Managers make decisions about investment in intangibles, whether they explicitly realise this or not. They may be based on more or less acts of faith – or guided by rules of thumb – or through managers being sufficiently persuasive in managerial politics to win approval for their plans. If this deficiency is to be overcome, the internal accounting system needs to be organised in a way that dovetails with management’s intentions. The adverse consequences of these incomplete systems in today’s environment have been documented (Otley, 1999; Bouwens and Abernethy, 2000; Ittner and Larcker, 2001).

Although our focus is mainly on the internal management dimension of intangible investment, it is evident that disclosure of more detailed information about such investment is likely to be of interest to analysts and other stakeholders (such as employees or customers) or potential investors. There is the likelihood, however, that the interests of the different parties will generate differing demands for information, reflecting their separate interests. Debt holders, creditors, and customers (through quality warranty concerns) have an interest in full and objective information about the future prospects of business in which they have a financial stake. Employees likewise have concerns over their future employment and earning prospects. Shareholders want assurance that management is looking after their interests, which can be identified with the long run value of the firm. But for a variety of reasons, such as the “horizon problem” (Dechow and Sloan, 1992; Cheng and Cheng, 2002) – leading to deferment of investment in intangible assets to bolster short-term performance – senior management may prefer to pursue other objectives. Such behaviour may be difficult

to detect and monitor until the damage has been done. Indeed, even the experts are regularly “fooled” when financial reporting practices of corporations “cover up” financial distress so that large companies collapse without apparent warning.

Accounting standards leave considerable discretion regarding their application, which means that management has the power to manipulate accounting methods to provide reports that will favourably reflect performance indicators in ways that suit them, rather than maximising longer-term value. Incentive-based remuneration is linked to accounting measures of financial performance, which can be ‘managed’, or decisions incurring investment expenditure (such as R&D) are delayed at the cost of long-term value.

Because of the apparent scale of intangible investment in modern enterprise and the problems associated with reliable measurement, it is arguable that the level of information asymmetry between internal management and external stakeholders is increasing, relative to the tangible investment-intensive firm.¹⁸ Given the implications for corporate governance related abuses, this information asymmetry is an issue for security market regulators. In particular, if the proportion of total investment that is intangible in nature is reported then the uncertainty associated with the firms’ assets and sources of expected earnings, and hence the level of outsiders’ investment risk, is more readily determinable.

For management, a claimed disadvantage of non-disclosure is that it may have the effect of increasing the cost of capital and producing share prices or company valuations that do not fully reflect reality. However, empirical evidence does not support this claim (see the Commission of European Communities study 2003). It is

¹⁸ For further discussion and references on the micro-economic effects of asymmetry see, Commission of European Communities (2003).

worth noting also that this deficiency of information will have knock-on consequences for the macro-economic management of the economy.

5. CURRENT RESPONSES TO THE INFORMATION VACUUM

The perceived vacuum in the official accounting measures in relation to intangible investment has spawned a divergent literature. One avenue seeks an accounting solution – an internally consistent system of accounting rules but a solution that has scant regard to the economics of the expenditures under consideration (e.g., Canibano, Garcia-Ayuso and Sanchez, 2000). An accounting based solution has not been pursued by accounting standards bodies due to political interventions and the inability of accounting to solve the ‘intangibles’ problem divorced from the economic context.

¹⁹ Another avenue focuses on the anatomy of intangibles (often termed intangible capital or intellectual capital literature by its proponents), producing batteries of possible indicators that are held out to managers as effective measures of their intangible assets.²⁰ These include sets of indicators supported by government (e.g., Denmark and other Scandinavian countries), plus sets put together by academics and consultants. Rather than review this in detail here, we present some broad conclusions from our earlier study of literature and company practice evolved by academics, consultants and firms relating to this line of development (Hunter, Webster and Wyatt, 2005). We do so under four headings: motivation, structure and indicators,

¹⁹ For example, the United States’ Financial Accounting Standards Board announced an enhanced disclosure project that will “consider requiring disclosures about intangible assets that are currently not recognized in financial statements but would have been recognized as assets if acquired, either separately or in a business combination” on January 9, 2002 with the stated goal to work towards required rather than voluntary disclosures on intangible assets. This project has subsequently been withdrawn in the wake of the Enron and other financial collapse crises.

²⁰ For example, some of the “branded” IC metrics that currently exist include Intangible Asset Monitor (Sveiby, 1997), Balanced Scorecard (Kaplan and Norton, 1992), IC-dVAL (Bounfour, 2003), Intellectual Capital Web (Zhou et al, 2003a, 2003b), Scaling (Cinca et al, 2003), Value Creation Index (Funk, 2003, Kalafut and Low, 2001), European Performance Satisfaction Index (Eskildsen, et al 2003), European Employee Index (Eskildsen, et al 2003), FiMIAM (Rodov and Leliaert, 2002), and IC-3 dimensional scaling (Edvinsson, 1997).

causality and conclusions. The main points of this discussion are summarized in the bottom panel of Figure 1.

Motivation: there are many motives for management engaging in IC measurement, but also a number of disincentives pulling in the opposite direction, although how seriously these should be taken is an empirical issue that remains unaddressed. Measurement is undertaken both for internal purposes (strategic) and for external signalling purposes (optimism about future performance prospects). Measurement that helps management to improve strategic thinking by identifying intangible drivers of future value is important. However, unless the purpose for measurement is clear, and the causative links from the measurement constructs to the empirical measures are explicit and stand up to empirical scrutiny, the outcome may be at best opaque and at worst misleading.

Structure: In one respect the literature appears to have moved toward some acceptance of intangible asset structure, though different authors use different labels for broadly similar concepts. These are:

1. The human capital embodied in the skills, knowledge and experience of the management and workforce;
2. Organisational (or infrastructure) capital in the form of organization-specific structures, procedures and business or operational routines;
3. Relational (or market) capital, the established set of relationships with suppliers, customers, partners and business associates; and
4. Intellectual property, comprising assets like patents and trademarks, design titles, copyright and plant and seed breeders' rights, with a legal ownership embodied in the company.

The problem with these descriptive labels is that they do not lead to easily quantifiable measures of value, with the consequence that researchers and consultants have spawned a mass of non-financial 'indicators', both qualitative and quantitative, which they maintain are positive correlates of the scale of intensity of each of the

categories in an organisation. Agreement on the indicators is lacking in large part because there is little convergence on what questions the sets of indicators are seeking to answer. Many of the detailed indicators are highly industry-specific, and are not expressed in a form that permits aggregation across lines of business. Furthermore, it is generally not clear whether these non-financial indicators are reflections of the activity (cost) expended to generate the asset, or are meant to represent forward-looking values for the firm. We maintain that virtually no company would find it sensible (or efficient) to collect and analyse the range of information required to yield the recommended indicators.

Causality: Although those who develop measurement tools would maintain that there is a connection between proposed indicators and one or other measure of performance, the purpose of measurement and the evidence to support the connections is absent in all but a few cases. The existing series of indicators are not linked into the processes of value-creation that drive the competitive capability of the business. Meaningful rates of return on investment are those classifiable according to designated competitive strategies. Unfortunately, most of the existing indicators and their imputed influence on performance measures are remote from intermediate business objectives and the processes of management. In other words, the indicators are not integrated with a justifiable business model.

In practice, most of these espoused measurement systems *assume* causal relationships rather than validate them with robust empirical evidence: "...correlations between measures have rarely been empirically proven and some critics even doubt the assumption of causalities in widely implemented measurement systems such as the

Balanced Scorecard” (Kaplan and Norton, 2000; Norreklit, 2000: in Marr, Gray and Neely 2003, 445).²¹

Conclusion: If our object is to measure investment and analyse value creation, these indicators are a superfluous step for they clearly reflect neither inputs into the intangible investment process nor outputs. If they do not enable us to either know the quantum of returns to a given expenditure on resources, or to comprehend why we achieved a certain profit result in a given period, then the cost of collecting them can hardly be justified. We argue that intangible investment measures should be based on costs or monies outlaid: without details about the quantity and quality of these expenditures, there are few objective ways of estimating rates of returns and values – the latter being a forward-looking prospective-profits measure. The data needed for our purpose has to address key questions such as: How do these forms of intangible investment fit into the value creating process? How robust is the hypothesised line of causation between specific inputs and outputs? Do investments in different forms of intangible assets work independently or do they interact with each other to create a synergy effect? We begin to develop our own approach to these issues in the following section.

6. LINKING ACCOUNTING AND VALUE CREATION PROCESSES

The purpose of all commercial activity is to add value to inputs or resources used up in the course of business.²² A firm’s success in this value creation process reflects its

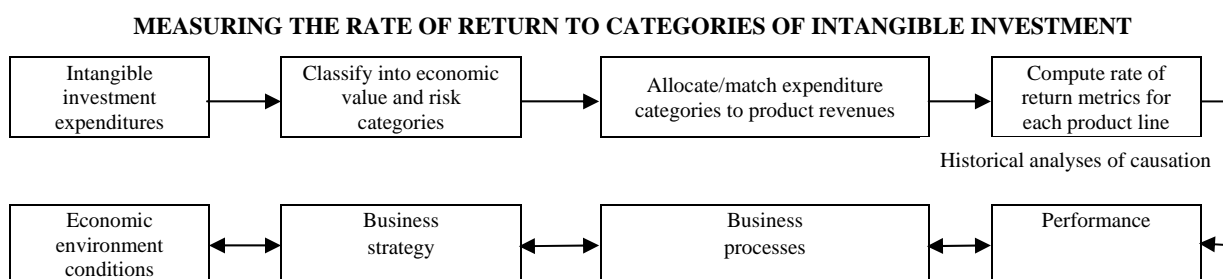
²¹ According to Hunter, Webster and Wyatt (2005), very few of the consultant companies providing IC metrics for other companies have any type of formal analytical framework, and where they do so, it tends to be poorly specified or based on a simple typology or structure.

²² Added value has been defined as ‘the difference between the (comprehensively accounted) value of a firm’s output and the (comprehensively accounted) cost of the firms’s output’. Kay (1993, 19),

competitive advantage, ability to survive and outperform rivals.²³ Failure to add value implies that the resources commanded should be transferred with advantage to alternative uses. Firms in an industry achieve different degrees of adding value because they use their productive resources in more or less effective ways (i.e., they follow different *business processes* in their pursuit of value creation). The nature of the industry dictates a ‘normal’ profile of value creation (e.g., the typical proportions of expenditure on capital, labour, materials, management), as does the technology, and regulation. Within these constraints, individual firms in the industry show variations.

Since our purpose is to measure intangible investment to enable risk and rate of return metrics, we need to be able to link the investments to the distinctive value creation processes of the firm. An overview is given in Figure 2. We envisage a forward-backwards approach. We first collect intangible investment data disaggregated according to a generic set of value and risk drivers. Second, this data works forwards to produce rate of return metrics for product lines. Third, in a feedback loop, the analyst can use the data and rate of return metrics to examine historical questions relating strategy, business processes, and economic environment conditions, to the firm’s mix of intangible investment and product line performance outcomes.

Figure 2: Linking Accounting and Value Creation



²³ Value creation refers to the generation of profits and related increments to shareholders’ wealth (see Penman 2003).

From the analysis in the previous sections (summarized in Figure 1), we propose that the preferred metric of intangible investment and capital should incorporate the following features:

- (1) The criterion for determining whether an expenditure is an investment or an expense is based on managers' *ex ante* intentions.²⁴
- (2) Data is collected on actual costs, including wages and salaries. Rates of return and future economic benefits can only be determined after data on costs is collated and categorised in an appropriate manner. This condition is obvious: to calculate a rate of return requires pecuniary, standardised measures of expenditures, expenses and revenues.
- (3) The data collection process is integrated into the normal accounting process. This requires adjusting the Charts of Accounts.
- (4) The system of classification for these investment expenditures is congruent with the ways firms conceive their strategic intention.

We do not accept the notion that compliance with the definability and recognisability attributes of (a) identifiability; (b) control; and (c) a high probability of future benefits, is a proper basis for determining whether expenditures are treated as a current expenses or capital investments. Any form of classification involves errors and there is usually a trade-off between Type I and Type II errors.²⁵ The trade-off between Type I and II errors depends on where we draw the line on the criteria such as 'separable', 'probable future economic benefits' and 'control'. The more permissive the standards are towards intangibles, the more type II errors and fewer type I errors; the less permissive, the more type I error and less type II error. It is unclear *a priori* how steep the trade-off is between these errors as the boundary changes and what are the costs of each type of error. It is certain, though, that being

²⁴ This criterion does not imply capitalization of an asset on the balance sheet is necessary to achieve a goal of reporting total expenditure allocated to different types of investments for evaluating the performance of different types of investment.

²⁵ Discussed above in Section 3

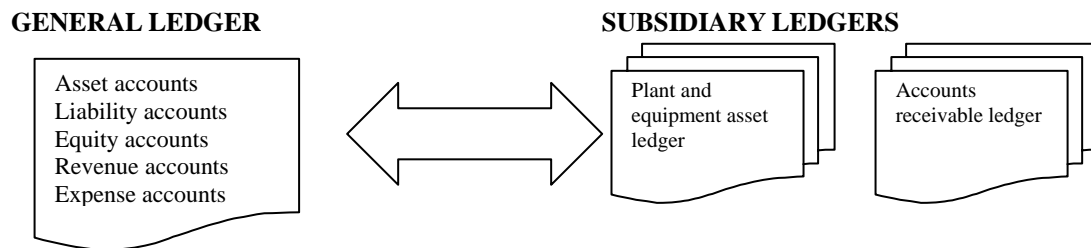
conservative towards treating expenditure on intangible capital goods as investment expenditures, (minimising Type I errors) is, by definition, neither an inherently more reliable nor more valid form of accounting than the converse (due to the reciprocal increase in Type II errors).

Essentially, a system needs to be constructed for *intangible* investments, in parallel system to that for expenditure on *tangible investments*. A *tangible* investment is facilitated in the first instance by the firm's strategic planning process and the associated capital budgeting and cash flow budgeting activities. Once the firm's strategy is operating and tangible investments are made, the relevant purchase orders, invoices and receipts verify a measure of the tangible investment to be recorded in the appropriate asset accounts. This amount is presented in summary form on the balance sheet at the end of each fiscal year at its depreciated carrying amount until its useful life concludes. In this way, both internal and external accounting tends to reflect management's *ex ante* intentions in the case of tangible investment.

If we are to fill the gap in the recording of expenditures on intangible investment, we need to organize the internal accounting system to accumulate data aligned with management's intentions. Internal accounting systems are organized around a Chart of Accounts as shown in Table 1. This includes an account for each major type of transaction in which the firm is engaged. It represents a listing of all the accounts with each account accompanied by a reference number. An account numbering system is always constructed so that new accounts can be added as necessary and old accounts can be deleted if they become obsolete. To keep the detail out of the general ledger (i.e., the complete set of all accounts and balances), the detail of the accounts (e.g., the full listing and transactions associated with the individual accounts receivable

(debtors) owing the company money) are kept in a subsidiary ledger and only the total appears in the general ledger. Industry organizations and accounting software publish recommended Charts of Accounts in order to establish a standard for best practice and comparability. A cursory look at examples of these indicates the “industrial” fixed-asset firm is well represented with the bulk of the asset accounts relating to items such as furniture and fixtures, equipment, vehicles, buildings, and land.

Table 1 General ledger



For our proposed scheme, to systematically record intangible investment, management will have their reference numbers set up to reflect their strategic intentions, as suggested in Table 2. Rather than focus on recording of primarily purchased tangible investments, this will entail including asset and expense accounts to capture all the expenditures. These expenditures include those which management intends as investment to bring benefits beyond the current accounting period and those that management intends are consumed in the current period. This will entail subsidiary ledgers of detailed accounts with only totals appearing in the general ledger.

Table 2 Suggested form of accounts to capture management investment expenditure

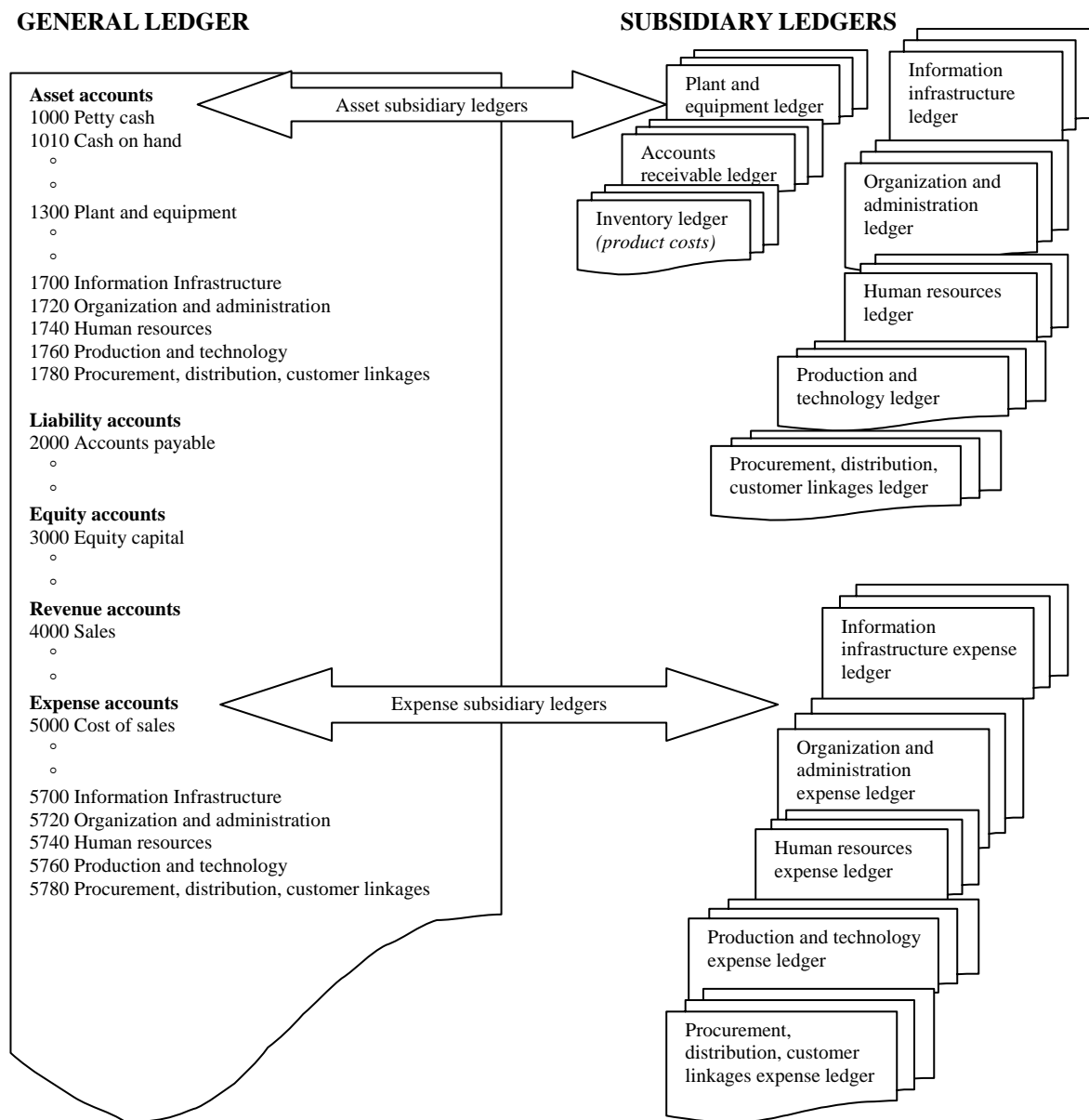


Table 2 illustrates the changes to the Chart of Accounts to accommodate the classifications of expenditures on intangible investments. There are general ledger summary accounts for each classification under both the assets and expenses accounts. This reflects the fact that some intangible investment is shorter lived in effect on earnings than other expenditures on intangible investment.

An ideal classification system would enable managers to compute rates of return to each category of investment to be estimated. To advance on what has been done

before, we need to ensure that the classification we use, and the relation of the components to net income, is supported by prior theory and empirical evidence. To become an economy-wide standard, categories must be widely applicable across industries, firm types, and sizes. The main concern is to disentangle expenditures for current production from investment allocations to the major categories of value creation, thus enabling rates of return on these allocations to be measured. The two related problems are, therefore, those of the investment categories and consistency with strategy.

On the structural issue, for illustrative purposes we employ a modification of the approach developed by Young (1998) as part of an OECD programme to develop a national accounts framework for intangible investment. Young begins by identifying a spread of potential components, along the lines of Table 2 above. In the right hand column in Table 3, we make a start in identifying some of the expenditure lines within each of the core categories.

Table 3: A Framework for Classifying Expenditures on Intangible Investment

Classification ^a	Examples of intangible investment expenditures
Information System Infrastructure	<u>Expenditure on :</u> Wages of staff involved in information systems planning and development, Commercial enterprise systems, Software, Databases, Other Computer Services, Licenses
Production and Technology	<u>Expenditure on</u> Product & process R&D, Product design, engineering and development, Process design, engineering and development, Technology adoption, Quality control systems, Proprietary technology, patents, designs, Licenses
Human Resources	<u>Expenditure on :</u> Wages of HR managers Re-engineering incentive systems, Staff development and training, Staff goal planning and evaluation, Information and knowledge database development, Programs for health and motivation of workforce (eg: labour relations, health care, fitness)
Organization and Administration	<u>Expenditure on :</u> Wages of staff involved in organizational design and management techniques Corporate governance structures, Networks and strategic alliances, Administration structure and systems, Finance systems, Accounting systems.
Procurement, distribution, customer linkages	<u>Expenditure on :</u> Distribution and market research systems, Advertising, Trademarks, brands, Customer lists, subscribers' list, potential customer list, Product certification, quality certificates.

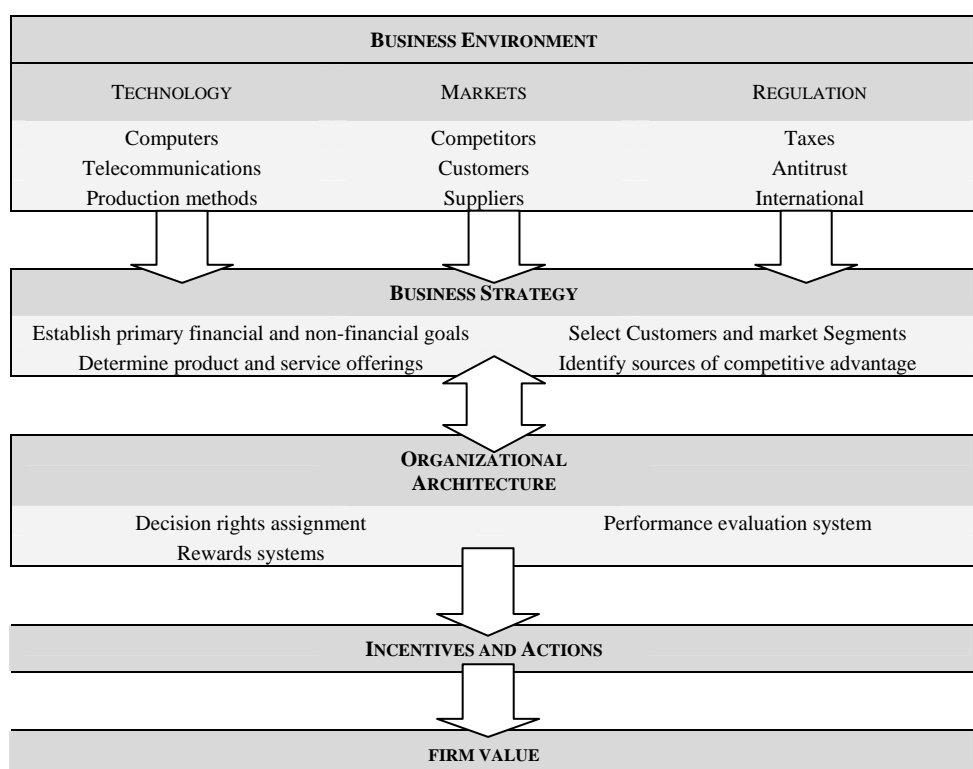
Notes: (a) This classification is adapted from Young (1998). The principal criterion is whether the expenditures are 'long term outlays by firms aimed at improving their future performance (other than by the acquisition of fixed assets)'.

This grouping of intangible investment activities shares with other classifications the problem that it does not functionally link the categories or their individual components into the value creation process. To achieve this functional link, we need a relatively generic business model of the firm. The model needs to bring the different strands together: strategic motivation, value and risk drivers, and their relationship to broad categories of intangible investment and individual components, within a monetary measurement framework. We also need a degree of empirical support for the linkage between investment expenditure lines and value.

A feasible option is the Value Based Management Accounting framework (see Ittner and Larcker, 2001 for a review of this literature).²⁶ As an example of this linkage, Figure 3 provides a model of organisational value creation that brings together many of the elements we have prescribed, including links from the external environment to business strategy, organisational architecture and firm value. However, an explicit treatment of the intangible investment function is lacking in this model.

²⁶ An alternative is an adaptation of the balanced scorecard approach of Kaplan and Norton (1996, 2000), which associates traditional financial variables with non-financial operating measures that can be regarded as drivers of future performance. While the balanced scorecard approach is widely adopted by companies, which might allow some benchmark comparisons, provided the measurement systems are standardized, its qualitative foundation makes the model intractable.

Figure 3: Model of Organizational Architecture*



* Adaptation of Ittner and Larcker (2001, 354, Figure 2), which is an adaptation of Brickley et al (1995)

Underlying this model, at any point of time, is the firm whose characteristics have accumulated from the path history, and with a set of opportunities and constraints.

Not all desirable choices of strategic positioning are available to the firm at this time.

In considering its strategic objectives, the firm's constraints include (Teece 1998):

- The competitive market structure and the firm's position within it;
- The technological environment (reflecting the technological maturity of the technological trajectory dominating the firm's operations and the life cycle stage of the industry sector(s) where it operates);
- Regulation and government policy factors; and
- Financial constraints (credit and capital raising).

Strategy is central to this model. However, strategy is under constant adjustment and revision in light of changing internal and external circumstance. Largely, it is 'emergent' and embodied in a 'crafting' process rather than the formal execution of a plan (Mintzberg, 1985). Thus, with strategy continually evolving, it is not possible, except in the longer term, to identify and judge *ex ante* the success of any particular

strategic choice. If we are concerned about the performance of a current strategic choice, we will have to wait—often for several years—to know what the strategy was and whether it has worked or not—by which time it will almost certainly have evolved. This suggests our business model, to be capable of explicating intangible investment stocks and flows, must be formulated at the operational level of the firm rather than at a higher strategic level.²⁷

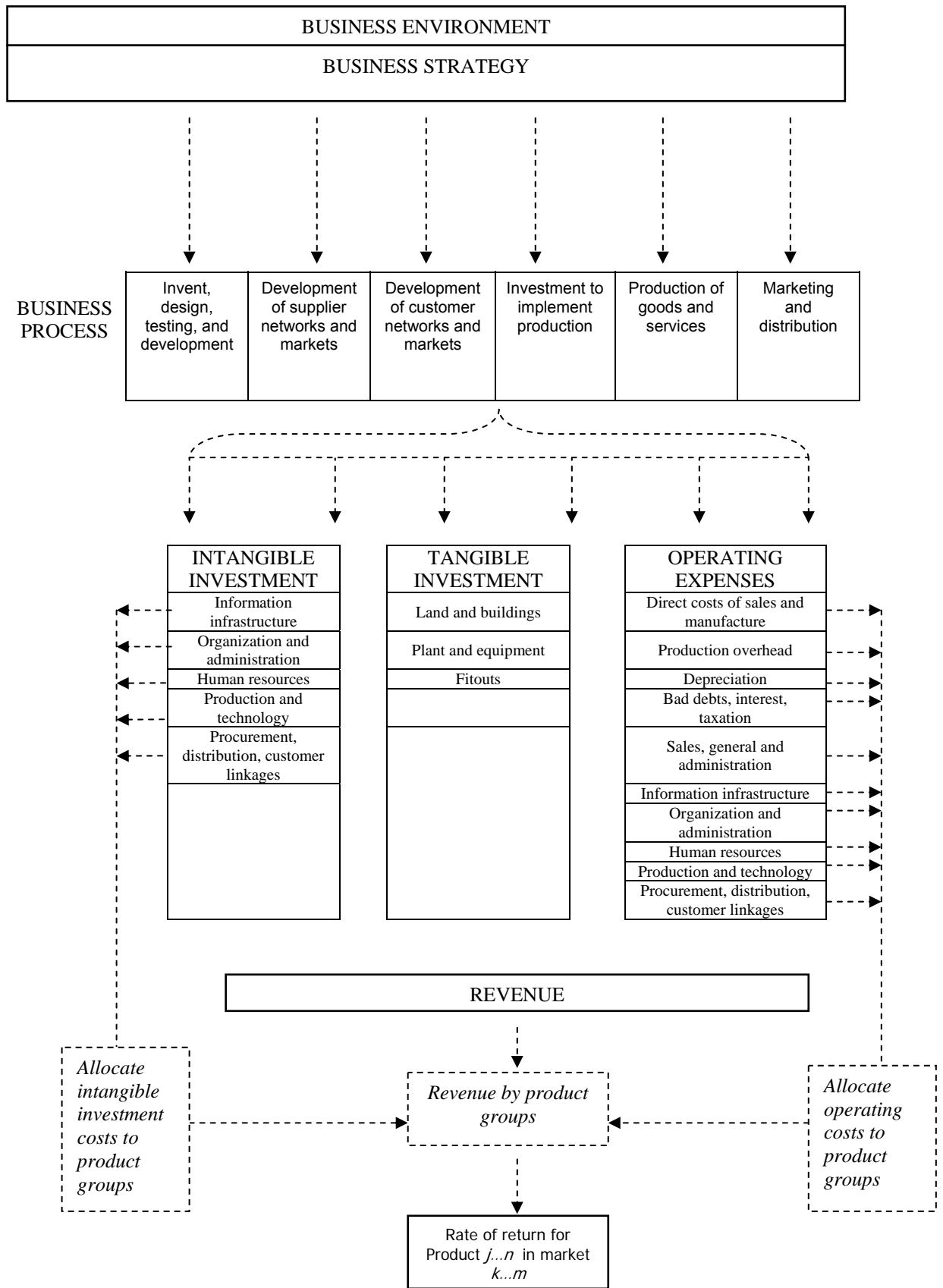
Figure 4 outlines an operational model of cost flows built around our measurement rule for distinguishing intangible and tangible investment. This rule is to define investments in terms of management's *ex ante* intentions of long-term reward and not the uncertainty of the reward. We define individual classes of intangible investment according to Young's (1998) typology (Table 3 above). One additional costs category to consider is operating expenses, which include variable costs of production, sales, and other operating and administrative charges incurred in generating revenue in the particular period.

The arrows in Figure 4 suggest causal links. These links start with the business environment and business strategy from Figure 3 which gives rise to the structure of the firm's business process. For the rate of return analysis, cost flows from intangible investment are allocated proportionately from each class of intangible investment, to each product line. Costs also flow from the firm's operating expenses, which include depreciation charges from tangible investments plus costs of sales, and other operating expenses of the reporting period. The outcome is a matching of revenue with intangible investment and current period expenses, for each product line *j* within

²⁷ The firm's spending patterns—its disposition of resources across markets, functions and activities—is a guide to the impact of strategy. This is revealed either by observing *changes* in the pattern, such as an increase in marketing expenditure or on distribution, or by noting *differences* between a specific firm and the norm for the markets in which it operates.

market k for all $j \dots n$ products and $k \dots m$ markets. The important “unknown” we have proxied for our current purpose is the breakdown of intangible investment into classes of expenditures that are causally related to future growth in revenues. It is a central goal of the intangible metric developed below to provide empirical evidence for informing an operational model of causal relations between intangible investment flows and revenues.

Figure 4: Cost-Flows Model



7. A PROPOSED INTANGIBLE CAPITAL METRIC

In this section, we provide an illustration of how the approach just outlined may be deployed and the kind of results that emerge. Using the indicated method, the analyst will have, for each product, a spreadsheet containing:

1. An allocation of the expenditures on intangible investment for each of the five categories listed in Figure 4 (information infrastructure, organization and administration, human resources, production and technology, procurement, distribution, and customer linkages) for each time period; and
2. Revenues less wages spent on direct or production workers and operating expenses as indicated in Figure 4.

On this second point, the returns to an investment include revenues less any spending on current or variable costs. This requires a careful treatment of labour costs. The wages and salaries of workers whose time is primarily spent creating new products and processes, training other workers or developing their own skills, developing new methods for marketing and distributing products and other activities for which the returns will extend beyond the 12 month period, should be classified as investment expenditure. The wages and salaries of workers whose time is primarily spent in the direct production of goods and services, or other activities for which the returns are achievable within 12 months should be classified as current or variable costs which are netted out of our revenue data (i.e., classified as operating expenses).

Figure 5 provides a graphical representation of this net revenue stream from a specific product together with two types of expenditure on intangible investment, type a (high initial investment) and type b (low initial investment). Net revenue is sales revenue less the fixed and variable cost allocation (wages and input costs).

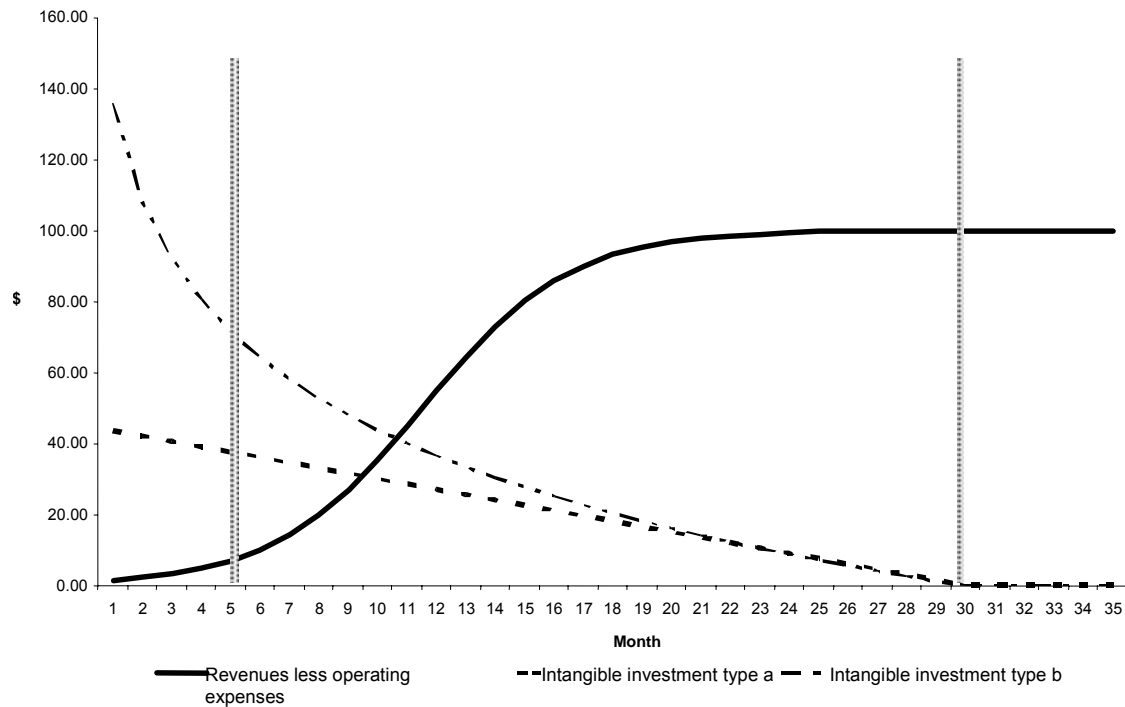


Figure 5: Stylised representation of revenues and expenditures on intangible investment for a specific product

The rate of return to each of the intangible investment types can be calculated at any point in time as the return to the present value of accumulated intangible investment costs from the present value of net sales revenues. These rates of return will vary according to the designated ‘time period’ and how it relates to the point in the life cycle of the product. In the graphical example given above, the estimated rates of return to intangible investment types a and b will be very small – and indeed negative – at month 5 but considerably greater at month 30. This is because there are clearly more accumulated costs than accumulated revenues at month 5. By month 30, however, there has been more time to accumulate revenues. Both estimates of the rate of return are valid, and their significance depends on the context. Clearly, a manager would expect negative rates of return in the early phase of a product’s life, but would be disappointed if this was still the case as the product matured.

Estimating the rates of return requires data from at least as many products as there are intangible investment types. It is then straightforward to estimate the rates of return using non-linear regression estimation.²⁸ The following formula is used for each product type:

The present value of net revenues, *NPR*, is equal to:

$$PVR = R_{-n}(1+r)^n + R_{-n-1}(1+r)^{n-1} + \dots + R_{-1}(1+r) + R_0$$

where *R* is net revenue in each time period from $-n$ to 0 , *r* is the rate of default-free external interest (bill rate). Time ranges from $-n$ (in the past) to 0 (the current period).

The present value of investment type a, *NPIa*, is equal to:

$$PVIa = Ia_{-n}(1+r)^n + Ia_{-n-1}(1+r)^{n-1} + \dots + Ia_{-1}(1+r) + Ia_0$$

where *Ia* is intangible investment expenditure of type a in each time period $-n$ to 0 . A similar expression is used for the present value of intangible investment type b. The rate of return to each investment type, is the γ and λ that equates the *PVR* with *PVIa* + *PVIb*, such that:

$$\begin{aligned} & \left[Ia_{-n}(1+r)^n(1+\gamma)^n + Ia_{-n-1}(1+r)^{n-1}(1+\gamma)^{n-1} + \dots + Ia_{-1}(1+r)(1+\gamma) + Ia_0 \right] + \\ & \left[Ib_{-n}(1+r)^n(1+\lambda)^n + Ib_{-n-1}(1+r)^{n-1}(1+\lambda)^{n-1} + \dots + Ib_{-1}(1+r)(1+\lambda) + Ib_0 \right] = \\ & R_{-n}(1+r)^n + R_{-n-1}(1+r)^{n-1} + \dots + R_{-1}(1+r) + R_0 \end{aligned}$$

or

$$\sum_{t=-n}^0 Ia_t * (1+\gamma)^t + \sum_{t=-n}^0 Ib_t * (1+\lambda)^t = \sum R * \tag{1}$$

²⁸ We are grateful to Alfons Palangkaraya for this suggestion.

where the * represents the present value of each revenue or expenditure item. Equation 1 can be constructed for each time span n which in which the ‘current period’ is represented as 0 . To estimate γ and λ for one or more time periods, we require data from a series of products, suitably transformed into a series of present values where R , r , n , Ia and Ib are all givens. In a hypothetical example, involving five products and two intangible investment types, and streams of net revenues and intangible investment expenditures similar to the example in Figure 5, we derived the following estimates, using a maximum likelihood estimation:

Month	γ	λ
5	-0.41	-0.99
30	0.09	0.04

Not surprisingly, given the shape of the curves in Figure 3, the rates of return at month 5, depicted by the grey vertical line, are large and negative, for this is essentially the build-up investment phase of the life cycle of the good. Once the product has matured, at for example month 30, we find rates of return that are more representative of steady state. The formula can be applied to any temporal patterns of revenues and expenditures.

In our example, we have combined data from products that are the same stage in their life cycle, so the estimates of γ and λ at month 5, all relate to products that are in the build-up investment stage but, by month 30, are in the mature stage. This is not essential, since data from products at different stages of the product life cycle can be combined, but this will affect the interpretation of the estimated values for γ and λ . Again, there is no limit on the number of intangible investment types one can include in the regression, provided there are more products than investment types and there are no difficulties with computational power.

There are several caveats about this method. Most firms will not have data already in this format. This system for measuring the returns to intangible investment is not a quick solution to missing management information. It will take time before estimates can be calculated. Secondly, the issue of which investment expenditure to apply to which revenue stream (product line) will involve a certain amount of managerial judgement.

This is a familiar problem as in the allocation of overheads in multi-activity organisations and should be treated in a parallel manner. Some investment expenditures, arising for example from higher level management labour costs, may be justifiably apportioned evenly over the all revenue streams, while others will fall disproportionately across streams. *When* the first investment payment can be clearly identified with a particular revenue stream will also be a discretionary decision. Thirdly, although the estimation procedure does not permit a given investment to have variable rates of return over time, (γ and λ are constants) it does allow for different rates of return to different types of investment. Investments in organisation and administration may have very long but high rates of return, while investments in procurement, distribution and customer linkages may have short duration but high rates. These rates will be empirically determined.

8. CONCLUSIONS

While the statutory accounting system was created to uphold the probity of companies operations, it also provides the foundations for management accounts and economic data. In other words, organisations customarily design their internal reporting systems to support the preparation of external financial accounting reports (Nathan et al., 1996). Likewise, public statistical agencies build their economic data around existing

company records. Accordingly, how the system is devised, its internal logic and its protocols have a dominant influence on both management operations and public economic policy. Inevitably, we focus our attention on what can be seen or measured. Re-aligning the statutory system with management strategy and economic theory will therefore assist firm operations and the accountability of the firm to the external world.

Managers *are* making decisions about investment in intangibles, whether they explicitly realise this or not, either on more or less acts of faith – or guided by rules of thumb – or by skill in persuasion in organizational politics to win approval for their plans. The current deficiencies in formally accounting for intangible investments has meant that managers either seek out alternative information sources about the composition of the firms' assets and expected future benefits or take decisions about intangibles expenditure with little information about the returns from past expenditures of this type or the likely future returns from such expenditure. In both these cases, decisions about intangible investment are likely to be sub-optimal and will have an unknown impact on performance – defined as profitability or market value of the business.

Our aim in this paper has been to build up from this critical base towards a more explicit method of accounting for, and estimating rates of return on intangible investment expenditures. This has required us to locate an extended chart of accounts and a more fully developed line reporting system for intangible investment expenditures within a business process model directly linked to strategy. We acknowledge that this makes for a rather complex structure of argument, but in terms of seeking to establish the principles on which to develop an acceptable form of

intangible investment accounting and analysis, we believe that the elements included here are all necessary. In doing so, we have used models developed by others (e.g., Young, 1998; Ittner and Larcker 2001) which we believe approximate to what is needed. No doubt, these are capable of further refinement, or alternatives may be proposed that better serve the purpose. We have however been able to carry through the investigation to the point where we can simulate the kind of results that are possible, given suitable data. Therein lies the main remaining problem, for at present the accounting rules and standards provide no incentive for companies to develop an accounting framework yielding the kind of data that would allow our approach to be tested empirically. This is a matter of regret (to us at least), but it should not be allowed to frustrate the search for a better solution to the present imperfections of contemporary understanding and analysis of intangible investment.

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