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Paul Edward Nix

David E. Nix

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Paul E. Nix
MONTANA STATE UNIVERSITY
and
David E. Nix
BOISE STATE UNIVERSITY

A HISTORICAL REVIEW OF THE ACCOUNTING TREATMENT OF RESEARCH AND DEVELOPMENT COSTS

Abstract: This study reviews the literature and the practice of accounting for research and development (R&D) costs from the first reference in 1917 to the current treatment. The conceptual treatment of R&D is compared to current financial accounting rules and explanation of the evolution of the current rules is presented. The economic and social consequences of the current rules which require R&D costs to be expressed are examined. The paper explores possible alternative treatment of R&D costs. As a contrast to U.S. practice, the accounting treatment of R&D costs in other countries is discussed. Given the findings of this paper, a strong case can be made for changing the way that R&D costs are accounted for in the United States.

In today's rapidly changing world which relies increasingly on technology, the investments made in research and development (R&D) are more critical than ever to the economic future of companies and countries. The current financial accounting for R&D costs in the United States is to expense these costs as incurred.¹ While this accounting treatment is certainly question-

¹Attempts have been made by authors such as Higgins (1954) to distinguish between research costs and development costs:

Development costs are usually thought of as being the costs of attempting to convert the results of research to a commercial basis. Since the terms "research" and "development" are often used interchangeably, it is important to distinguish between the two. Research in industry today is usually used in connection with products currently being produced or with new products and is commonly termed "general research." It includes the study of the suitability of materials for specific purposes, the experimental testing of material, the study of manufacturing processes, and techniques and similar research work.

Unless otherwise indicated, which is frequently done, R&D costs are considered as a single cost in this paper. Development costs are frequently referred to

able from a theory standpoint, the expense-as-incurred rule may have a practical consequence of being a disincentive to firms making R&D expenditures. Arguably, as a consequence, the current accounting treatment may hinder the United States' economic position in the global marketplace.

In this paper, the history of accounting for research and development costs is analyzed to determine why the current accounting rules require immediate expensing. Thus, the evolution of accounting rules is traced from 1917 to the present. The reporting environment, issues and investigation conducted by the FASB in 1974 which led to the expense-as-incurred rule is examined. Particularly significant to the thesis of this paper is empirical evidence that was available at the time to counter the FASB's overly pessimistic assessment of the likely outcome of an R&D expenditure. The paper then reviews the more recent pronouncement about accounting for software development costs as a contrast to R&D accounting. Finally the paper examines how other countries account for R&D costs as another contrast to the U.S. practice, despite the similarity to the U.S. accounting problem. Before tracing the historical evolution of the accounting for research and development costs, the paper examines the importance of R&D and the importance of how R&D costs are accounted for in the next section of the paper.

OVERVIEW OF THE R&D ISSUE

Clearly, R&D costs are necessary for the survival of many businesses and are the "engine that drives our economy." Solow [1957] estimated that 90 percent of the per capita increase in output between 1909 and 1949 was caused by technological change. Furthermore, the Committee for Economic Development [Denison, 1962] estimated 36 percent of the increase in output per worker between 1929 and 1957 was caused by research and development, and only 9 percent by capital intensity. Technology is even more pivotal in today's world economy. Thus, the amount of R&D expenditures and how these expendi-

as "applied research" while research with no immediate application is referred to as "pure research." As is the practice in the United States, the following generally do not fall under the definition of accounting for R&D costs: research under contract for others, physical plant for research activities, and costs incurred in the extractive industries.

tures are accounted have important economic impact on the future.

In an unpublished study of 182 research intensive corporations, 62 percent of the respondents spent from 25 percent to 350 percent of profits in R&D costs [Nix, 1972]. Unfortunately, the rate at which U.S. companies are increasing their R&D efforts is declining: "[a] wave of corporate restructuring and a continuing emphasis on short-term profits are pushing R&D spending back into the doldrums of the mid-1970s" [R&D Scoreboard, 1988]. According to the National Science Foundation, the first real decline in R&D expenditures in the past fourteen years occurred in 1989 [Tax Foundation, 1990]. The Industrial Research Institute's Annual R&D Trends Survey indicates that 1992 will see a slowdown in the growth of industrial R&D in the United States [November, 1991].

A major Japanese competitive trade advantage over the U.S. is Japan's heavy emphasis on the process-applied area of R&D while utilizing advanced technology from the West [Mansfield, 1988]. Although this emphasis on process-applied R&D is not likely to change in the near future, Japanese firms now seem to devote about the same percentage of their R&D budget to risky long-term projects as American firms [Mansfield, 1988]. This differs significantly from the early 1970s when Japanese industrial R&D was largely characterized by low-risk and short-term projects [Peck and Tamura, 1976]. Thus, the Japanese are increasingly moving into long-term R&D as the means for creating future innovative products and securing a long-term trade advantage. U.S. firms may be reluctant to invest in long-term R&D because of the expense-as-incurred financial reporting rules. Yet "[c]orporations in the U.S.A. are beginning to realize the intellectual property may be their most valuable asset in competing with Japan" [Dreyfuss, 1987].

The theoretical foundation for the current requirement of expensing R&D costs as incurred certainly may be questioned. The accounting model with the annual measurement of income may be best suited for an agrarian economy characterized by manual labor and a static technology. However, income may not be as easily or exactly measured in an industrialized economy characterized by long-lived capital assets and a rapidly changing technology. A longer time perspective than the annual accounting measurement cycle may be required to measure performance of many companies which sell technology based products.

In regard to the financial treatment of R&D costs, current practice may be defective in the following respects: (1) matching of revenue and associated costs often is not achieved, (2) R&D is a major asset but may not be presented as such, and (3) disclosure of R&D costs has not kept pace with its increasing importance. In short, methods used in accounting for R&D costs may not present a realistic picture of economic consequences of the firm's research and operating activities.

Accounting income is estimated by matching expenses and revenues over the appropriate time period with cost allocation being essential to the matching process. In a rapidly changing technology, however, the useful lives of capital assets become inordinately difficult to estimate. Technology may render a plant obsolete many years before it wears out. The lives of many assets are determined by technological change. Therefore, cost allocation to determine annual profits becomes even more difficult, yet more important, given a rapidly changing technology. If capital assets are currently expensed, this allocation distorts present income even more than capitalization [Thomas, 1969]. Imagine expensing a multimillion dollar plant during construction. Current accounting rules for R&D costs have the same effect because intangible assets arising from research costs are expensed in the year they are incurred. As Bierman and Dukes conclude, "[t]he result of expensing R&D may distort corporate decision making and lead to faulty measurement of income and changes in income through time. Business firms do not generally begin new product or process development projects until the principal technical uncertainties have been resolved" [Bierman and Dukes, 1975].

A study of 200 companies on the *Fortune 500* list suggested that new ventures need, on average, eight years before they reach profitability [Biggadike, 1979]. Therefore, it may be that many R&D expenditures fit the FASB definition of an asset, like expenditures for capital equipment which are required to be capitalized. This is to say that R&D expenditures are made with the expectation of future benefits and are subject to reasonable measurement. Because R&D costs are incurred to secure future benefits, expenditures for R&D costs should be capitalized as assets and allocated to expense in the periods in which they help generate revenues.

If one accepts the hypothesis that capital markets are efficient in the procuring of information, "[d]isclosure of the

amount of research and development expenditures is an extremely important first step" [Bierman and Dukes, 1975]. As suggested by Drebin [1966], either cost-allocation procedures or current market values are preferable to expensing-as-incurred for reporting R&D costs.

In support of capitalization of R&D costs and the matching principle, though the timing of benefits from R&D costs is uncertain, an appropriate allocation arguably is better than an immediate write-off. A subjective estimate of the value is better than an arbitrary write-off to no value [Drebin, 1966]. However, for such subjective estimates to be an improvement, a considerable amount of attention would have to be given in the development of industry guidelines. An analysis into what type(s) of R&D should be capitalized and at what stage of completion R&D should be capitalized would be necessary. Such efforts could result in a much better matching of these costs and related revenue. Other researchers indicate that the current expense treatment for R&D costs may be in conflict with the matching principle of financial reporting [Bierman and Dukes, 1975].

Historically, the accounting for R&D costs has ranged from requiring that all R&D costs be expensed in the year incurred (generally the current practice in the United States) to that of deferring and thereby allocating and matching R&D costs to the periods to which they help generate revenue. Although tax considerations should not be allowed to dictate accounting theory, the income tax aspects of accounting for R&D have had an impact on the choice of methods used to expense R&D costs. Prior to 1954, tax law required that the deduction of R&D costs conform to the timing of the reported expense in the financial statements. Therefore, by immediately expensing R&D costs in the period incurred, the corporation received an immediate write-off for tax purposes [Raby, 1964]. After 1954, corporations could get an immediate tax deduction for R&D expenditures whether expensed or capitalized for financial reporting purposes. Despite the ability to get the deduction irrespective of accounting treatment, after 1954 most companies continued the practice of expensing R&D costs for accounting purposes.

Although the choice of methods in financial reporting of R&D costs is no longer allowed, there seems to be little complaint from management that R&D costs ought to be capitalized and amortized, rather than expensed. The apparent satisfaction of management with the current accounting rule of "expense-as-

incurred” may be due to the fear that if financial accounting rules allow or require capitalization of R&D costs, the tax rules might be changed and the immediate write-off for tax purposes may be lost. The lack of groundswell support by management for changing the accounting for R&D costs may also be due to concerns over the problem that could be created if capitalized R&D costs suddenly must be written-off because the research proved unproductive, and, as a result, a large loss occurred. Managers also seem to be concerned that capitalizing R&D costs may complicate consolidated reporting, especially when entities with capitalized R&D costs are acquired or disposed. The satisfaction of corporate management with the expensing of R&D costs may also be due to the rule giving management the ability “to manage income” of a given accounting period by cutting or accelerating R&D expenditures. Finally, the current practice of expensing R&D costs may be preferred by management because managers feel that the company currently has the freedom to extensively disclose (or alternatively not to extensively disclose) in the notes to the financial statements the information that management wants to convey to the investor about R&D activities.

Given this background about R&D, the problem with the current accounting treatment and the apparent lack of demand for change, the history of accounting for R&D costs is traced in the sections that follow. Exhibit I contains a historical overview of the major events in R&D accounting. These events are discussed in detail in the sections that follow.

THE HISTORICAL RECORD (1917 TO PRESENT)

A search of accounting literature reveals no reference to accounting for R&D costs prior to 1917. However, in 1917 the Federal Reserve Board [*Federal Reserve Bulletin*, 1917] accepted R&D as a deferred charge in published financial statements. The Federal Reserve Board reaffirmed this position in 1929 [*Federal Reserve Bulletin*, 1929].

At approximately the same time other institutions, such as the National Association of Cost Accountants, promoted the same deferral treatment. In the 1924 edition of the *National Association of Cost Accountant's Bulletin*, the following statement is found:

It is perfectly proper to carry (the cost of developing a new article or line) as a deferred account, and an esti-

Exhibit I**A Historical Summary of the Financial Accounting for R&D in the United States**

1917	Federal Reserve Board — Deferral supported.
1924	NACA — Deferral supported.
1926	NACA — Deferral reaffirmed.
1929	Federal Reserve Board — Deferral reaffirmed.
1920-1930s	IRS — Deferral preferred.
1954	AICPA — Deferral supported only if there is a reasonable connection to future operations.
Prior to 1954	Tax law allowed expenditures to be expensed only when the same procedure was followed in the financial statements.
1954	Tax legislation allows direct write-off regardless of the financial accounting treatment.
1960s	Gellein — Disclosure varies considerably.
1964	Raby — Majority of companies expense as incurred because of established practice prior to 1954 tax legislation.
1972	APB No. 22 and SEC No. 125 — Mandatory disclosure in the financial statements and annual 10K report.
1975	SFAS No. 2 (1974) — Direct write-off mandated. Disclosure required. Expenditures defined.
1985	SFAS No. 86 — Later capitalization and subsequent write-off allowed on computer software expenditures with proven feasibility.
1985 to Present	Direct write-off required. Later capitalization and subsequent write-off allowed on computer software expenditures with proven feasibility. Disclosure varies considerably.

mate should be made to ascertain the number of units or volume of sale or units, as well as an estimate of the length of time over which this development will be spread [1924].

But,

. . . experimenting (covering the current or minor experimenting that is continual in most manufacturing establishments) should be charged against current operations each month as the money is expended and assessed against the lines of products affected [1924].

In 1926, the National Association of Cost Accountants again stated that it was acceptable to capitalize the cost of developing a new product (to defer R&D expenses) “. . . if you are starting out with a new product in which you have a very definite knowl-

edge that there is a field for it, and you are going to spend a lot of money, and you know it is going to come back to you" [1926]. At its 1954 annual meeting, the American Institute of Certified Public Accountants supported the deferral treatment *only* if future benefits were definite: "Development expenses should be deferred only in those cases where they have a reasonable connection with future operations" [Higgins, 1954]. Thus, accounting organizations had generally supported the deferral treatment for research and development expenditures. It may be seen, however, that the definition of what could be deferred became, over time, more conservative and restrictive. Paton [1955] supported the deferral treatment in an accounting text:

On the other hand, whenever research and related costs are incurred in substantial amount on a particular project which is expected to result in a valuable new process, perhaps patentable, there is much to be said for deferring followed by systematic absorption in later years.

Perhaps the most influential institution affecting the accounting treatment of research and development costs has been the Internal Revenue Service. The Internal Revenue Service tax policy in the 1920s and 1930s favored the deferral treatment of research and development costs. From the beginning, early tax court decisions and accounting literature supported research and development cost deferral; but scientists and economists supported immediate deduction for tax purposes as a means to stimulate research and development.

Businessmen, constantly on the alert for immediate benefits, increased political pressure on Congress to allow the immediate deduction of R&D costs for tax purposes. However, the tax law prior to 1954 allowed the current expensing of research and development only when the same procedure was followed in the financial statement. Thus, before 1954, business firms may have switched from deferral to current expensing of research and development in published financial statements to take advantage of the tax benefits of immediate deduction.

In 1954, Congress passed tax legislation which allowed for the immediate deduction of R&D costs as they were incurred; these deductions could be taken irrespective of the financial accounting treatment of these costs. Thus there was no longer a tax requirement that R&D costs be treated for tax purposes ac-

ording to the treatment on the financial statements. Interestingly, in 1954 Congress merely removed the tax-financial accounting conformity requirement. Congress still permitted the taxpayer to elect to capitalize and amortize R&D costs for tax purposes or to deduct these costs as incurred. This tax election for R&D costs continues today.

The following quotation from the *Senate Finance Committee Report on the Internal Revenue Code of 1954* illustrates the intent of Congress in making the tax law change:

No specific treatment is authorized by present law for research and experimental expenditures. To the extent that they are ordinary and necessary they are deductible; to the extent that they are capital in nature they are to be capitalized and amortized over useful life. Losses are permitted where amounts have been capitalized in connection with abandoned projects, and recovery through amortization is provided where useful life of these capital items is determinable, as in the case of a patent. However, where projects are not abandoned and where a useful life cannot definitely be determined, taxpayers have had no means of amortizing research expenditures.

To eliminate uncertainty and to encourage taxpayers to carry on research and experimentation the House and your Committee's bill provide that these expenditures, incurred subsequent to December 31, 1953, may, at the option of the taxpayer, be treated as deductible expenses. It also provides that a taxpayer may elect to capitalize such expenditures and if no other means of amortization is provided, may write them off over a period of not less than 60 months, beginning with the month in which benefits are first realized. [Higgins, 1954].

Raby logically asserts that the majority of companies were probably currently expensing research and development in the mid-sixties because of income tax law prior to 1954. "Perhaps a major force underlying this accounting treatment is that before 1954 what was done in the books and financial statements controlled what was allowed to be done on tax returns" [Raby, August 1964]. Furthermore, once this practice was established, it was continued regardless of the post-1954 tax impact. Raby [August 1964] states, "[a]s a consequence, companies quite logically set up [the] practice of expensing research expenditures, and

this practice has continued since, even though tax justification for doing so has ceased to exist.”

Indeed, a survey of 244 companies in the 1960s [Gellein and Newman, 1973] disclosed that the common practice was to currently expense research and development expenditures. The investigation also revealed 60 percent of the companies disclosed the dollar amount of research and development in some way, but only 10 percent disclosed the accounting treatment in published financial statements. Therefore, comparability of financial statements was difficult.

Acceptance of the current expense treatment for research and development expenditures in accounting practice is revealed in the accounting literature. Braithwaite [1967] said in an article in *Accountancy*, “The [British] auditor . . . will take a jaundiced attitude to any attempt to capitalize research expenditures on the grounds of expected future benefits to the company.” Thus, auditors were most comfortable when research and development costs were expensed; but Braithwaite stated further, “[t]he auditor . . . may agree that in the long run a research program necessarily must be judged by its overall fruitfulness.” The contradiction in Braithwaite’s statements about current expensing of research and development and future benefits from research and development is obvious.

Auditors have an incentive to support the immediate write-off of research and development expenditures to avoid unnecessary audit risk. Prior to the *SFAS No. 2* [1974] expense requirement, business firms had (and still have) an incentive to capitalize research costs having little future benefit so current earnings would be more impressive. When it became apparent to the auditor and to others that these costs had no future benefit, they were written off. If the write-off caused sharp reduction in profits and investors saw their investments decline in value, the auditor might face investor liability suits for being a party to misleading prior financial statements. Thus, much of the support for expensing R&D costs as incurred came from auditors who otherwise might face difficulty in evaluating R&D costs.

Prior to *SFAS No. 2* [1974], four basic questions regarding the official accounting treatment of R&D in financial statements remained unanswered: (1) What activities should be included in R&D? (2) What portion, if any, of the costs related to these R&D activities should be deferred? (3) How should these deferred costs be amortized? (4) How should R&D be disclosed in the

financial statements? These unanswered questions made the comparability of R&D information between companies and, for a company, between years very difficult. Also, these questions made current and future financial accounting for R&D very difficult.

Prior to *SFAS No. 2*, R&D expenditures were sometimes classified as separate expenses on the income statement. Some companies included R&D expenses with other expenses, yet other companies included R&D in the cost of goods sold. Also, management had the flexibility of either currently expensing R&D or capitalizing R&D and writing it off over future time periods. Large write-offs of capitalized R&D costs would occur unexpectedly when it became apparent that the expenditures no longer had a future benefit. The variety of accounting treatments of R&D costs led to criticism over the lack of uniform accounting.

Because of criticism over the variety of methods of accounting for R&D, action was taken by the Accounting Principles Board (APB) and the Securities and Exchange Commission (SEC) in 1972. The *APB Opinion No. 22* [1972] made the disclosure of R&D expenditures in financial statements mandatory. Also, the SEC required the reporting of R&D in the Annual 10-K Report. Although badly needed, the disclosure requirements of the APB and the SEC did not solve the problem of the "proper" accounting treatment for R&D costs in financial reporting. However, these disclosures made apparent to financial statement users the significance of R&D expenditures in relationship to accounting measurements.

A BRIEF SUMMARY AND CRITIQUE OF *SFAS NO. 2*, ACCOUNTING FOR RESEARCH AND DEVELOPMENT COSTS

As of January 1975, the Financial Accounting Standards Board (FASB) required the expensing of all R&D expenditures during the year incurred. The two exceptions to this rule are (1) R&D under contract for others, and (2) plant and equipment (an R&D lab) which has alternative future uses. A further exception was made by the *SFAS No. 86* [1985] for the capitalization of computer software for which technological feasibility has been established.

In *SFAS No. 2*, FASB recognized the problems associated with the accounting for R&D costs. However, the FASB did an inadequate amount of research on the problem before making

its decision in 1974: “[t]he FASB did not undertake a major research effort for the project. The FASB staff interviewed a limited number of selected financial analysts and commercial bankers and reviewed a substantial number of published financial statements” [*SFAS No. 2, Para. 20, 1974*]. Consequently, the effect of the current expense treatment on the total dollar amount of R&D was not carefully considered. Thus, the now established practice of currently expensing R&D costs may not be appropriate for all investments or business firms. The current expense-as-incurred practice may well have reduced R&D costs in total and caused a shift from “pure” to “applied” R&D. The need to maintain current reported profits and earnings per share may have resulted in a change in type and amount of R&D expenditures.

The major objectives of the Statement were (1) to provide more uniformity in accounting reporting for R&D; and (2) to provide useful financial information about R&D. *FASB Statement No. 2* defines R&D activities, identifies costs associated with these activities, and specifies the accounting treatment and disclosure of these costs. It specifically excludes certain activities found only in the extractive industries, but includes R&D in other industries.

In *Statement No. 2*, FASB discussed four alternatives in accounting for R&D. These four alternatives are:

1. Charge all costs to expense when incurred;
2. Capitalize all costs when incurred;
3. Capitalize costs when incurred if specified conditions are fulfilled and charge all other costs to expense;
4. Accumulate all costs in a special category until the existence of future benefits can be determined [*SFAS No. 2, 1974*].

Accounting theory supports alternative three, which is to:

... capitalize costs when incurred if specified conditions are fulfilled and charge all other costs to expense” [*SFAS No. 2, 1974*]. Consequently, when research and development expenditures are expected to benefit future time periods, they should be capitalized and amortized over the periods benefited. This capitalization and future write-off is consistent with the matching concept as defined by the Financial Accounting Standards Board. The pronouncement refers to matching as, “identifying, measuring, and relating revenues and ex-

penses of an enterprise for an accounting period” [FASB, 1974].

However, the FASB still chose the first alternative which is, “. . . charge all costs to expense when incurred” [1974]. As support for this decision, the FASB utilized research studies that emphasized a high failure rate for R&D. For example, “. . . one study of a number of industries found that an average of less than 2 percent of new product development projects were commercially successful” [Higgins, 1954]. Another study estimated exceedingly high new product failure rates, ranging from 30 to 90 percent. In all likelihood, these studies were not and are not representative of typical research and development projects. Other studies indicated more optimistic results. Mansfield [May, 1972] found more than 75 percent of the projects he examined had estimated probabilities of success of 80 percent or greater. Forty-four percent of these projects were technically successful, and only 16 percent were technically unsuccessful. Scherer [1970] attributes this high success ratio to the fact that “. . . business firms do not, as a rule, begin new product or process development until the principle technical difficulties have been whittled down through inexpensive research, conducted either by their own personnel or by outsiders.” Thus, R&D success is much higher than inferred in the Board’s decision.

The FASB [1974] also states, “. . . a direct relationship between R&D and specific future revenue generally has not been demonstrated.” However, as previously stated, many projects are successful and future revenue is directly related to them. Numerous studies [Minasian, May 1969] have been undertaken to show this relationship; they have had some success in linking R&D activity with future revenue amounts, even though the studies encountered data problems. Most of these studies use the number of patents or number of employees as statistical data, rather than the dollar value spent on R&D. Additional study of the outcomes of research, with actual R&D expenditure data, may prove enlightening to accounting rule makers.

The FASB [1974] indicated, “. . . at the time most R&D costs are incurred, the future benefits are, at the most, uncertain.” This statement implies there is no economic resource creation. If no future benefits are generated, it would certainly be irrational for a firm to undertake an R&D project. However, many studies show the marginal rate of return on R&D is either

comparable to or greater than investment return on the capital expenditures. Denison [1962] calculated the rate of return on R&D to be about the same as for plant and equipment expenditures, but he assumed no time lag. The return rate for R&D investment would have been much greater with a time lag. Grilich [1964] found the rate of return for investment in agricultural research to be between 35 and 170 percent. More specifically, Mansfield [May 1972] estimates the marginal rate of return on R&D in the petroleum industry to be over 40 percent, while in the chemical industry, Minasian [May 1969] estimates a 50 percent marginal rate of return on R&D.

Referring to the total economy, Fellner [1970] estimates the rate of return on R&D to be in excess of 18 percent. Assuming a static technology, 18 percent is much greater than the marginal rate of return from plant and equipment. Consequently, contrary to the FASB opinion, there was tangible evidence of resource generation at the time of the R&D expenditure. Perhaps a final irony can be found in the following statement from the FASB. R&D should not be capitalized even when future benefits are known simply because they “. . . cannot be measured with a reasonable degree of accuracy . . .” [*SFAS No. 2, 1974*]. Following this reasoning, fixed assets, such as plant and equipment, would not be capitalized because the future productivity of fixed assets is subject to uncertain marketing conditions and rapid technology change. Who can estimate accurately the business life of fixed assets? For example, nuclear power plants may be closed on a moment’s notice. Under the same rationale, “goodwill” in a purchase of a business would never be shown on the balance sheet and the intangible drilling cost of a “wild-cat” oil well, whether “wet” or “dry” can never be an asset. Thus, in comparison to other costs that are capitalized, R&D costs do not seem to be of any greater uncertainty or risk.

Given the reasoning behind the FASB’s decision, it may be concluded that *SFAS No. 2* had, at best, a questionable theoretical foundation in support for its treatment of R&D costs.

THE HISTORICAL RECORD FOLLOWING THE 1974 ENACTMENT OF *SFAS NO. 2*

A considerable amount of financial accounting research was conducted subsequent to the 1974 issuance of *SFAS No. 2* to determine the impact, if any, of the expense-as-incurred requirement on R&D expenditures. A central thrust of this re-

search concerned whether the expense-as-incurred rule might result in decreased corporate spending on R&D in order to maintain profit levels.

The contradictory findings of much of this research were published in a special supplement to the 1980 *Journal of Accounting Research*. Horwitz and Kolodny [1980] concluded that the rule did, in some cases, reduce R&D expenditure. "We conclude that the evidence supports the premise that the expense only rule caused a relative decline in R&D outlays for small high technology firms which had primarily used the deferred method of measurement."

Other researchers such as Dukes, Dyckman and Elliott [1980] concluded that *SFAS No. 2* did not have any effect on R&D expenditures: "all three sets of tests fail to support an effect on research and development expenditures attributable to *SFAS No. 2*." Wolfson [1980] notes that Horwitz and Kolodny provided ". . . no evidence of market inefficiencies occurring as a result of *SFAS No. 2*." Vigeland [1981] reports that ". . . no market reaction was observed." In other words, lacking evidence to the contrary, we must conclude investors are aware of the impact of *SFAS No. 2* on reported earnings. This suggests that the price of a company's stock would not decrease in response to the effect of *SFAS No. 2* on reported earnings, and the company would not be motivated to reduce R&D expenditures as a result of the rule.

Most researchers would probably agree that we do not understand the R&D decision making process. Authors such as Ball [1980] state there is an almost complete absence of theory on the determination of R&D expenditure and accounting policy choice. Marshall [1980] states, "[t]he process of determining R&D expenditures, including the choice and role of accounting method is so complex that designs such as those used by Dukes, *et. al.*, and Horwitz and Kolodny are incapable of producing creditable results." If nothing else, the research of the late 1970s has forced us to acknowledge we may draw no firm conclusions in regard to the impact of *SFAS No. 2* on R&D expenditures.

Although additional research was conducted in the 1980s regarding the impact of *SFAS No. 2*, few, if any, conclusive findings were made. In 1984, Elliott, Richardson, Dyckman and Dukes attempted to reconcile the results of the 1980 Horwitz and Kolodny study with their study [1980] which did not show a

SFAS No. 2 effect. The results of the 1984 study were again inconclusive. Interestingly, this study did show a relative decline in R&D expenditures prior to the 1974 issuance of *SFAS No. 2*. Elliott, Richardson, Dyckman and Duke [1984] suggest that we cannot conclude that *SFAS No. 2* caused changes in R&D expenditures. In a 1984 investigation of managers' adoptions to *SFAS No. 2*, Selto and Clouse also found inconclusive results in regard to the effect of the FASB mandated expensing of R&D requirement. However, Daley and Vigeland [1983] observed that ". . . R&D capitalizing firms were more highly levered, employed more public debt, and had a higher ratio of dividends to unrestricted retained earnings, and were smaller in size than R&D expensing firms." This finding hints that the FASB requirement had an economic impact on these smaller R&D firms.

A 1987 study of R&D management and corporate financial policy by Guerard, Bean and Andrews analyzed the relationship of R&D investment, dividends and new debt financing decisions. Not surprisingly, they found significant relationships among these variables. They concluded that changes in these variables occurred simultaneously and could not be considered independently. In regard to the effect of *SFAS No. 2*, the efficient market hypothesis that stock prices reported the impact of R&D expenditures whether they were capitalized or not was neither confirmed nor denied.

Horwitz and Normolle examined the effect that *SFAS No. 2* had on small technology firms in securing R&D awards from federal agencies [1989]. The study explored whether the detrimental effect of the expense-as-incurred requirement on small firms' financial ratios might make the firms ineligible for governmental R&D contracts. As a result of *SFAS No. 2*, the financial ratios of these companies were negatively affected, but no evidence was found that the expensing requirement reduced the amount of R&D awards by federal agencies to small research intensive companies.

DISCLOSURE OF RESEARCH AND DEVELOPMENT EXPENDITURES CURRENT PRACTICE

Disclosure of R&D expenditures is, today, not unlike that existing prior to 1975 when *SFAS No. 2* was implemented. Corporations, in their annual reports, display a wide variety of information regarding R&D expenditures. Some companies provide no disclosure, others offer considerable detail. The annual

dollar amount of R&D by year is often separately disclosed on comparative income statements. Occasionally, either in the notes or in management's discussion of corporate activities, information is provided for R&D such as percentage of operating revenue, percentage change from the previous year, number of full-time R&D employees, and directions the R&D effort is taking. It appears that management of these companies disclose what they want with regard to the firm's R&D activities.

Although companies are required to expense R&D costs in the year incurred, there is still considerable latitude in what management discloses to investors. It seems that companies in which R&D activities reflect favorably upon them take ample opportunity to disclose such; other companies for various reasons provide little or no information regarding their R&D efforts. Thus, irrespective of the required current expensing of R&D, stockholders are frequently not well informed about R&D efforts.

A BRIEF SUMMARY AND CRITIQUE OF SFAS NO. 86 ACCOUNTING FOR THE COSTS OF COMPUTER SOFTWARE TO BE SOLD, LEASED OR OTHERWISE MARKETED

The costs of developing computer software that is to be marketed are similar to R&D costs. In both cases, the costs are mainly salaries of personnel who are engaged in the projects. Software development costs and R&D costs are also somewhat similar as to uncertainty of outcomes, (risks and revenue amounts) and as to long periods of time between expenditures and sales. Given these similarities, it is interesting to note the contrast in accounting for the costs related to developing computer software of software vendors to costs of R&D of a drug manufacturer, biotechnology firm or even to the R&D costs of a computer hardware manufacturer.

Before the issuance of *SFAS No. 86* in 1985, the financial statements of computer software companies provided inadequate disclosure about software development costs, and comparisons between companies in the industry were hampered by the variety of accounting practices for software development costs. Thus, the latter problem was very similar to the R&D cost situation prior to *SFAS No. 2*, while the former problem is still unresolved with regard to R&D today.

SFAS No. 86 [1985] addressed the issue of whether software producers should expense development costs as they are in-

curred or capitalize them on the theory that the cost is creating a productive asset. The potential impact of this issue is reflected in the fact that the computer software industry spent \$7 billion in 1985 [Chakravarty and Kolsek]. *SFAS No. 86* requires software producers to expense development costs while the product is still in the R&D phase; but as soon as the product is "technologically feasible," companies *must* capitalize any further development costs and amortize them over the life of the product. The practical problem in applying this statement is determining at what point in time a product becomes technologically feasible. This is particularly a complex problem in the case of computer software which is often redesigned.

SFAS No. 86's treatment of software development costs follows the conceptual definition of an asset in financial accounting: an asset is a cost which benefits a future accounting period. However, the Statement did not resolve the problem of the lack of inter-company comparability of financial statements. For instance, in 1984 IBM capitalized 67 percent of its investment in software products while other companies reported capitalizing between 3 to 25 percent of their software development costs [Chakravarty and Koseika]. Thus it appears that *SFAS No. 86* may not accomplish its intended purposes of providing better disclosure and making software companies' financial statements more comparable. The practical effect of the statement was to allow software companies to determine when a product's asset life begins. The software firm must make this critical accounting decision to determine what costs to capitalize for each software development project. As a result, there is still difficulty in comparing companies within the industry from their financial statements.

The experience with capitalization of software development costs is instructive if changes to the accounting for R&D costs are ever considered. Even though being more conceptually correct, the capitalization of R&D costs will not automatically produce pragmatic improvement. Indeed, less comparability between companies financial statements could result. If capitalization of R&D costs became the financial accounting rule, there would probably be a requirement that a project reach "technological feasibility" before costs could be capitalized. Again, like the experience with software development costs, such a vague rule causes a wide range of interpretations and could cause the problem of lack of comparability of financial statements be-

tween R&D firms as well. Thus it is important, if changes to the accounting for R&D are made to allow capitalization of costs, that classification criteria be set forth as well to specify precisely when capitalization would begin in an R&D project.

THE HISTORICAL RECORD OF FINANCIAL ACCOUNTING FOR R&D COSTS IN OTHER SELECTED COUNTRIES

In other English-speaking nations, i.e., Australia, Canada, Great Britain, Ireland, etc., the capitalization of at least some R&D costs is permitted. This practice usually has caused a myriad of problems in defining research development and various types of research such as pure research versus applied. As with the "technologically feasible" U.S. requirement for software development costs, these distinctions are important to determine which costs are capitalized from those that are expensed. As with the U.S. software costs, interpreting the rules and applying the distinctions can vary from company to company. Thus, accounting for R&D costs, even within one country, can vary considerably. As will be examined in this section, there is great variation and problems with the accounting treatment around the globe.

In 1983, the Australian accounting profession issued the standard "Accounting for Research and Development Costs" (AAS No. 13). The objectives of the standard were similar to those of SFAS No. 2 issued in 1974: to provide useful information regarding R&D costs and to reduce the number of alternative accounting practices for R&D expenditures [Carnegie and Turner, 1983].

Attempts were made in AAS No. 13 to distinguish between research and development costs and between basic and applied research. The definitions, not surprisingly, were difficult to work with as observed in the following passage taken from AAS No. 13:

4(a) Research means planned investigation undertaken with the hope of gaining new scientific or technical knowledge and understanding which will be useful in developing a new product or service (hereinafter *product*), or a new process or technique (hereinafter *process*), or in bringing about a significant improvement to an existing product or process.

4(b) Development means the translation of research findings or other knowledge into a plan or design for a

new product or process or for a significant improvement to an existing product or process.

AAS No. 13 further divided research into basic research and applied research. Basic research was defined as “. . . original investigation directed primarily towards the advancement of knowledge,” while applied research was defined as “. . . original investigation directed primarily towards solving recognized practical problems.” This distinction was made to assist the practitioner in evaluating the classification of specific costs. From these definitions, it appears distinguishing between development costs and applied research costs is an enigmatic chore.

AAS No. 13 allows “selective capitalization” in accounting for R&D costs; that is, some R&D costs may be capitalized or expensed in the period incurred while others must be currently expensed. In general, both applied research and development costs *could* be capitalized. Basic or pure research is required to be expensed in the period incurred. Although the theory behind AAS No. 13 is sound, the practical difficulties in defining and distinguishing between research costs (pure and applied) and development costs limit the usefulness of the approach.

In Canada, there is a very basic difference between Canadian and United States’ accounting rules for R&D costs; in Canada development costs *should* be deferred to future periods if all of the following criteria are satisfied:

- (a) the product or process is clearly defined and the costs attributable thereto can be identified;
- (b) the technical feasibility of the product or process has been established;
- (c) the management of the enterprise has indicated its intention to produce and market, or use, the product or process;
- (d) the future market for the product or process is clearly defined or, if it is to be used internally rather than sold, its usefulness to the enterprise has been established; and
- (e) adequate resources exist, or are expected to be available, to complete the project. (*CICA Handbook*, Aug. 1978).

By contrast, development costs in the United States must be expensed in the period incurred.

In Great Britain, the accounting profession has taken the position that both pure and applied research should be expensed in the period incurred [SSAP No. 13 revised, Jan. 1989].

However, the British Accounting rules distinguish the development of new products and services from pure and applied research; these development costs, under certain circumstances, should be deferred. It is the authors' opinion these distinctions (which possess the same difficulties as those used in Australia) are very difficult to define and utilize.

The reasoning behind the British requirements of expensing pure and applied research is that these costs are regarded as part of continuing operations required to maintain a company's competitive position. Therefore, these costs cannot be placed on the balance sheet as assets, but should be expensed in the period incurred. Also required is a significant amount of disclosure about the R&D activities of the period. If development costs meet the rigid criteria specified in *SSAP No. 13*, they are defined as intangible assets for balance sheet purposes and are amortized as expense in revenue generation or written off immediately if found to be worthless.

The International Accounting Standards Committee takes the position that research and development costs should usually be charged to expense in the period in which they are incurred [1980]. However, notes the Committee, ". . . if it can be demonstrated that the product or process is technically and commercially feasible and that the enterprise has adequate resources to enable the product or process to be marketed—it *may be* appropriate to defer the costs of development activities to future periods."

It can be seen that the United States and other nations share the difficulty of accounting for R&D costs. Despite problems of implementation and lack of comparability of financial statements in some cases, other nations are more sophisticated in distinguishing between types and stages of R&D. These countries specify accounting treatment according to the type of R&D costs. Perhaps, U.S. accounting should consider adopting some of the approaches used in these countries.

SUMMARY

Since research and development expenditures are significant in amount, the historical accounting treatment of this important cost was investigated. Historical research reveals that accounting organizations, the Internal Revenue Service, and accounting practice originally supported capitalization and future amortization of R&D expenditures. However, economic and so-

cial forces exerted pressure for immediate write-off of R&D costs because of the income tax advantage.

The Internal Revenue Service yielded to these forces but required that R&D costs be currently expensed in published financial statements when immediate write-off for tax purposes was to be allowed. This tax requirement was reversed in 1954, but the current expensing technique had already become institutionalized into financial accounting.

Auditors who examined published financial statements supported the established practice of currently expensing research and development costs. The difficulty in measuring future benefits of the expenditures and the lack of tangible, physical evidence were the main reasons given for this support. Also, management was reluctant to adopt accounting treatment that could result in an unexpected immediate write-off of R&D "assets" when deemed to have no future value.

In 1974, the FASB issued *Statement No. 2* which required that private research and development expenditures be currently expensed. The troublesome problem of whether to capitalize or to expense R&D costs was temporarily solved. No more would the write-offs of past capitalized R&D costs cause drastic declines in current income and in the stock price.

SFAS No. 2 was pragmatically designed to temporarily handle the current problem of a lack of uniformity between companies in accounting for R&D costs. Uniformity in the accounting for R&D costs was established by simply requiring all firms to expense R&D in the year incurred. Thus, unlike the treatment of other types of costs, R&D costs are arbitrarily expensed despite the fact that R&D meets the classic definition of an asset for the "future benefit" inherent in such expenditures. Also, apparently little analysis was undertaken by the FASB either to consider the success rate of R&D expenditures or to consider the effect established practice would have on the dollar amount and on the type of private research and development in the United States. Nor was a close analysis undertaken by the Board to determine to what extent research and development might become a function of current profits *as a result of the current expense treatment*. In accounting research conducted since the issuance of *SFAS No. 2* the impact of the requirement to immediately expense R&D costs on the amount of R&D expenditures has been inconclusive. However, pressure is building for more adequate disclosure of R&D costs and toward some change in U.S. accounting rules to allow the capitalization of

some costs as permitted in numerous foreign nations and, within the U.S., as permitted for software development costs.

CONCLUSIONS AND IMPLICATIONS FOR FURTHER RESEARCH

In more and more industries, research and development is becoming the dominant asset. The accounting rules have not kept pace with adequately disclosing and capitalizing this cost. It is in both the investor's interest (in terms of rational decision making) and the accounting profession's (in terms of responsibility to society and reputation) to reconsider the accounting for R&D costs on the financial statements and the amount of detail disclosed in notes to the statements.

Corporate reporting of R&D can be improved in two ways: by disclosing more information about R&D spending and activities and by recognizing probable successful development expenditures as an asset that will give future benefits. The difficulties encountered in determining at what point in time R&D costs become an asset must be adequately addressed. This has not yet been done. By contrast, in spite of the difficulties encountered with *SFAS No. 86*, accounting rules do allow software development costs to be capitalized at some point in the development. Arguably, accounting should afford R&D costs similar treatment.

In contrast to the United States, a number of foreign nations allow the deferment of at least some R&D costs, although many definitional problems of research, pure research, applied research, and development costs are encountered.

More research is needed in the classification of R&D costs. Fortunately, a current study by the AICPA's Accounting Standards Executive Committee concerning the classification, capitalization and amortization of advertising costs clearly has implications for the accounting treatment of R&D costs [Flesher, 1979; also, Thompson, Hoskins, and Flesher, 1991]. This is especially true because advertising costs may be even more difficult to match with future revenue. Both R&D and advertising costs are "intangible" in nature, are material in amount and benefit future time periods. The expensing of either of these costs in the period incurred frequently violates the matching principle of accounting and distorts reported net income. Flesher explores the ". . . possibility of integrating qualitative marketing department information with that of accounting."

Similar research which integrates qualitative R&D department information with that of accounting may be appropriate. Also, a comprehensive study of foreign countries' economic treatment of R&D costs may be useful.

One financial accounting alternative for R&D costs currently being investigated is to classify R&D costs as a contra stockholders' equity account when incurred rather than expensing in the period incurred. This approach would eliminate the problem of calling R&D costs an asset and also would eliminate the negative effect on current net income presently experienced from expensing R&D costs when incurred. Another approach to be considered would be the capitalization of R&D costs in an account similar to organization costs and written off over a definite future time period regardless of revenue generation and recognition.

Alternatively, accounting rule makers also should consider expensing general research costs and capitalization of those costs related to specific projects. These capitalized costs could be then matched with the future revenue of the project, unless the project's revenues prove too small to recover these capitalized costs which would lead to the write-off of the remaining capitalized costs of the project [Milburn, 1968]. Milburn defines general research as ". . . research of indirect benefit to the future and its contribution cannot be related to specific future periods on a reasonable basis . . . and . . . specific development, if successful, as identifiable with specific future benefits." Milburn cites as support for his view *APB No. 11*, paragraph 14d, Accounting for Income Taxes, which follows:

Costs identifiable with future revenue or otherwise identifiable with future time periods should be deferred to those future periods. When a cost cannot be related to future revenues or to future periods on some basis other than revenues, or it cannot reasonably be expected to be recovered from future revenues, it becomes, by necessity, a cost or an expense of the current period (or in some cases of a prior period).

The impact of *SFAS No. 86*, (accounting for the costs of computer software) on R&D expenditures in total amount and type offers a fruitful area for future research. Difficulties encountered in implementing the standard and how companies and investors have reacted to it should prove interesting. Also, the appropriateness of the selective capitalization of R&D in

specific industries, such as the drug industry, merits investigation. Furthermore, the impact of *SFAS No. 2* on small developing companies should be researched in depth. Although this article has dealt primarily with the financial reporting of R&D expenditures, the tax aspects of this subject merit further research. For instance, to what extent is the United States performing R&D overseas due to the tax advantages of foreign countries?

Accounting research into the feasibility and appropriateness of capitalization and amortization of advertising costs clearly has implications for the financial accounting treatment of R&D costs, especially since advertising costs are perhaps more difficult to match with future revenue than are R&D costs. The direct costing approach in which only variable R&D costs would be capitalized and expensed over future time periods deserves further consideration. Given the historical controversy regarding the financial accounting of R&D costs, accounting researchers and policy makers should focus carefully on the impact of the current accounting rules and analyze alternative accounting treatments.

In conclusion, the current requirement [*SFAS No. 2*] of expensing R&D costs as incurred for financial statement purposes is inappropriate. R&D costs are material in amount, benefit future time periods, and should more clearly be matched with (charged to) the revenues they help generate. They also clearly fit the FASB definition of an asset. It is likely that corporations' fear of losing the R&D tax shelter and the loss of flexibility in managing reported profits via the timing of R&D expenditures are major obstacles to change in existing financial reporting requirements. However, a change in the financial reporting of these expenditures is in order.

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