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Cost Management

New Technology Driving Change

SAP S/4HANA: Revolution or Evolution?

Financial Accounting Versus Product Costing

Allocating Facility-level Activity Costs

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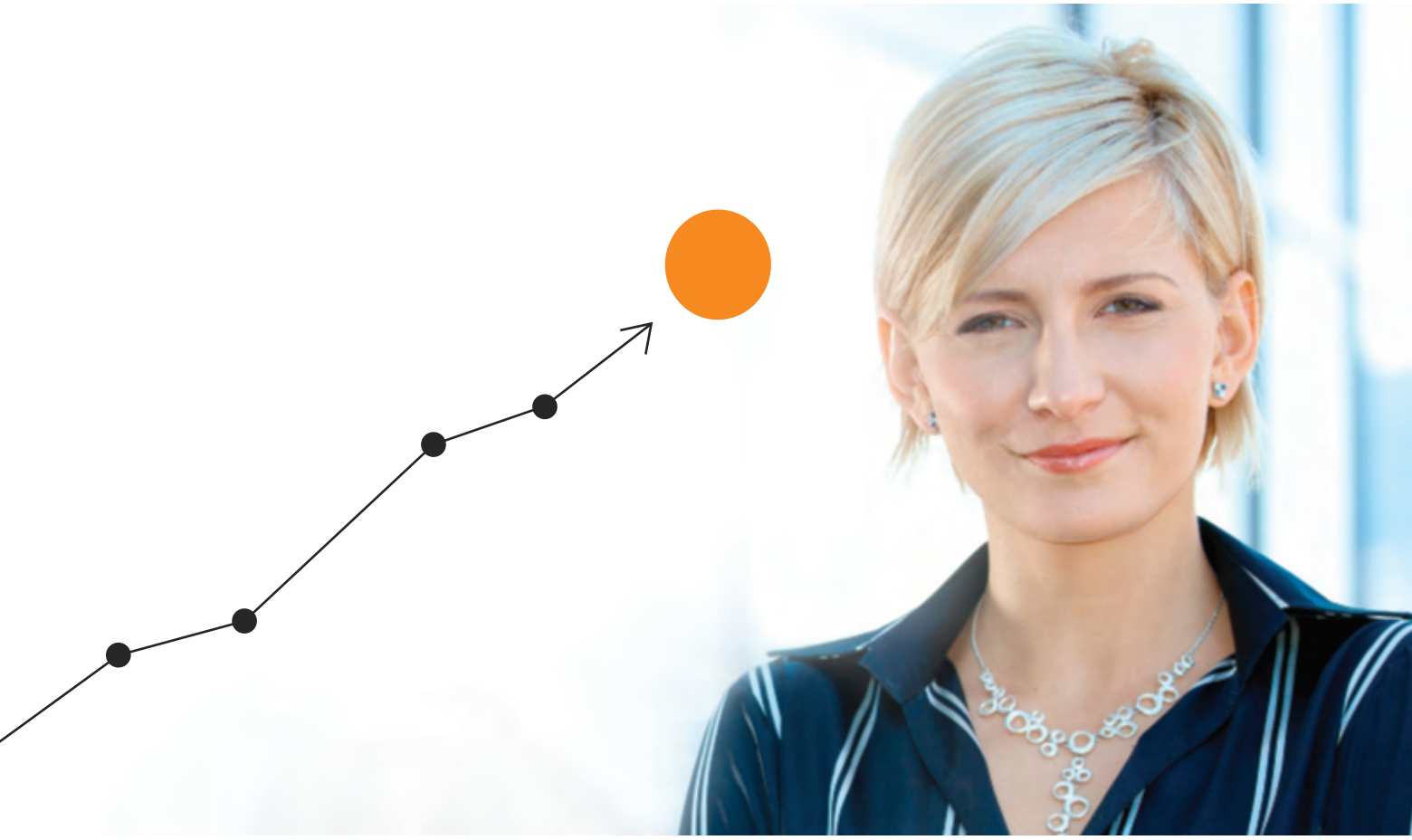

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NEW TECHNOLOGY DRIVING CHANGE

In the 2017 May/June issue of *Cost Management*, my Letter from the Editor posed a challenge to readers and the accounting profession to answer "how we might correlate customer satisfaction and value creation."[1] The response was resoundingly quiet, which was disappointing. It is my belief that human beings have the ability to integrate financial and nonfinancial measurements, and that the accounting profession might consider how its practices and principles could be modified to achieve this end. This is especially important because the accounting firms and accounting associations are highly committed to launching integrated reporting with their support of the International Integrated Reporting Council.

There is a YouTube video of Robert Kaplan speaking about the Balanced Scorecard, during the first few moments of which he describes how he teaches traditional accounting.[2] He goes on to say that he believes there is an opportunity to do more. Of course, Dr. Kaplan is a major proponent of the Balanced Scorecard and has proselytized about its foundational four perspectives, an important one of which is the internal or process perspective.

Two years ago at the American Accounting Association Management Accounting Section Midyear Meeting, a Harvard professor presented a paper on the subject of the correlation of financial and nonfinancial measurements. It was an interesting and well-researched paper that met accounting academic research requirements extremely well, but it made no reference to the process construct. I asked, given her affiliation with Harvard, home of Robert Kaplan, father of the Balanced Scorecard, why she had not mentioned the internal or process perspective. Her response was informative: There is no accounting research on the subject of processes.

Over the years, I have done a lot of work with process management and activity-based costing (ABC) and have found it possible to use ABC to calculate the cost of steps in every process and therefore reconcile operating flows to the cost of resources consumed. This is useful because all nonfinancial performance, resource consumption, and human performance occurs and is best managed in the context of processes, not siloed department records, which have been fine for accounting record-keeping. This idea may take some discussion, but it is straightforward to demonstrate and fundamental to leading operating management practices.

It strikes me that the accounting profession can do better with cost accounting by learning how to do more than simply capture and report on typical department expense budgets. Department expense budgets are the building blocks of the accounting-determined management control system but not the physical. If accountants could account for costs by process as well as by department, it would significantly increase the potential value of accounting systems by reconciling financial and nonfinancial measurements. Exhibit 1 shows an overlay of cost on a process map and suggests the measures chain logic of a process map. When cost and process analysis are combined, it is feasible to reconcile financial and nonfinancial measurements and therefore align strategy, process, and job role/responsibility.

It seems that we accountants keep working within our existing siloed accounting practices and methods, hoping that we can cause all other measurement systems to align with ours. The profession speaks in glowing terms about performance management and the Balanced Scorecard but actually has no way

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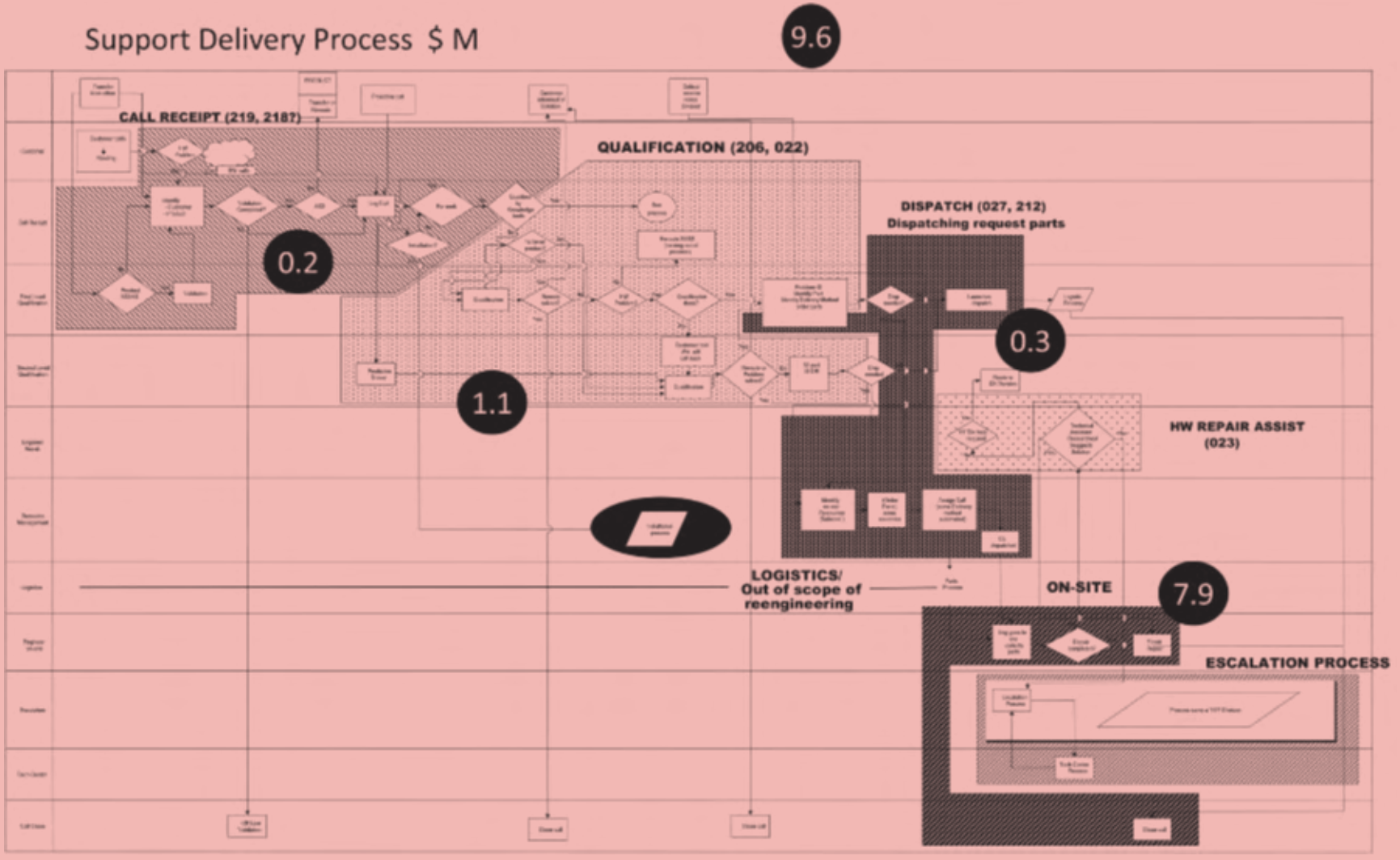
EXHIBIT 1 Costed "Is" Process Map



to understand that "if you keep doing what you have always done, you always get what you always got!" The accounting profession could be a little more adventurous in understanding how work is performed in the context of processes and then figuring out how changes can be made to costing methods in order to align with the way organization performance actually occurs. Technology changes have already created analytics and warehouse technology that are more than capable of providing accountants with the wherewithal to do what I am suggesting.

Hence, our first article in this issue of *Cost Management* is entitled "SAP S/4HANA: Revolution or Evolution in Business Performance Management," written by Niko Hofmann, René Linsner, and Frank Poschadel, all consultants with Horváth & Partners, one of Europe's most respected performance management consulting firms. It has been a long time since a new enterprise resource planning system triggered such intense discussions in the financial and IT departments. Based on practical experience, the authors have examined the topic of SAP S/4HANA in the article, primarily from a business view. An additional example from the manufacturing sector provides a realistic perspective. Our conclusion is that there are indeed considerable opportunities available. But without a sound business design and the boldness to make changes to business management, the potential will go unused.

Professor Monica Singhania and Sanjeev Sharma are the authors of our second article, "Profitability and Leverage Analysis of Indian Railways: Impact of Cost-based Indexation." An attempt is made to analyze the impact of cost-based indexation of fare and freight to fuel price on the breakeven analysis and leverages of Indian Railways (IR). The authors aim to determine the impact of implementing the fuel adjustment component (FAC) in freight and fare rates on IR's breakeven point (BEP) and leverages. BEP represents the cutoff point for profit or loss of an organization, and leverages are indicators of risk. While operating leverage is due to fixed cost associated with the production of goods and services, financial leverage exists due to the presence of debt in the capital structure of the company. Leverage analysis enables understanding and development of an effective relationship between overall risk and returns. The authors find BEP and margin of safety to improve substantially after implementing the FAC. In addition, application of the FAC in fare and freight would improve IR's profitability (from 0.013 to 0.113) and leverages by improving operating leverage to 5.48 from 12.85 (without the FAC) and financial leverage to 1.42 from 4.52 (without the FAC). The results showcase the profound impact of fuel costs and recovery on IR's BEP and operating leverage.

THE ACCOUNTING PROFESSION COULD BE A LITTLE MORE ADVENTUROUS IN UNDERSTANDING HOW WORK IS PERFORMED IN THE CONTEXT OF PROCESSES AND THEN FIGURING OUT HOW CHANGES CAN BE MADE TO COSTING METHODS IN ORDER TO ALIGN WITH THE WAY ORGANIZATION PERFORMANCE ACTUALLY OCCURS.

Our next article, "The Domination of Financial Accounting Over Product Costing" is the work of John A. Brierley of the University of Sheffield. This article analyzes Dr. Kaplan's notion that financial accounting dominates management accounting in the context of whether it dominates product costing and if this is moderated by the methods used to calculate product costs and the types of cost system used. This is achieved by conducting 49 semi-structured exploratory interviews with management accountants in the British manufacturing industry. The results show that, in general, financial accounting does not dominate product costing, particularly in the following scenarios:

- when product costs are calculated using ABC or direct costing, and if they are calculated using absorption costing by a cost system that is separate from the financial accounting system (FAS);
- when a database system using absorption costing is used, provided the product costing system is sufficiently different from the FAS; and
- when operating units use absorption costing with a single system, and financial accounting information is regarded as being based on product costing information.

In contrast, financial accounting dominates product costing when financial

accounting is regarded as the main function of the accounting department. Contrary to Dr. Kaplan's arguments, the selection of the method used to calculate product costs is related not to the dominance of financial accounting but rather the need to produce good-quality product cost information given the particular context of an operating unit.

Our final article was prepared by Professor Parvez Sopariwala, titled "Activity-based Costing Systems: Should Facility-level Activity Costs Be Allocated and, If so, How?" Because most, if not all, practicing corporate cost accountants learned ABC in their undergraduate or graduate cost/managerial accounting courses, their knowledge of ABC depends on the treatment of facility-level activities illustrated in their textbooks. Hence, the author's primary objective in this article is to provide current accounting students and cost accounting professionals who read *Cost Management* a reasoned argument why some facility-level activities (those like factory supervision that are primarily manufacturing- or factory-related) should be allocated to a product using a certain comprehensive activity driver, in contrast to other facility-level activities that are primarily administrative or corporate activities and should not be allocated to a product. This issue is important because without accurate product costs, a business is likely to make regrettable business decisions, such as continuing to produce and sell an unprofitable product or provide an unprofitable service.

As always, it will be a pleasure to hear from readers of *Cost Management*. Please feel free to send emails to me. ■

NOTES

[1] Sharman, P., Managing cost to maximize value, *Cost Management* 31, no. 3 (2017): 3–5.

[2] "The balanced scorecard," Harvard business School Executive Education (2011). Available at: https://www.youtube.com/watch?v=oNy8kupW8oI.

SAP S/4HANA: REVOLUTION OR EVOLUTION IN BUSINESS PERFORMANCE MANAGEMENT?

Changing to SAP S/4HANA requires an even greater effort to further improve most companies' process and data quality.

NIKO HOFMANN, RENÉ LINSNER, AND FRANK POSCHADEL

It has been a long time since a new enterprise resource planning (ERP) system triggered such intense discussions in the financial and IT departments. Based on practical experience, we would like to examine the topic of SAP S/4HANA, primarily from a business view. An additional example from the manufacturing sector provides a realistic perspective. We conclude that there are indeed considerable opportunities available, but without a sound business design and the boldness to make changes to business management, the potential goes unused.

Corporate management requires transparency in real time

Increasing requirements of corporate management. Products and services should be as innovative and efficient as possible, sold on the market for a good profit, and simultaneously creating the foundation for further company growth. The Internet creates maximum transparency, and globally competitive companies vie for customers. Private customers research the most favorable prices, and companies of every size have long since professionalized purchasing with the objective of sourcing goods and services under

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FRANK POSCHADEL *is principal at the Controlling and Finance Center and an expert in corporate management as well as cost/profit and loss accounting and reporting. He is responsible for both business and IT design and IT implementation for a variety of large projects in this context.*

the best possible terms. At the same time, increasing globalization leads to ever more complex value chains within a company's own organization when cooperating with partners and suppliers. In addition, technological changes like digitization, big data, Industry 4.0, and the Internet of Things lead to wide-reaching upheaval in value creation and the interfaces to customers and suppliers.

In the meantime, customer requirements also constantly increase. Instead of standard products, in many cases, customized (or customizable) solutions are expected. For example, the variety of models in the automotive industry has increased by over 300 percent since 1990.[1] Additionally, there are very high service requirements depending on the product (e.g., immediate availability and delivery or even remote diagnostics if there is a malfunction, including online repairs whenever possible). To be able to profitably provide products and services in this environment, companies require evermore precise knowledge of which price is acceptable on the market, what manufacturing will cost, which points in the value chain contain dormant potential for optimization, and at which point targeted accessory and surcharge policies can be used to realize additional profit margins.

But this process is not just about achieving greater precision, greater speed is also vital. The trend toward having information available in real time through Internet research and global, around-the-clock competitive pressure leads to an enormous acceleration of management and decision-making processes in companies. Companies do not have a lot of time for detailed analysis of their own value chain processes and determining profitability and market success.

Transparency through digitization of performance management processes? It quickly becomes clear that more transparency requires state-of-the-art financial processes in all stages of a company's value chain. But what does "state of the art" mean in this context? In the context previously described, financial information is only a benefit if it is as complete as possible, comprehensive, and available quickly and if it can be used to make operational decisions. With regard to an individual product, a pump for example, "complete" means that the cost items relevant to manufacturing a pump can be determined. In addition to the materials used and the production costs, the following costs are also available: the real costs incurred for logistics, storage, setup times, failures, defects, customs duties, etc., without unrealized profits. The costs incurred for a product along the value chain should be recorded as precisely as possible and should be able to be assigned to the product as cost objects, even across several stages of production. Financial processes must therefore be closely connected to value chain processes and therefore with the flow of materials. Ideally, they are fully identical.

TO BE ABLE TO PROFITABLY PROVIDE PRODUCTS AND SERVICES IN THIS ENVIRONMENT, COMPANIES REQUIRE EVERMORE PRECISE KNOWLEDGE OF WHICH PRICE IS ACCEPTABLE ON THE MARKET, WHAT MANUFACTURING WILL COST, WHICH POINTS IN THE VALUE CHAIN CONTAIN DORMANT POTENTIAL FOR OPTIMIZATION, AND AT WHICH POINT TARGETED ACCESSORY AND SURCHARGE POLICIES CAN BE USED TO REALIZE ADDITIONAL PROFIT MARGINS.

For the underlying commercial IT systems, usually reflected in the ERP systems, this requires complete representation of all corporate sites and processes (e.g., sales, logistics, and service processes) that are as harmonized as possible on the one hand and a connection to underlying operative systems, up to the level of the production machines, on the other hand. The many interfaces in all parts of a company using the ERP system lead to considerable challenges in the process, including the following:

1. Large volumes of data must be processed.
2. Information from different sources must be scaled and standardized globally across the entire value chain.
3. If there are changes, for example new products, the systems must be able to be adapted quickly.
4. With regard to the aforementioned challenge, it should also be possible

to process everything as quickly as possible in real time.

In processes, it is important to take into account that the ERP systems on the market are often based on separate data and databases. In the case of SAP, for example, in the classic financial accounting and controlling environment, the general ledgers and subsidiary ledgers of the financial accounting data are kept separate from the controlling data. SAP took an initial step toward merging these areas several years ago with the New General Ledger (New GL).

In addition to the technical prerequisites, it is important to note that there is also such a thing as too much information, which can quickly overburden the recipient and make target-oriented performance management, identification of measures, and decision-making almost impossible. This applies even more so if financial information is not linked to basic operational and logistics processes or can only be identified and evaluated with limitations, for which root cause analysis is often only possible to a limited extent. The structuring and user-friendly processing of information are therefore necessary to gain the full potential of available transparency. In practice, a variety of methods and procedures are available, such as big data analyses, exception reporting, predictive analytics, analytical models, etc.

However, these methods are limited if the data are extremely heterogeneous. Many companies do not have a broad and universally harmonized information base. In reality, systems are developed historically and must often be merged into the reporting system in parts, often manually and at great costs. Fast and flexible adaptation of the system is not possible, and data are not actually available in real time, if they can even be made available at all.

SAP S/4HANA: The beginning of a new era? For some time now, a new ERP system has been available on the market, SAP S/4HANA. It replaces the previous SAP R/3 system, also known as SAP ERP. The promises and expectations associated with the new product are high. Business processes are expected to become simpler and faster. In addition to concepts like digitization, there is even the promise of real-time information provision. Further innovations are also integrated or closely tied in, such as BPC Embedded (business planning and consolidation, a standard solution for planning, reporting, and consolidation) and SAP BW/4HANA, the well-known SAP data warehouse.

First of all, the basis for these are technical improvements with a combination of a new storage algorithm and in-memory database technology. CPU and data-intensive calculation and processing operations, like order settlement or work-in-process calculations, are directly performed in the HANA database in SAP S/4HANA and are thus significantly faster than they were previously.

In addition to the technical transformation, there are also content-related improvements with regard to business processes. The basic idea is to provide information for controlling (management accounting) items, like cost centers, orders, customers, or industry segment, based on the general ledger account to remove the classic separation of the financial accounting landscape from the controlling landscape. To this end, there will be an integrated posting document (a so-called "universal journal") in the future. It will link accounting data to other information, such as data from controlling, logistics, or customer management (see the Sidebar for more information).

Even if the practical use of SAP S/4HANA offers a lot of potential for improvement, some of the discussed changes require far-reaching changes to performance management concepts, management accounting, processes, and the organization. Consequently, changing existing SAP systems to SAP S/4HANA is not a simple system upgrade. This is especially due to deeply segregated and often heterogeneous system landscapes, highly individualized and modified ERP installations, the differentiation between financial and management accounting, and the very specific and individually structured reporting processes that are thereby often performed manually. All these factors require more than a plain tech-

THE BASIC IDEA IS TO PROVIDE INFORMATION FOR CONTROLLING (MANAGEMENT ACCOUNTING) ITEMS, LIKE COST CENTERS, ORDERS, CUSTOMERS, OR INDUSTRY SEGMENT, BASED ON THE GENERAL LEDGER ACCOUNT TO REMOVE THE CLASSIC SEPARATION OF THE FINANCIAL ACCOUNTING LANDSCAPE FROM THE CONTROLLING LANDSCAPE.

nical migration. The development of a business performance management target picture that structures different business management instruments and puts them in relation to each other becomes very important. A detailed and integrated concept should be developed that, in addition to the technical dimension, also includes methods, processes, and the organization. Only when all these measures are taken can a new era also be introduced in business management with SAP S/4HANA.

Practical use cases

How do the previously described improvement potentials present themselves in practice? For this purpose, the existing challenges in business and operational corporate management are evaluated with regard to improvements that can be achieved with SAP S/4HANA based on specific examples from the manufacturing sector. This is initially performed with regard to integrated overall corporate management and then, in a second step, is based on observations of selected instruments for corporate management.

SAP S/4HANA for integrated reporting and performance management

Initial situation. Many of the previously described challenges for reporting and operational corporate management are relevant in the practical example described here. A variety of different reporting landscapes and systems leads to numerous weaknesses during the financial organization's daily work. While creating and transitioning the reports, there was a high degree of manual effort, limited possibilities of automated validation of reporting data, and ultimately a limited ability to analyze and explain the reported data; there were even inconsistencies in the reported data. Although the initial situation and target always require company-specific consideration, the initial situation described here, as well as the resulting objectives and the potentials resulting from SAP S/4HANA, can be transferred well to other companies.

A VARIETY OF DIFFERENT REPORTING LANDSCAPES AND SYSTEMS LEADS TO NUMEROUS WEAKNESSES DURING THE FINANCIAL ORGANIZATION'S DAILY WORK.

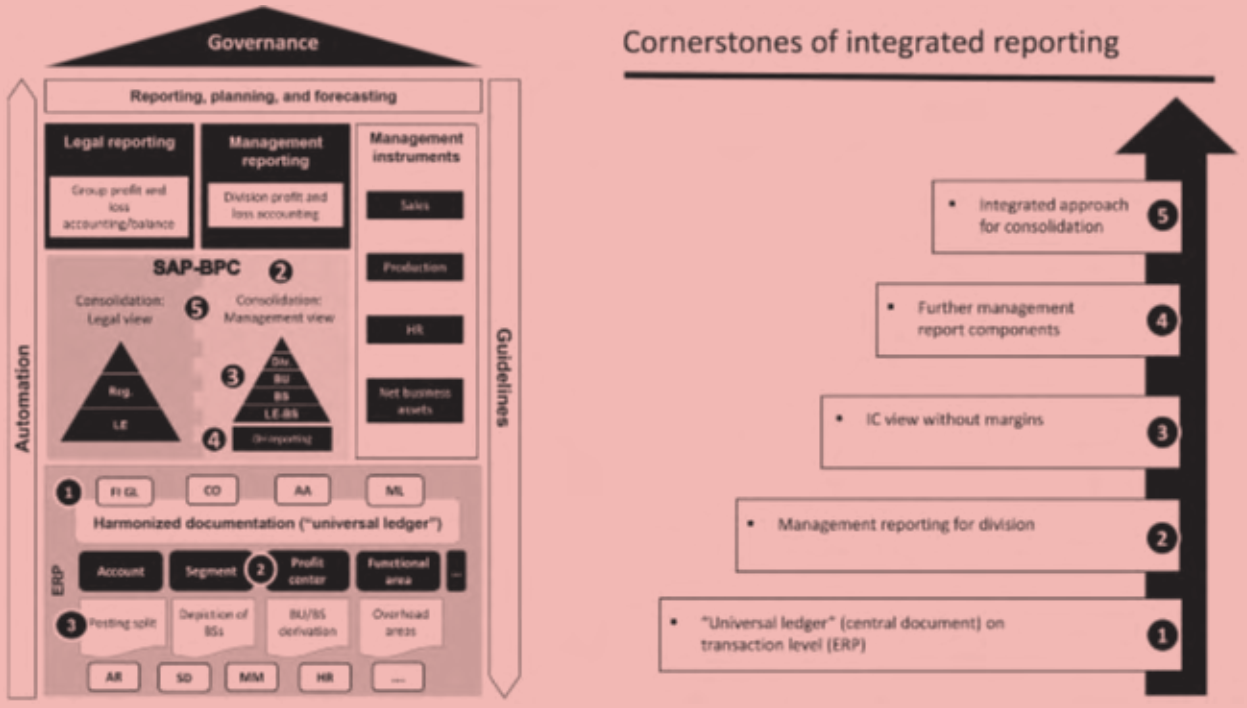
Objectives and benefits of integrated reporting. The following objectives were the focus during implementation of integrated reporting:

- improving the convergence and methods of financial and management accounting;
- maximizing the consistency and transparency in the sense of "one version of the truth";
- accelerating and increasing the efficiency of reporting;
- increasing the flexibility of reporting with regard to representing the corporate structure in particular; and
- creating logical data storage for all employees in accounting and controlling with clearly defined quality responsibility for the reporting data in the legal entities.

Prerequisite: Clarifying the extent of an integrated performance management approach. The integrated reporting has to reflect how the company or group is managed and controlled. This is expressed in business management approaches and instruments as well as the key performance indicators. The following core elements were determined in the described practical example for business management:

- creating an integrated reporting landscape for group and segment reporting of the essential financial control variables (this includes further, lower-level management units in addition to the first management level also reported externally);
- reflection of the existing management approach (profit and loss items and production output quantities are reported without the margins resulting from intercompany [IC] business);
- integration of advanced reporting requirements in management profit and loss accounts for recording the complete overhead report; and
- integrated reporting approach with total reconciliation of further information so that cost control of the production plants or stock

EXHIBIT 1 Important Technical and IT Solution Elements for Integrated Reporting



reporting also follows a common rationale.

New overall (IT) architecture for integrated business management. The implementation of an integrated reporting approach and integrated business management is performed in a comprehensive IT architecture in which the different levels of the systems are transformed and integrated. The relevant technical cornerstones of new integrated reporting include:

- the harmonization of the data's source (transactional posting in the ERP);
- a common consolidation rationale for legal and management consolidation in the consolidation system;
- the methodical changes to creating the IC view without margins according to the existing performance management model; and
- integration of further operational report contents, such as overhead reporting, or of production cost management.

Essential business and IT elements of a solution. In the described practical example, achieving the previously illustrated objectives requires different business- and IT-related elements of a solution that was defined and implemented based on a comprehensive business management concept. The reason for this was that the different objectives could not be achieved with one individual element of a solution, although the technical and IT-related form of business management already had a high degree of maturity.

In particular, the described elements for the solution are significant for achieving the following results:

- reflection of parallel valuation according to group International Financial Reporting Standards (IFRS) and local valuation;
- fulfilling the reporting requirements for segment reporting;
- being able to reconcile between legal views and management views; and
- presenting the cost-of-sales method and detailed functional area views.

Exhibit 1 shows an overview of the essential elements. The most important

elements are subsequently described in detail in the context of SAP S/4HANA.

Source for integrated reporting and integrated business management (1). An important prerequisite for integrated reporting is the transactional posting of logistical transactions in the ERP system with *all* required information for accounting and controlling in one harmonized, central supporting document. This information creates the basis for reporting and business management. Parallel availability of international accounting according to IFRS and the local valuation in the posting data is also contained therein. However, delta posting logic will replace the account-based approach that exists today. The use of a parallel ledger combined with complete posting logic for IFRS and local valuation is the intended solution for the future.

Depicting management reporting for divisions (2). The leading management structure of the divisions and their lower-level management units is consistently reflected in the operative ERP systems as the basis for integrated reporting. A profit center structure provides the basis for this purpose, and segment allocation is derived from the profit centers. In addition, partner information for companies (partner companies) and segments (partner segments) is documented in accounting documents. In contrast to today's established structures, this makes consistent and integrated posting of all transactions to the segments possible, including full reconciliation between the legal view and management view (division) within the individual companies.

The existing management control logic and today's consolidation approach for management units are not based on the posting or service agreement–based business between the divisions or lower levels of the management hierarchy. In future ERP systems, services will be settled between profit centers and segments that are based on the transfer price for transactions between legal units and group production costs for transactions within a legal unit. According to this new approach, documentation of IC revenue and associated costs between management units are provided in the division profit and loss statement, but they are eliminated in the transition to the group profit and loss statement.

Creating a management view without IC margins (3). A further central requirement for new reporting is the disclosure of margin-free results for the management units, in particular the divisions and legal entities. In addition, the IC view without margins for overhead reporting is being expanded. Today, this is not entirely ensured within the group view.

Additional management tools based on group production costs remain. The ability to fully reconcile the plant cost report used for production control is ensured by integrating all account assignments posted in the ERP. A limited ability to transfer at a consolidated level, with particular focus on the sales side, is the aim of the customer and product profitability analysis used for the complementary reporting for detailed portfolio and profitability management. Whereas changes to content, for example by recording internal sale, only took place on a limited basis, numerous functionalities are provided in the ERP to generate an internal high-quality profit and loss statement without IC margins. To generate the IC view without margins, either posting of IC margins is avoided, or the incidental IC margins are correctly documented in the system as additional information within each transaction.

A LIMITED ABILITY TO TRANSFER AT A CONSOLIDATED LEVEL, WITH PARTICULAR FOCUS ON THE SALES SIDE, IS THE AIM OF THE CUSTOMER AND PRODUCT PROFITABILITY ANALYSIS USED FOR THE COMPLEMENTARY REPORTING FOR DETAILED PORTFOLIO AND PROFITABILITY MANAGEMENT.

As a first example, the solution for provision of divisional results without IC margins is based on a clear framework of posting rules for IC business. This regulates IC service exchanges in which changes to segments/management units may not occur at the same time as an exchange between companies. After consolidation of the IC business, the service exchange between segments always remains free of IC margins.

A further solution element is the overhead area documentation (e.g., within division profit and loss accounts) without IC margins. This documentation, which was not previously possible, is achieved by posting the IC margins to separate accounts.

Reflection of functional cost areas according to the cost-of-sales method and overhead reporting structure (4). Functional cost area accounting and the profit and loss accounting are integrated into accounting and depicted according to the cost-of-sales method: The common account-based solution, which splits the accounts by functional cost areas, is replaced with the standard functionality provided by the New GL in SAP for derivation and updating posting logic of the functional areas. This functionality is also used to make it possible to completely integrate overhead reporting in the consolidation system by differentiating posted subfunctional areas. For this purpose, overhead areas (subfunctional areas) are individually assigned to profit and loss account functional areas, which requires splitting the areas with previous multiple assignments. During reporting in division profit and loss accounting, the overhead subfunctional area is reflected in an individual reporting line.

Integrated approach for consolidation (5). The hitherto different methods for consolidating the group view and the view of management units will be implemented on the basis of harmonized data and the same methods in the future. Consolidating the management units across three hierarchy levels and that of the group, including segment reporting, is performed in SAP-BPC as a common tool for this purpose. As a data basis, the companies must deliver uniformly posted data and partner relationships both for service exchanges between companies and between the management units defined as segments. Data submission is implemented based on the standardized chart of accounts between the legal and management view. The uniform structures for legal and management views enable comprehensive validation at the group and local levels, which optimally limits inconsistencies or differences between both reporting landscapes. In addition, specific solutions for consolidation or elimination logic are provided for individual report items. These are outlined in the following example.

AS A DATA BASIS, THE COMPANIES MUST DELIVER UNIFORMLY POSTED DATA AND PARTNER RELATIONSHIPS BOTH FOR SERVICE EXCHANGES BETWEEN COMPANIES AND BETWEEN THE MANAGEMENT UNITS DEFINED AS SEGMENTS.

Integrated reporting support with SAP S/4HANA. How does SAP S/4HANA now contribute to the aforementioned functional and IT-related elements of the solution? It becomes clear very quickly that the benefits associated with SAP S/4HANA can support the objectives on the business and IT side:

1. Transactional information distributed in today's SAP landscape is merged in the universal journal in a document with the assignments required for accounting and controlling. This includes merging the legal units' view for accounting with the management units' view (divisions, plants, functional areas, etc.) for controlling by depicting parallel stock valuation according to local view and group view. It also includes the assignment of relevant partner information for consolidation of the desired reporting views on the group and management unit levels, as well as the defined (sub)functional areas.
2. All management accounting activities (e.g., allocations) for intra- and IC transactions are integrated in the universal journal so that the relevant reporting dimensions — legal units, management units, functional area/overhead areas, plants, etc. — are correctly released and charged, and there are no deviations between external accounting and controlling.
3. Comprehensive validation capabilities between the different reporting views are based on posting in the ERP and subsequent integrated consolidation methods in real time.

SAP S/4HANA PROVIDES A NUMBER OF IMPROVEMENT OPPORTUNITIES FOR CORPORATE MANAGEMENT. THE QUESTION AS TO WHETHER IT IS A MORE OF AN EVOLUTIONARY OR REVOLUTIONARY DEVELOPMENT CAN BE ANSWERED QUITE DIFFERENTLY WHEN INDIVIDUAL BUSINESS MANAGEMENT INSTRUMENTS ARE TAKEN INTO CONSIDERATION.

4. Reports in the legal units with all defined reporting requirements are based directly on the transactions in the SAP system without consolidation in summary tables of the general and subsidiary ledgers and controlling-side computer units or in SAP Business Warehouse.
5. The new database technology also enables significant acceleration of reporting and processing.

At the same time, there are two further important aspects that need to be taken into account. On the one hand, many of the aforementioned solution elements could have been implemented in the functions that were already available in SAP ERP. In particular, these include the New GL and the material ledger in which the described reporting requirements can be fully reflected in this practical example, then supplemented with automated additional postings. The additional integration of all required information in the universal journal is surely a consistent further development into a standardized and harmonized finance environment. Overall, using SAP S/4HANA is more of an evolutionary development step toward greater integration. This constitutes more of a revolution when profit and loss accounts are taken into consideration. This was previously illustrated by using the New GL in a separate data inventory. In this case, the universal ledger creates the opportunity to also provide this information integrated with the data from external accounting, among other things.

The second aspect in this environment is broader in scope. The potentials that can be realized with SAP S/4HANA can only be achieved if important functional and technical prerequisites are in place. In the described case, reporting and business management were not the only aspects that were revised. Important IT-related changes were also implemented in the form of far-reaching changes and a high level of standardization in the ERP systems.

In particular, the following improvements were achieved:

- Convergence and methods of financial and management accounting were improved (harmonized structures, integrated transactional posting of all required information, and common consolidation logic to ensure a high degree of convergence).
- Consistency and transparency of all reporting were achieved in line with "one version of the truth" for all reporting elements, which allows harmonized performance management of the group and its management units.
- The new concept created one logical data pool for all employees in accounting and controlling. Its responsibility for quality of basic reporting data can be completely transferred to the legal units. Individual allocations and the consolidation postings continue to be executed on this basis at the group level but to a much lesser extent.

How does SAP S/4HANA affect operational management instruments?

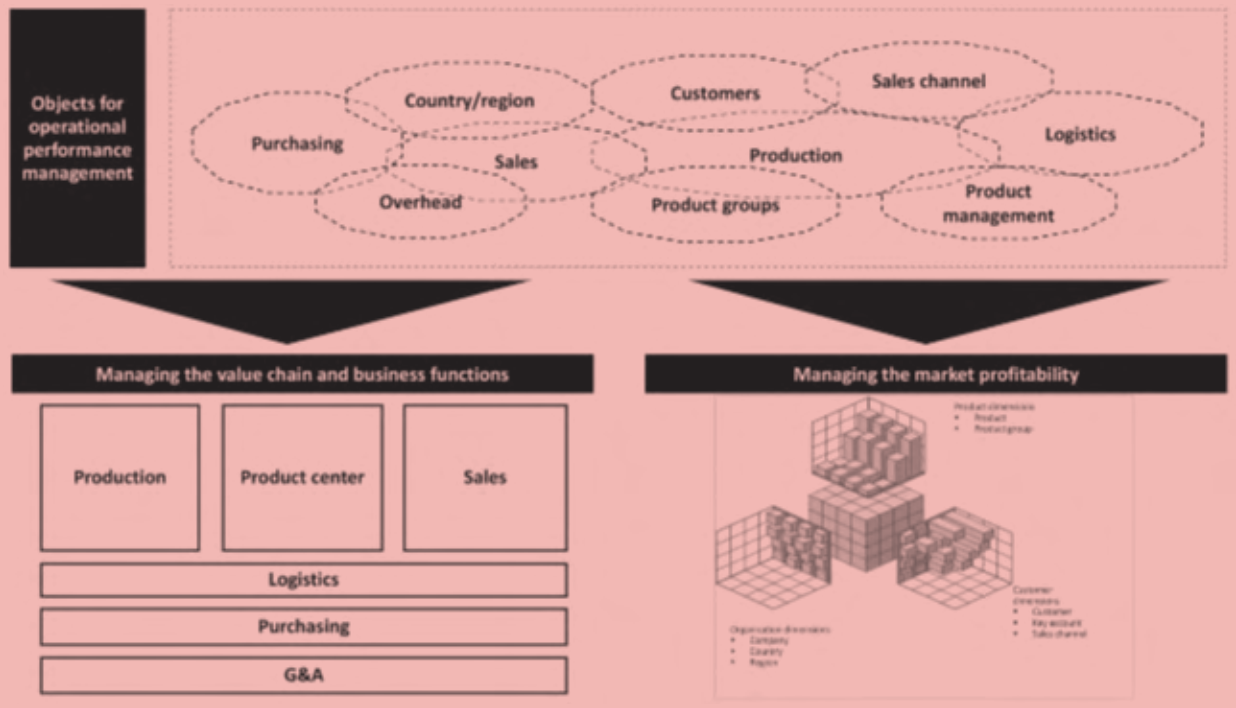
As demonstrated, SAP S/4HANA provides a number of improvement opportunities for corporate management. The question as to whether it is a more of an evolutionary or revolutionary development can be answered quite differently when individual business management instruments are taken into consideration.

Operational corporate performance management areas. As described, operational management of companies includes two important areas of responsibility (see Exhibit 2): management of individual areas or views of the company (e.g., sites, functions, markets, regions) and management in line with achieving the overall optimum performance for the company. To achieve this, two perspectives need to be considered:

- management of market success and profitability; and
- management of the value chain and the individual functions and stages of the value chain.

Managing market success and profitability. SAP ERP has already provided an instrument for comprehensive management of profitability achieved on the market for several years with the CO-PA module

EXHIBIT 2 Operational Performance Management Areas



(Controlling Profitability Analysis). This facilitates reporting and analysis of a variety of reporting dimensions (or "characteristics"), such as product, customer, sales channel, region, etc. Originally, the CO-PA module was designed to be an instrument for sales performance management, measuring and managing turnover and margins achieved in sales. However, it was then further developed into a complete profitability statement in which, for example, the associated overhead costs of the company or the individual market segment can be viewed using allocations. In the process, the CO-PA module is completely integrated in the logistical value flows. Two different approaches are generally available: account-based profitability analysis, based on accounts or cost elements, and costing-based profitability analysis, in which the depiction of profit and loss accounting is based on so-called "value fields" using imputed costs in many cases. Costing-based profitability analysis is particularly used today. However, there are usually several challenges associated with using the costing-based CO-PA, which are described in the following sections.

CO-PA creates its own data inventories with a high level of detail. This can often lead to a large number of data records, which can have a negative effect on performance, in particular during detailed analysis.

For CO-PA, separate value flows must be established to transfer operational data from the logistical processes and objects (e.g., customers, sales orders, projects, cost centers, production orders). With increased complexity of the logistical processes, the complexity of the required value flows in the CO-PA increases, which initially increases the implementation effort. Far more serious is the increase in error susceptibility that also occurs when transferring data into the CO-PA during operation due to, for example, faulty preceding processes or during changes in preceding processes, which can result in differences between accounting and CO-PA. Troubleshooting and corrections are then often complex and time-

intensive. Confidence in the data is also undermined.

When analytical profit and loss accounting is applied, turnover and production costs are based on the cost-of-sales view. Transitioning to the total cost method often used in accounting is thus only possible in selected areas of profitability analysis. If imputed approaches are also used (e.g., for interest or amortization), this can cause further differences.

The valuation of production costs is initially based on the valuation from the perspective of the local accounting area, possibly containing included IC margins. If profit and loss accounting is to be performed based on group production costs, this is only possible if the turnover resulting from the external customers is always valuated with the group production costs actually incurred, and this can be reported in the CO-PA. Under certain technical conditions using a single controlling area, this is possible for standard products using group cost calculation. With increased complexity of the value flow and products (e.g., for configurable products or in project business), the complexity of determining the group production costs also increases.

To depict projects from the PS module (Project System), in particular for industrial equipment and project and solution business, the CO-PA can only be utilized to a limited degree because, on the one hand, transitioning to the specific analytical CO-PA value flows must be organized, and, on the other hand, other views and management focus are required for managing project business than for product business. Examples of this include actual costs instead of standard costs plus deviations, percentage-of-completion view, determining provisions, etc.

Development of the CO-PA's own reporting functions was very limited in the past and not up to date with modern reporting tools. Appealing and user-friendly reporting was usually only possible using SAP BW and, if necessary, further reporting front ends.

How can SAP S/4HANA contribute to addressing the previously mentioned challenges? First, it is apparent that all data are merged to one location in a data record using the universal ledger. In the interaction with the changed technical structure and the in-memory technology, this leads to a significantly smaller database and, simultaneously, a simpler data model, as well as faster access and processing times.

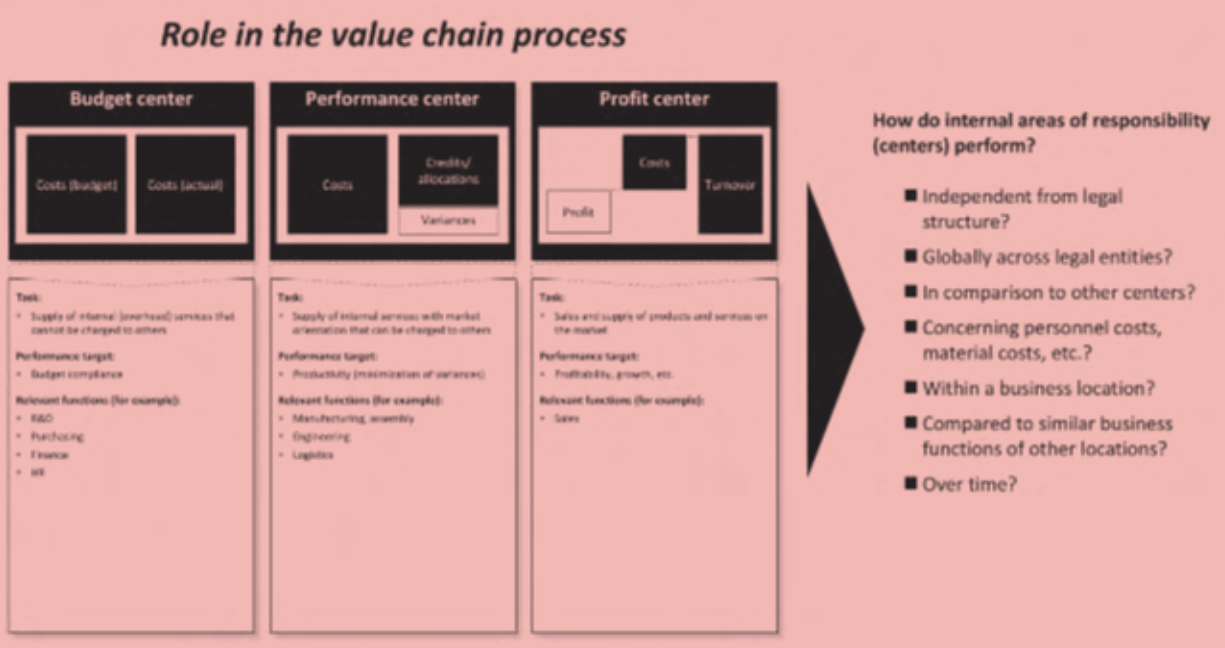
The previously existing separation of content from external accounting and management accounting is eliminated. All postings are executed relating to an account. Dedicated cost elements in the CO module (Controlling) no longer exist. The account-based profitability analysis in CO-PA thereby becomes the method of choice. To do this, the value posted to the account must be enriched with the required information dimensions for market segment profitability analysis. Usage of the costing-based profitability analysis will be less important in the future. The following sections highlight two specific potentials.

Availability of goods issue posting. The (standard) production costs could previously only be provided in the account-based profitability analysis with one account (goods issue) as a total. In costing-based profitability analysis, it was possible to break down production costs according to the cost component scheme at the point in time when the turnover was posted. With SAP S/4HANA, the (standard) production costs are now also available in accounting terms in the outline of the cost component scheme. When applying the cost-of-sales method, a two-step posting can initially show goods in transit, which can later be reposted to be shown as cost of goods sold. During the posting process, the dimensions of profit and loss accounting are also assigned at the same time.

IN PRINCIPLE, DERIVATION OF THE PROFITABILITY ANALYSIS CHARACTERISTICS OCCURS IN REAL TIME; THAT IS, SETTLEMENT RUNS (E.G., FOR COST CENTERS, PROJECTS, OR COST OBJECTS) ARE NO LONGER NEEDED TO PROVIDE PROFITABILITY ANALYSIS INFORMATION.

Cost object variances. This also applies for cost object variances (production order). These were previously only avail-

EXHIBIT 3 Center Types in the Company



able in account-based profitability analysis in one account (price difference account) and could only be further broken down in costing-based profitability analysis. In SAP S/4HANA, the cost object variances in the SAP standard variance categories — input price variance, input quantity variance, scrap, etc. — are available as accounts. These are also assigned to the dimension of market segment profitability analysis.

Both of these aspects illustrate that a large step toward identifying accounting and management accounting can be achieved. However, we should realize that much stricter requirements must be placed on quality and completeness of the data, value flows, and the required derivation rules for market segment information, because the previous option (even if it was not to be recommended) to correct CO-PA data is no longer available, or only to a limited degree. In principle, derivation of the profitability analysis characteristics occurs in real time; that is, settlement runs (e.g., for cost centers, projects, or cost objects) are no longer needed to provide profitability analysis information. However, by providing profitability analysis information based on group production costs, the same challenges that previously existed still remain.

Further significant improvements are the new Fiori interface and connection with further reporting tools, such as SAP Analysis for Office, for analytical reporting and management reporting. More intuitive user interfaces in conjunction with direct access to posted transaction data in real time allow for faster and more flexible analysis and create the basis for "self-service reporting" up to the top management level.

Managing the value chain. The fact that different business functions require different performance management approaches due to their specific tasks must be taken into account when performance management instruments and tools are designed and implemented. Three different center types can usually be discerned (as shown in Exhibit 3).

In practice, the different management approaches also result in different requirements for the respective management instruments and the information required. While the budget center is usually managed based on a simple comparison of budgeted costs and actual

INTEGRATED POSTING DOCUMENT IN THE UNIVERSAL JOURNAL

All data are stored into a central table (known as the ACDOCA table). This is accessed during every business transaction and is also available centrally for reporting purposes. Information is thus available in enhanced posting documents at the most detailed level. Not only do they contain accounting information, but they also include all data important for management accounting and profit and loss accounts in controlling. This includes assignments to cost centers, cost objects, and profit centers as well as detailed information with regard to products, customers, sales channels, etc. This brings significant benefits. Accountants and controllers work with an identical level of information, which leads to factual coordination between internal and external accounting. Complex reconciliations of external and internal results, including lengthy coordination meetings, can be eliminated. Evaluations also become more flexible because different perspectives on the accounting materials can be seen ad hoc.

costs, management of a performance center is more complex. This can be seen clearly in the example of a production plant. The responsibility of a production plant is to manufacture the required quantity of products at the agreed cost and at the standard cost of goods. Furthermore, an additional direction from management is usually set, such as the development of standard production costs over time. On the other hand, production is not responsible for volume variances. An example of these variances would be underutilization due to missing quantities that result from overly optimistic sales planning or the effects of changing raw material prices. Production can be considered successful if their consumption variances are as small as possible. Ideally, they equal zero.

Based on this example, it can be seen that performance management of different business functions in today's SAP landscape must often access data from different modules. In the case of production management, these are the valuated output (change in inventory), the actual costs of production cost centers and production orders, and variances from cost centers and production orders. Profit center accounting creates the common basis in which the functional breakdown of the company is reflected, and the individual elements of plant performance management are available at the account level. However, this itemization is usually not sufficient. For example, if variance information is only posted in total to one account (price differences), additional information from other sources (particularly cost center accounting and product cost accounting) must be added.

The universal ledger in SAP S/4HANA can significantly simplify things here. An outline of the deviation categories can be derived according to accounts in order for them to be directly available for reporting. Because profit center assignment and further assignments for management accounting are posted, it is possible to perform a complete analysis on the basis of the universal ledger data.

While the technical availability or provision of the data is significantly simplified with SAP S/4HANA, the interpretation of the data and, in particular, the interpretation of the variances, continue to remain complex. One of the greatest challenges lies in deriving the correct measures on the production side on the basis of the determined (financial) variances, for example. SAP S/4HANA can only provide the *technical* basis as the starting point for further analysis with regard to the causative products, machines, batch sizes, production sequence, etc. In the future, complex (stochastic) models will also be required here. They are used to determine the causes and also to prevent or reduce possible deviations beforehand.

Conclusions

A final evaluation of the initial question "revolution or evolution in corporate performance management" must be provided. SAP S/4HANA can achieve significant improvements for creating the transparency in real time needed for corporate performance management. Information that was previously distributed is merged in one place; financial and management accounting are more strongly integrated; information is available faster, in more detail, and can be accessed with greater flexibility. However, more data and granularity do not automatically mean better management decisions. In reality, the transparency created

with regard to the recipient must be structured and provided in a recipient-specific manner. At the same time, the requirements of the quality of the accounting data and preceding processes and value flows also increase. The experiences from today's SAP landscape demonstrate that high integration is both a blessing and a curse. Changing to SAP S/4HANA requires an even greater effort to further improve most companies' process and data quality.

The most important aspect in this context, the quality of the performance management model, remains unchanged. Even in the SAP S/4HANA landscape, the question of how management of the whole company and individual business functions should be performed in the context of sound business management must be answered. Which instruments are necessary for this, and which structure and process prerequisites must be created? SAP S/4HANA results in new and improved options for the implementation of sound business management in today's SAP landscape. ■

NOTES

[1] Reiling, G., "A study of automotive added value: The trend goes from OEMs to suppliers," AutomotiveIT (Nov 13, 2012) [translated from German]. Available at: www.automotiveit.eu/studie-zur-automobilen-wertschopfung-der-trend-geht-von-dem-oems-zu-den-zulieferern/management/id-0038289.

PROFITABILITY AND LEVERAGE ANALYSIS OF INDIAN RAILWAYS: IMPACT OF COST-BASED INDEXATION

Application of the fuel adjustment component in fare and freight for Indian Railways would improve its profitability and leverages by improving operating leverage.

MONICA SINGHANIA AND SANJEEV SHARMA

Indian Railways (IR) integrates India through a single transportation network, covering almost every state, and caters to the needs of people across the country — people from diverse income strata and cultural, religious, and social backgrounds. It serves as a critical infastructure facilitator for both passengers and goods and connects centers of commerce, industry, pilgrims, historical heritage, and tourist attractions, in addition to linking ports to the hinterland. IR brings the more remote and underserved areas of the country into the national mainstream.

IR incurs substantial expenditure every year on a variety of unremunerative services. These costs are mostly due to low ordinary second-class fare, monthly/periodical season tickets for

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SANJEEV SHARMA *works with the Indian Railway Accounts Service and is presently serving as deputy chief project manager handling the Accounting Reforms Project of the Ministry of Railways. The project involves implementation of accrual accounting, performance costing, and outcome budgeting in Indian Railways. He holds an MBA from the Faculty of Management Studies at the University of Delhi after studying commerce and legislative laws at the University.*

EXHIBIT 1 Growth in Traffic Earnings

Year	Passenger		Goods	
	Amount (INR in millions)	% increase over previous year	Amount (INR in millions)	% increase over previous year
2002–03	125,750	12.3	265,050	6.7
2003–04	132,980	5.7	276,180	4.2
2004–05	141,130	6.1	307,780	11.4
2005–06	151,260	7.2	362,870	17.9
2006–07	172,250	13.9	417,170	15.0
2007–08	198,440	15.2	474,350	13.7
2008–09	219,310	10.5	534,330	12.6
2009–10	234,880	7.1	585,020	9.5
2010–11	257,930	9.8	628,450	7.4

(Adapted from Indian Railways Annual Report and Accounts 2011–12. Available at: http://www.indianrailways.gov.in/railwayboard/view_section.jsp?lang=0&id=0,1,304,366,554,1276.)

EXHIBIT 2 Growth in Yield per Unit of Performance

Year	Freight traffic		Passenger traffic	
	NTKM (millions)	Yield per NTKM (INR)	PKM (millions)	Yield per PKM (INR)
2002–03	353,194	0.75	515,772	0.24
2003–04	381,241	0.72	542,052	0.25
2004–05	407,398	0.75	575,608	0.25
2005–06	439,596	0.82	616,632	0.25
2006–07	480,993	0.86	695,821	0.25
2007–08	521,372	0.91	771,070	0.25
2008–09	551,448	0.97	839,203	0.26
2009–10	600,548	0.97	904,761	0.26
2010–11	625,723	1.00	980,131	0.26

(Adapted from Indian Railways Annual Report and Accounts 2011-12. Available at: http://www.indianrailways.gov.in/railwayboard/view_section.jsp?lang=0&id=0,1,304,366,554,1276.)

EXHIBIT 3 Average Unit Cost of Fuel (High-speed Diesel and Electricity) for Traction on IR

Year	**Unit cost (per kiloliter)** INR in millions	**% increase over last year**	**Unit cost (per thousand kilowatt hours)** INR in millions	**% increase over last year**
2002–03	175,228.8		43,840	
2003–04	197,103.7	11.1	42,830	–2.4
2004–05	238,996.0	17.5	42,400	–1.0
2005–06	289,000.5	17.3	42,900	1.2
2006–07	311,658.3	7.3	43,250	0.8
2007–08	311,507.9	0.0	44,100	1.9
2008–09	341,413.1	8.8	44,270	0.4
2009–10	331,882.1	–2.9	45,180	2.0
2010–11	377,273.7	12.0	47,220	4.3

(Adapted from Indian Railways Annual Report and Accounts 2011-12. Available at: http://www.indianrailways.gov.in/railwayboard/view_section.jsp?lang=0&id=0,1,304,366,554,1276.)

EXHIBIT 4 Distribution of Fixed Costs

	Goods	**Suburban**	**Nonsuburban**	**Total**
GTKM (in million kilometers)	1,067,281	35,001	542,073	**1,644,355**
% of GTKM	64.91	2.13	32.97	
Fixed cost (INR in millions)	519,990	17,050	264,100	**801,140**

Data from: Indian Railways Annual Statistical Statements 2011–12. Available at: http://www.indianrailways.gov.in/railwayboard/view_section.jsp?lang=0&id=0,1,304,366,554,1276.

suburban and nonsuburban passengers, a variety of concessions allowed on passenger tickets, and the transportation of certain goods that cost less than the operation of trains, which imposes a heavy burden on IR's finances. Thus, a gap is created between the revenues generated through these services and their operating costs. The loss incurred by IR for these social services during

EXHIBIT 5 IR Sales–Revenue Mix

Services	Amount (INR in millions)	%
Passenger, suburban (Statement No. 12)	17,870	1.85
Passenger, nonsuburban (Statement No. 12)	239,190	24.74
Total passengers (Statement No. 6)	257,060	26.59
Goods (Statement No. 6)	606,870	62.77
Other	102,880	10.64
Total*	966,810	100

Data from Indian Railways Annual Statistical Statements 2011–12. Available at: http://www.indianrailways.gov.in/railwayboard/view_section.jsp?lang=0&id=0,1,304,366,554,1276.

**From the Explanatory Memorandum on Railway Budget 2011–12. Available at: http://www.indianrailways.gov.in/railwayboard/uploads/directorate/finance_budget/RailBudget_11-12/Explantory_Memorandum.pdf.)*

2010–2011 amounts to INR 157,135.1 million, which comprises 16.62 percent of the total revenue earnings and 17.57 percent of the total expenditure. Hence, in order to reach every corner of the country, the financial health of IR needs to be improved.

Fuel (diesel and electricity) constitutes the second largest component of IR's operating expenses, or ordinary working expenses. During 2010–2011, fuel constituted 24.5 percent of the ordinary working expenses, of which electricity comprised 9.1 percent and diesel made up 15.4 percent. While a lot of attention has been paid to areas such as downsizing, austerity measures, and expenditure control, no serious discussion has taken place to analyze the impact of fuel costs and the fuel adjustment component (FAC) of fare/freight on profitability and the leverage analysis of IR. We aim to address this issue. The rest of the article is structured as follows: First, we discuss the historical background of IR in terms of rate fixation over the past few decades. In the next section, we review the existing literature on breakeven point (BEP) and operating leverage analysis with respect to the FAC, so as to index fare and freight to fuel. Next, we outline the research design of the study, including the objective, the data set considered for model-building, and the applied technique of BEP and operating leverage. This section also discusses the limitations of our work. We conclude with the analysis and findings of our study and summarize the conclusions that can subsequently be drawn.

Historical background

Traditionally, IR has been perceived as an essential public service that should provide affordable transport services to the economically weaker population, not just the affluent classes. The rate of growth in IR revenues has been outstripped by the rate of increasing costs due to a loss of market share in the profitable freight business, lack of flexibility in pricing, the high cost of internally

EXHIBIT 6 BEP Analysis of IR Revenues: 2010–2011

	Goods	Passenger		Total
		Suburban	Nonsuburban	
VC, fuel only (INR in millions)	65,120	6,100	80,400	151,620
FC, distributed based on GTKM (INR in millions)	519,990	17,050	264,100	801,140
Total cost (INR in millions)	585,110	23,150	344,500	952,760
Operating earnings (INR in millions)	606,870	17,870	239,190	863,930
Other earnings, distributed based on earnings (INR in millions)	72,270	2,130	28,480	102,880
Total earnings, operating and non-operating (INR in millions)	679,140	20,000	267,670	966,810
NTKM/PKM (in millions)	625,720	137,130	841,380	
Sales (operating earnings) per NTKM and PKM (INR)	0.970	0.130	0.284	
VC per NTKM (goods) and PKM (passengers) (INR)	0.104	0.044	0.096	
Profit – Volume (PV) ratio = (Sales – VC) × 100 / Sales (%)	89.27	65.86	66.39	
Contribution = Sales – VC (INR)	0.866	0.086	0.189	
BEP = FC / Contribution, NTKM or PKM (units in millions)	600,582.6	198,677.8	1,399,392.8	
BEP operating earnings = FC / Contribution (INR in millions)	582,489.8	25,890.6	397,823.5	
BEP operating earnings per NTKM (goods) and per PKM (passengers) (INR)	0.960	1.449	1.663	
Margin of safety (with operating earnings) = (Sales – BEP) / Sales	0.04	–0.45	–0.66	
Sales (total earnings) per NTKM or PKM (INR)	1.09	0.15	0.32	
PV ratio = (Total revenue – VC) × 100 / Total revenue (%)	90.41	69.50	69.96	
Contribution = Total revenue – VC (INR)	0.981	0.101	0.223	
BEP total earnings = FC / Contribution in NTKM and PKM (units in millions)	529,895.6	168,256.8	1,186,550.3	
BEP total earnings = FC / Contribution (INR in millions)	575,133.3	24,537.3	377,484.9	
BEP total earnings per NTKM (goods) and per PKM (passengers) (INR)	0.847	1.227	1.410	
Margin of safety (with total earnings)	0.15	-0.23	–0.41	

EXHIBIT 7 Sales–Revenue Mix of IR (INR in millions)

Services	Figures without FAC		Projected figures with FAC	
	Amount	%	Amount	%
Passenger, suburban*	17,870	1.85	18,830	1.76
Passenger, nonsuburban*	239,190	24.74	299,560	27.97
Total passenger**	**257,060**	**26.59**	**318,390**	**29.72**
Goods**	**606,870**	**62.77**	**649,900**	**60.67**
Other	**102,880**	**10.64**	**102,880**	**9.6**
Total***	**966,810**	**100**	**1,071,170**	**100**

*Statement No. 12 of Annual Statistical Statements 2011–12.

**Statement No. 6 of Annual Statistical Statements 2011–12.

****From the Explanatory Memorandum on Railway Budget 2011–12. Available at: http://www.indianrailways.gov.in/railwayboard/uploads/directorate/finance_budget/RailBudget_11-12/Explantory_Memorandum.pdf.*

Indian Railways Annual Statistical Statements 2011–12. Available at: http://www.indianrailways.gov.in/railwayboard/view_section.jsp?lang=0&id=0,1,304,366,554,1276.

sourced products and services, and investments in unremunerative projects.

Therefore, IR needs to accelerate the growth rate of its revenues from both freight and passenger traffic to improve its finances. Fixation of passenger fares, especially for the lower classes, is generally governed by political considerations, and this inevitably leads to subsidization. A part of this subsidization is made up by inflating upper-class fares; however, increasing upper-class fare can only contribute so much to this subsidy. As a result, the burden of cross-subsidization is borne by freight traffic to balance the finances, which makes it costlier and uncompetitive — especially when it comes to road services. If this practice is not stopped by rationally linking passenger fare to input costs, IR will soon be outpriced in the freight market. Therefore, it is essential to establish a suitable tariff structure that can not only cover the cost of operation but also provide for the replacement of assets and growth of business. IR, thus, needs to develop a pricing policy to index fare and freight with the Wholesale Price Index in respect to the cost of petrol and diesel.

Exhibits 1 and 2 show the growth trends of revenue, yield per unit, and fuel costs since the last tariff revision.

Fuel costs are the product of fuel consumption and fuel price. There has been a continuous rise in fuel cost since the last fare revision in 2002–2003, as indicated in Exhibit 3.

As shown in Exhibits 2 and 3, the growth in yield per unit has been significantly less than the increase in fuel costs. However, since the decision to increase fare and freight is subject to sociopolitical factors, indexing freight and fare to fuel price through the FAC is the only accept-

EXHIBIT 8 BEP Analysis of IR Revenues (Projected Revenues with the Implementation of FAC): 2010–2011

	Goods	Passenger		Total
		Suburban	Nonsuburban	
VC, fuel only (INR in millions)	65,120	6,100	80,400	151,620
FC, distributed based on GTKM (INR in millions)	519,990	17,050	264,100	801,140
Total cost (INR in millions)	585,110	23,150	344,500	952,760
Operating earnings (INR in millions)	649,900	18,830	299,560	968,290
Other earnings, distributed based on earnings (INR in millions)	72,270	2,130	28,480	102,880
Total earnings, operating and non-operating (INR in millions)	722,170	20,960	328,040	1,071,170
NTKM/PKM (in millions)	625,720	137,130	841,380	
Sales (operating earnings) per NTKM and PKM (INR)	**1.039**	**0.137**	**0.356**	
VC per NTKM for goods and per PKM for passengers (INR)	0.104	0.044	0.096	
PV ratio = (Sales – VC) × 100 / Sales (%)	89.98	67.60	73.16	
Contribution = Sales – VC (INR)	0.935	0.093	0.260	
BEP = FC / Contribution, NTKM or PKM (units in millions)	556,392.5	183,700.5	1,013,907.7	
BEP operating earnings = FC / Contribution (INR in millions)	577,890.9	25,224.3	360,987.6	
BEP operating earnings per NTKM for goods and per PKM for passengers (INR)	0.889	1.340	1.205	
Margin of safety (with operating earnings) = (Sales – BEP sales) / Sales	0.11	–0.34	–0.21	
Sales (total earnings) per NTKM or PKM (INR)	1.15	0.15	0.39	
PV ratio = (Total revenue – VC) × 100 / Total revenue (%)	90.98	70.90	75.49	
Contribution = Total revenue – VC (INR)	1.050	0.108	0.294	
BEP total earnings = FC / Contribution in NTKM and PKM (units in millions)	495,193.8	157,368.6	897,303.3	
BEP total earnings = FC / Contribution (INR in millions)	571,521.8	24,053.0	349,845.2	
BEP total earnings per NTKM for goods and per PKM for passengers (INR)	0.791	1.148	1.066	
Margin of safety (with total earnings)	0.21	–0.15	–0.07	

able solution to achieve financial viability for the system. This article attempts to determine the impact of implementing the FAC in freight and fare rates on IR's BEP and leverages. Based on published data, an attempt has been made to study how implementing an FAC in fare and freight affects IR profitability.

Theoretical framework

To remain financially solvent, IR must not only earn enough revenue to meet the operational costs (the cost of administration, repair and maintenance of assets, train operation, provision of depreciation, pension benefits, and dividend payments), but it must also have sufficient surplus for the expenses of further development and expansion.

Pricing policy, therefore, directly impacts IR's financial well-being. While adopting an appropriate pricing policy, IR should consider its role as a premier public utility concern and its effect on rail users and the general economic development of India.

Research design

Objective. This article attempts to study the impact of indexing fare and freight to fuel price on the profitability and leverages of IR. This analysis further highlights a need for timely implementation of fare and freight revision through the FAC to compensate for changes in fuel price and the resultant impact on IR finances.

Data. IR publishes various reports and statements, including the Indian Railways Year Book, which contains information on the railway network (for each zone in addition to the entire system), railway infrastructure and expenditure thereon, its assets (e.g., tracks, bridges, electrification, signal and telecom, rolling stock, traction, passenger business, and freight operations), and asset utilization. The Indian Railways Year Book and the Annual Statistical Statements from

EXHIBIT 9 Leverage Analysis Without FAC

	Goods	Passenger services		Total
		Suburban	Nonsuburban	
VC, fuel only (INR in millions)	65,120	6,100	80,400	151,620
FC, distributed based on GTKM (INR in millions)	520,020	17,060	264,060	801,140
Total cost (INR in millions)	585,140	23,160	344,460	952,760
% of GTKM	64.91	2.13	32.97	
Sales, operating earnings (INR in millions)	606,870	17,870	239,190	863,930
Other earnings, distributed based on earnings (INR in millions)	72,270	2,130	28,480	102,880
Total earnings, operating and non-operating (INR in millions)	679,140	20,000	267,670	966,810
Capital at charge (INR in millions), interest-bearing government capital	678,557.2	22,253.0	344,639.8	1,045,450
Contribution = Sales – VC (INR in millions)	614,020	13,900	187,270	815,190
EBIT = Contribution – FC (excluding dividends to government) (INR in millions)	126,070.4	–2,113.8	–60,496.6	63,460.0
Interest (dividends to general revenues) (INR in millions)	32,071.6	1,051.8	16,289.2	49,412.5
EBT = EBIT – Interest (INR in millions)	93,998.8	–3,165.6	–76,785.7	14,047.5
Operating leverage = Contribution/EBIT	4.87	–6.57	–3.10	12.85
Financial leverage = EBIT/EBT	1.34	0.67	0.79	4.52
Total leverage = Contribution/EBT	6.53	1.24	19.13	58.03
EBT/Capital at charge	0.139	–0.142	–0.223	0.013

various years, in addition to the findings from the exploratory study "Cost-based Indexing of Fare and Freight to Fuel Price: Innovative Pricing Policy for Indian Railways," were our main sources of reference data and information.[1]

Model and methodology. The model and methodology of BEP and leverage analysis are described in the following sections.

BEP. The BEP depends on the relative ratios of fixed costs (FC) and variable costs (VC) of different services and has been analyzed for both traffic earnings and total earnings. The BEP is illustrated for each type of service. For this purpose, our assumptions and methodology include:

- VC as the actual expenditure on fuel (for suburban and nonsuburban passenger and goods transport);
- FC as total cost minus VC (distribution has been made based on gross

EXHIBIT 10 Leverage Analysis with Implementation of FAC

	Goods	Passenger services		Total
		Suburban	Nonsuburban	
VC, fuel only (INR in millions)				
FC, distributed based on GTKM (INR in millions)	520,020	17,060	264,060	801,140
Total cost (INR in millions)	585,140	23,160	344,460	952,760
% of GTKM	64.91	2.13	32.97	
Sales, operating earnings (INR in millions)	649,900	18,830	299,560	968,290
Other earnings, distributed based on earnings (INR in millions)	72,270	2,130	28,480	102,880
Total earnings, operating and non-operating (INR in millions)	722,170	20,960	328,040	1,071,170
Capital at charge (INR in millions), interest-bearing government capital	678,557.2	22,253.0	344,639.8	1,045,450
Contribution = Sales – VC (INR in millions)	657,050	14,860	247,640	919,550
EBIT = Contribution – FC (excluding dividends to government) (INR in millions)	169,100	–1,150	–130	167,820
Interest (dividends to general revenues) (INR in millions)	32,071.6	1,051.8	16,289.2	49,412.5
EBT = EBIT – Interest (INR in millions)	137,028.8	–2,205.6	–16,415.7	118,407.5
Operating leverage = Contribution/EBIT	3.89	–12.88	–1,956.54	5.48
Financial leverage = EBIT/EBT	1.23	0.52	0.01	1.42
Total leverage = Contribution/EBT	4.79	–6.74	–15.09	7.77
EBT/Capital at charge	0.202	–0.099	–0.048	0.113

tonne-kilometers [GTKM] worked for these services);
- sales (operating earnings) as earnings from fare and freight;
- total earnings as operating and non-operating earnings; and
- non-operating earnings have been distributed in ratio of passenger earnings to goods earnings.

The following concepts assist in our analysis.

The VC of product keeps changing with changes in volume of production. In this study, fuel (diesel and electricity) for services is assumed to be a VC and comprises 16 percent of the total cost (see Exhibit 4).

FC is the cost of product that does not change over time with changes in volume of production. For this study, staff cost, repairs, maintenance, and overhead have been assumed as the FC, which comprise

WHILE ADOPTING AN APPROPRIATE PRICING POLICY, IR SHOULD CONSIDER ITS ROLE AS A PREMIER PUBLIC UTILITY CONCERN AND ITS EFFECT ON RAIL USERS AND THE GENERAL ECONOMIC DEVELOPMENT OF INDIA.

83.22 percent of the total costs. The FC for each service has been distributed on the basis of GTKM (available from the Annual Statistical Statements No. 16 and No. 32 from 2011–2012), as depicted in Exhibit 4.[2]

Contribution is equal to sales less VC. This is the profit before adjusting the FC, so it includes both profit and FC.

Net tonne-kilometers (NTKM) and passenger-kilometers (PKM) are the performance parameters indicating total payload kilometers of freight traffic and passenger traffic (from Annual Statistical Statement No. 12 and No. 13 of 2011–2012).[3]

The BEP is the point of no profit and no loss for the organization.

Margin of safety is the difference between actual sales and breakeven sales. Profit is the difference between sales revenue and total cost.

Leverage analysis. The following concepts assist in our analysis.

Earnings before interest and taxes (EBIT) is an indicator of operational profitability of an organization and is critically linked to fixed cost. The formula is: EBIT = Profit/loss + Finance costs + Income tax expense.

Earnings before taxes (EBT) is an indicator of net profitability of an organization immediately before taxes. The general formula used for computing EBT is: EBT = Revenue – Expenses (excluding tax).

Operating leverage is an indicator of business risk.

Financial leverage attempts to estimate the percentage change in net income for a 1 percent change in operating income. Financial leverage refers to the amount of debt in the capital structure of the business firm. Financial leverage refers to the right side of the balance sheet, and operating leverage refers to the left side of the balance sheet — the plant and equipment side. While operating leverage determines the mix of fixed assets or plants and equipment used by the business firm, financial leverage refers to how the operation will be financed.

Analysis and findings

This study examines the possible impact of a wide range of strategic decisions in crucial areas such as pricing policies, product mixes, and other important considerations in the planning process in a simple yet analytical form. Armed with just three inputs of data (i.e., sales price, VC, and FC), the effect of the decisions that potentially alter the basic nature of managerial decision-making can be derived. The analysis is bifurcated into two parts: BEP analysis (Part A) and leverage analysis (Part B). Each of these parts is further divided into two sections: one based on the current scenario and the other based on the implementation of the FAC, or the prospective scenario.

Part A: BEP analysis. *Current scenario.* The revenue earnings of IR are derived from passenger (suburban and nonsuburban) fare, freight, and other miscellaneous earnings. The freight and passenger earnings comprise 61 percent and 30 percent of earnings, respectively. The revenue mix of IR for the year 2010–2011 is depicted in Exhibit 5.

We attempt to identify the BEP of three services (goods, suburban passenger, and nonsuburban passenger) with and without the FAC to determine its impact on profitability. BEP defines the limit up to which movement of a commodity is cost-effective and beyond which cost advantage shifts to other services. As the determination of BEP involves the ratio of FC and VC, the elements that constitute the FC and VC become critical for analysis. For IR, VC in terms of costs per tonne-kilometer include the fuel costs, and the remaining costs are fixed. The breakeven analysis of various services without the FAC is shown in Exhibit 6.

Prospective scenario. If cost-based indexation of fare and freight to fuel price is implemented, the projected sales–revenue mix of IR for 2010–2011 would be as shown in Exhibit 7.

The BEP analysis including the FAC would be as depicted in Exhibit 8.

Findings. The projected financial results of indexing fare/freight to fuel price show that the total operating earnings improve from INR 863,930 million to INR 968,290 million, while yield improves to INR 1.039 per NTKM, INR 0.137 per PKM (suburban), and INR 0.36 PKM (nonsuburban) if only operating

earnings are taken into account. If the nonoperating earnings are also included, the earnings would increase to INR 1,071,170 million from INR 966,810 million. The improvement in yield per NTKM or PKM would be INR 1.15, INR 0.15, and INR 0.39 for goods, suburban, and nonsuburban segments, respectively. The BEP and margin of safety would also improve substantially.

Part B: Leverage analysis. Leverage means the employment of assets or funds for which a firm pays a FC or fixed return. Operating leverage is an indicator of business risk arising as a result of high FC other than interest. With a higher proportion of FC and a lower proportion of VC, IR has high operating leverage. The higher the degree of operating leverage, the greater the potential danger from forecasting risk. It must continuously work to cover hefty FC. Financial leverage is an indicator of financial risk arising as a result from the presence of debt in the capital structure of the organization. Total leverage is an indicator of combined risk of both business and financial risk. Low return on capital indicates a dominance of social considerations in investment and pricing policy over consideration of profit.

The concept of leverage, in general, is used in breakeven analysis and in the development of the capital structure of a business firm. Leverages without the implementation of the FAC for IR are shown in Exhibit 9. Leverages with the implementation of the FAC are shown in Exhibit 10.

Findings. As shown, application of the FAC in fare and freight for IR would improve its profitability (i.e., EBT/capital at charge from 0.013 to 0.113) and leverages by improving operating leverage to 5.48 from 12.85 (without FAC) and financial leverage to 1.42 from 4.52 (without FAC).

Summary and conclusion

We aim to determine the impact of implementing the FAC in freight and fare rates for IR on its BEP and leverages. The BEP represents the cutoff point for the organization's profit or loss, and leverages are indicators of risk. While operating leverage is due to FC associated with the production of goods and services, financial leverage exists due to the presence of debt in the capital structure of the company. Leverage analysis enables understanding and developing an effective relationship between overall risk and returns. We find the BEP and margin of safety to improve substantially after implementing the FAC. In addition, application of the FAC in fare and freight would improve IR's profitability from 0.013 to 0.113 as well as its leverages, improving operating leverage to 5.48 from 12.85 (without FAC) and financial leverage to 1.42 from 4.52 (without FAC). These results demonstrate the profound impact of fuel costs and recovery on the BEP and operating leverage of IR. ■

NOTES

[1] Singhania, M. and Sharma, S., Cost-based indexing of fare and freight to fuel price: Innovative pricing policy for Indian Railways, *Cost Management* 30, no. 2 (2016): 24–39.

[2] "Indian Railways Annual Statistical Statements 2011–12," Available at: http://www.indianrailways.gov.in/railwayboard/view_section.jsp?lang=0&id=0,1,304,366,554,1276.

[3] *Ibid.*

THE DOMINATION OF FINANCIAL ACCOUNTING OVER PRODUCT COSTING

There is little evidence supporting the notion that financial accounting dominates product costing, and even where it does, it appears to be an issue of little concern.

JOHN A. BRIERLEY

Kaplan and his co-authors have popularized the notion that financial accounting dominates management accounting. Johnson and Kaplan argue that advances in U.S. management accounting ended by 1925, as management accountants have failed to develop new techniques. They argue that this failure was due partly to the dominance of financial accounting, which has resulted in the development of a financial accounting mentality when preparing management accounting information for decision-making and control.[1] Thus, the domination of financial accounting means that management accounting information is produced from the financial accounting system (FAS), which was never intended to be used for decision-making and control. In other words, for management accounting information to be useful, it should be prepared by the management accounting system (MAS), rather than the FAS.

The objective of this research is to study the results of interviews with management accountants in order to understand the extent to which financial accounting may dominate a particular area of management accounting, namely product costing. In particular, the research is original because it examines the extent to which the methods used to calculate product costs (i.e., absorption costing, direct or variable costing, or activity-based costing [ABC]) and the type of cost system used (i.e., single, separate, or database systems) affect the extent to which management accounting information is influenced by financial accounting considerations. Thus, the research focuses on how product costing systems are used and how they can fulfill the needs of management accountants. This is important because if the preparation of financial accounting information dominates the preparation of product costing information, then this may constrain the usefulness of product cost information used by management accountants.

Prior research into financial accounting domination has not considered the

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extent to which financial accounting requirements for inventory or stock valuation indicated by single systems dominates the extent to which product costs are prepared for decision-making. This is important because product costs for decision-making can be based either on financial accounting requirements or product cost information determined by identifying the relevant cost of a decision. Furthermore, prior research has not considered the extent to which financial accounting domination varies between the absorption costing and direct costing or ABC methods used to calculate product costs, as well as between single, separate, and database systems. This is important because it is expected that operating units in which financial accounting dominates product costing calculate product costs using absorption costing, whereby overhead costs are assigned to product costs using unit- or volume-based cost drivers, as required by financial accounting standards. It is expected that these operating units will use a single system because of the desire to meet financial accounting requirements. In contrast, financial accounting requirements are not expected to dominate the preparation of product costs in operating units that use either direct costing or ABC because they take more care to identify relevant costs for decision-making. Such product costs are expected to be calculated using separate systems or database systems and are not based on financial accounting requirements.

The domination of financial accounting

Product costing systems that are designed for inventory or stock valuation in order to satisfy financial accounting requirements have been regarded as being unlikely to provide accurate and timely information about product costs for the purpose of management decision-making and operational control in dynamic environments.[2] Specifically, Kaplan argues that product costs reported by such a cost system are too aggregated and too late to benefit production staff. Furthermore, it has been suggested that businesses should not operate such a cost system because it will satisfy only the first of the three purposes of cost systems, which include: (1) to allocate costs between cost of goods sold and inventory for inventory valuation and profit measurement; (2) to provide information for decision-making; and (3) to provide data for planning, control, and performance appraisal.[3] Specifically, the first purpose satisfies financial reporting requirements, while the second and third are concerned with satisfying management accounting's requirements by meeting management's internal information needs.[4] Kaplan notes, however, that when cost system designers are aware of these different purposes, any attempt to establish different systems to meet each purpose is stopped by senior management who, due to the domination of a financial accounting mentality, insist "on a single 'official' system," which is the inventory valuation system.[5] This suggests that rather than using a single system to satisfy the three purposes of inventory valuation, decision-making, and control, organizations should use either three separate cost systems to meet each purpose (separate systems) or a database cost system in which the three systems are integrated and information is extracted to meet each purpose when it is needed (database systems).[6]

In prior research, there is a lack of consensus about whether financial accounting dominates management accounting. There is evidence to show that product costing and control procedures are influenced heavily by financial accounting requirements.[7] In contrast, other research has found no evidence of the FAS dominating the MAS.[8] Others have criticized the notion of domination because of the lack of attention given to whether managers are aware of the limitations of the data obtained and use a variety of different pieces of information in a flexible way for decision-making.[9] In addition, the continued development in the capacity of MASs has led some to argue that the criticism of the notion of the dominance of financial accounting over management accounting as being somewhat redundant.[10] Related to this, it has been suggested

IN PRIOR RESEARCH, THERE IS A LACK OF CONSENSUS ABOUT WHETHER FINANCIAL ACCOUNTING DOMINATES MANAGEMENT ACCOUNTING.

that as there has been much integration between the MAS and FAS in the capture of accounting data, management accountants may perceive their information needs in terms of financial accounting information, which does not necessarily mean that the FAS dominates the MAS.[11] This may not be the case, however, if a database system is used to capture financial and management accounting information that is analyzed and prepared in different ways for different purposes. In this case, the integration of the MAS and FAS means that information prepared for management accounting purposes could be different from that prepared for financial accounting.[12]

The four-stage model of product costing systems

Kaplan developed a four-stage model to formally identify four different stages of product cost system design.[13] In Stage 1 systems, transactions are either not recorded or recorded with a large number of errors. Stages 2, 3, and 4 of these product costing systems can be used to calculate product costs to meet one or more of the three purposes of product cost information mentioned previously. In Stage 2 systems, the cost system is a single system that is used for financial accounting purposes. It is regarded as being inadequate for providing accurate product cost and control information because the system uses a small number of unit-based cost drivers to assign overhead costs to product costs, rather than using non-unit-based cost drivers to assign overhead costs to product costs based on the activities that drive those costs.[14] Stage 2 systems are said to provide distorted product cost and control information that is too aggregated, too late, and too financially orientated because it is produced by a system that is suitable for financial accounting purposes rather than for product costing purposes.[15]

In Stage 3 systems, operating units have three separate cost systems to satisfy each of their three purposes. The product cost system can be an ABC system that assigns overhead costs to product costs using non-unit-based cost drivers. Inventory valuations for financial accounting purposes are obtained from a Stage 2 system that can allocate production costs between cost of goods sold and inventory. The control system should aim to provide timely and accurate financial and nonfinancial information.[16] In this case, product costing information is produced separately from the FAS. It is not dominated by the FAS.

In Stage 4 systems, the ABC product costing system and the control system are integrated into a single cost database, which is used to prepare the financial statements.[17] The database can allow certain costs, such as nonmanufacturing costs, which are excluded from the cost of goods sold and inventory valuations in the financial statements, to be included in product costs for decision-making. In addition, certain facility-level costs (such as factory depreciation), which are included in the cost of goods sold and inventory in the financial statements, can be excluded from individual product costs. Stage 4 systems can be in the form of enterprise resource planning systems.[18] Alternatively, they can be in the form of a stand-alone database cost system that can meet inventory valuation requirements to which adjustments are made to produce separate cost databases for product costing and control.[19] Even though the FAS and MAS are integrated, the use of some form of database means that the FAS does not influence the production of product costs.

EVEN THOUGH THE FAS AND MAS ARE INTEGRATED, THE USE OF SOME FORM OF DATABASE MEANS THAT THE FAS DOES NOT INFLUENCE THE PRODUCTION OF PRODUCT COSTS.

Research method

The interviewees were a nonrandom sample of 49 qualified cost and management accountants working in the British manufacturing industry who responded to a questionnaire survey about product costing practices and had agreed to be interviewed. Information about the domination of financial accounting over product costing was obtained by responses to two questions from the questionnaire. The first question asked: In your operating unit, to what extent do you agree/disagree that the requirement to produce accounting information to meet financial account-

ing requirements dominates the need to produce product cost information for decision-making? The second question asked: In your operating unit, to what extent do you agree/disagree that the product costing system used for decision-making is designed mainly to provide information for published financial accounting statements? In the questionnaire, decision-making was defined as pricing, make-or-buy, cost reduction, product mix, output level, product design, evaluation of new production process, and product discontinuation decisions. The responses to both questions were marked on a five-point scale with responses ranging from 1–5, where 1 indicates *strongly agree* and 5 indicates *strongly disagree*. These responses were reverse scored, summed, and divided by two for data analysis.

Information about cost system design was obtained by asking whether product cost information was:

1. taken (and not subsequently adjusted) from a single cost database that is used for stock valuation (single system);
2. taken from a product costing system that is separate from the single cost database used for stock valuation (separate system); or
3. taken from an adjustment of product cost information produced by the single cost database that is used for stock valuation using a separate cost database (database system).

Here, the first response is analogous to the preparation of product costing information using an FAS, and the second and third responses are analogous to the preparation of product costing information that is based on management accounting information. In addition, the questionnaire also requested information about whether product costs were calculated using direct costing, absorption costing, or ABC. The interviews enhanced the richness of the questionnaire findings by asking interviewees the reasons for particular responses made on the questionnaire. An interview design was chosen to address the research objective to give a deeper insight into the extent to which financial accounting dominates product costing by examining the reasons why financial accounting does or does not dominate product costing. The interviews were semi-structured, recorded, and conducted face-to-face at the interviewee's operating unit.

Findings

Of the 49 interviewees, the median, mean, and standard deviation for the measure of the extent to which financial accounting dominates product costing are 2.50, 2.72, and 1.09, respectively. These figures indicate that financial accounting does not really dominate product costing. Based on the responses to questions on the questionnaire, the interviewees were from operating units that were not overly large (median annual sales revenue = £36 million, and median number of employees = 295) and were from a variety of manufacturing industries. Exhibit 1 shows the relationship between the type of cost system design for operating units and whether they use ABC, direct costing, or absorption costing.

Financial accounting does not dominate product costing. As expected, none of the interviewees from operating units preparing product costs for decision-making using ABC or direct costing felt that financial accounting dominated the preparation of product costs for decision-making, and, as expected, none of them produce product costs from a single cost system used for financial accounting. The interviewee from the only operating unit using ABC calculated product costs for decision-making using a separate system. Like Cooper and Kaplan, he considered financial accounting information to be unsuitable for calculating product costs and, by implication, the product costs should not be taken from a single system used to prepare the financial accounts. He said, "The first thing to do is to not allow the financial [accounting] system to dictate your costings. The traditional problem is most financial [accounting] systems are set up to cater for external parties. They're there for the shareholders and the stock exchange and tax people. They're not there to provide management information. They never were."

THESE FIGURES INDICATE THAT FINANCIAL ACCOUNTING DOES NOT REALLY DOMINATE PRODUCT COSTING.

EXHIBIT 1 The Relationship Between the Domination of Financial Accounting Over Product Costing and the Calculation of Product Costs and Cost System Design

Description	Single system n	(%)	Separate system n	(%)	Database system n	(%)	Adjustment of product cost data[a] n	(%)	Total n	(%)
Financial accounting does not dominate product costing:										
Operating units using ABC or direct costing	–	(–)	2	(33)	1	(17)	3	(50)	6	(100)
Operating units using absorption costing	17	(53)	6	(20)	9	(27)	–	(–)	32	(100)
Useable responses	17	(45)	8	(21)	10	(26)	3	(8)	38	(100)
Financial accounting dominates product costing:										
Operating units using ABC or direct costing	–	(–)	–	(–)	–	(–)	–	(–)	–	(–)
Operating units using absorption costing	10	(91)	–	(–)	1	(9)	–	(–)	11	(100)
Useable responses	10	(91)	–	(–)	1	(9)	–	(–)	11	(100)
Total usable interviewees	27	(55)	8	(16)	11	(23)	3	(6)	49	(100)

[a] The inventory valuation is an adjustment to the product cost data.

The operating units using direct costing use either a separate system, database system, or a system in which direct product costs are calculated initially and then adjusted to provide product costs for inventory valuation by including fixed manufacturing overhead costs. Although the latter type of cost system was not anticipated, it is similar to the database systems described previously, except that it operates in reverse. In this case, the financial accounting costs are prepared from the direct product costs, rather than the product costs for decision-making being prepared from the financial accounting costs. As with the operating unit using ABC, by using direct costing the interviewees said that their operating units ensure that the product costing system is different from the FAS and hence financial accounting does not influence product costing.

Unexpectedly, of the operating units using absorption costing to calculate product costs, 6 operating units use separate systems, and 10 use database systems. All of the operating units using absorption costing with separate systems consider financial accounting to not dominate product costing. The following comments from two of these interviewees (from manufacturers of pharmaceuticals and preserves, respectively) on the domination of financial accounting over product costing are typical:

> The product costing side has very little to do with the financial accounting side of it at all.…Obviously, you've got to keep your financial reporting requirements in the background. You can't divorce the two. I wouldn't have said they'd take any primary issue in financial accounting at all, really.

> I would say hardly any, to be honest. When we do a product cost, we do it because of the commercial outlet. We don't think, 'If we do this, how will it affect the financial accounting requirements?' It's very much commercially generated.

The views expressed are similar to interviewees using direct costing. The decision to keep the costing systems separate is not based on avoiding the pos-

sible adverse effects of the domination of financial accounting, but rather on the need to produce relevant product cost information for decision-making.

Although the adjustments to the database systems in nine operating units using absorption costing are fairly limited, they are sufficient for the interviewees to say that financial accounting requirements do not dominate product costing. Most of the adjustments in the database systems are to update the standard costs in the FAS to provide actual product costs for decision-making or to make minor changes to the calculation of the fixed overhead, such as excluding some or all fixed overhead costs from a product cost for a particular decision. These adjustments are not as extensive as those discussed by Cooper and Kaplan, and there is no attempt to calculate product costs that could be described as having ABC characteristics. Even so, the interviewees felt that these limited adjustments provide more relevant product cost information that is different to the financial accounting costs, which is consistent with the idea that managers produce the information they need to assist in managing their businesses.[20] For example, an interviewee from a manufacturer of foodstuffs, whose only adjustment to the financial accounting costs is to update standard costs to actual costs, said:

> I'm a management accountant, so I like to think that our financial reporting requirements do not drive our management reporting systems, and we've been very careful to keep the two very distinct. Our statutory accounts are not prepared from our MASs, and similarly with product costing. Yes, there is a fundamental requirement to value your stock, so therefore you've got to have a standard cost, but our standard costs used for product costing are based on management information rather than stock valuation requirements.

Thus, this relatively simple change is regarded as providing management information rather than financial accounting information.

The interviewees in operating units using absorption costing and single systems, which state that financial accounting does not dominate product costing, felt that the production of relevant management accounting information is the main driver of the financial accounting information. This is contrary to the suggestion that management accountants might perceive their information needs in terms of financial accounting.[21] Thus, rather than financial accounting dominating product costing, the culture in these accounting departments is that product costing dominates financial accounting. For example, an interviewee from a ceramics manufacturer said, "I believe that management [accounting] information for decision-making is far more important than financial [accounting] information. We tend to work that way around. Most of the information that requires financial accounting we tend to argue what we use is management decision information."

The argument here is that, notwithstanding the use of absorption costing, the accounting information is produced to satisfy product costing purposes, and it is almost incidental that it satisfies financial accounting purposes.

Financial accounting dominates product costing. None of the operating units using direct costing and ABC felt that financial accounting dominates product costing. For operating units using absorption costing with single systems, for which financial accounting is said to dominate product costing, 8 of the 10 interviewees acknowledge that there is little or no attempt to consider the possibility of obtaining more relevant product cost information. For example, an interviewee from a medical equipment manufacturer said:

> The financial accounting requirements are really what's driving the product costing structure, to some extent because we have to allocate all of our overheads and such like into there, and that's what's forming the basis of our inventory valuation from a financial accounting point of view. So the importance of it really is that it's driving everything in our costing structure to some extent. It's certainly driving the bottom-level numbers that we get. Thereafter, we haven't done an awful lot to investigate what we can do to segregate some of the more meaningful elements of the management accounting costs.

An interviewee from an industrial machinery manufacturer went further and said that he regards the preparation of the financial accounts as being the most important part of the accounting function and that, consequently, all man-

THE INTERVIEWEES FELT THAT THESE LIMITED ADJUSTMENTS PROVIDE MORE RELEVANT PRODUCT COST INFORMATION THAT IS DIFFERENT TO THE FINANCIAL ACCOUNTING COSTS.

THEIR CONCERN ABOUT THE USE OF FINANCIAL ACCOUNTING INFORMATION IN PRODUCT COSTING IS NOT DUE TO THE DOMINATION OF FINANCIAL ACCOUNTING, BUT RATHER THE LACK OF RESOURCES TO INVEST IN A PRODUCT COSTING SYSTEM THAT COULD PRODUCE MORE RELEVANT PRODUCT COSTS FOR DECISION-MAKING.

agement accounting information is subservient to this. The management accounting information is produced from the financial accounting information and has to be reconciled back to the financial accounting information. He said:

> The ultimate job that we have got is to produce the financial [accounts]. That is the corporate and the legal obligation of our accounting team. The fact that you've then got the spin-off of a management accounting function there that will be produced from figures that have been compiled from the financial [accounts]. What you will find is that you will not balance the financial [accounting] figures to the product costing or the management [accounting] information. It's always balancing the management [accounting] information to the financial [accounts]. The financial [accounting] is always the driver.... Martin will always put adjustments into the management [accounting] side of things to make it balance back to the financial [accounts].

In these cases, the usefulness of product costing information for decision-making is not an issue. The main concern is with producing financial accounting information, and the management accountants perceive their product costing information needs in terms of financial accounting information.[22] In these cases, although the relevance of product costing information can be improved, contrary to Kaplan and his co-authors, there is no criticism of the dominance of financial accounting leading to the calculation of poor-quality product costing information. In these operating units, the management accountants are content with their product costs.

For the other two interviewees, the domination of financial accounting over product costing arose in small operating units employing only one accountant, who has sole responsibility for producing accounting information. In these two cases, monthly financial accounts are the only accounting information produced because of the lack of resources preventing the production of separate product cost information for decision-making. An interviewee from a foodstuffs manufacturer said:

> The financial accounts are the only accounts that are produced at the moment. We need to prepare those financial accounts both for ourselves and our parent company. That dominates it because we've actually got to do it, and really at the moment that's the only way, through lack of manpower, we can actually make decisions really. At the moment, it [financial accounting] does dominate it because we don't have an up-to-date product costing. We've got to use the financial accounts at the moment.

Similarly, the management accountant in a small packaging manufacturer acknowledged the domination of financial accounting, the deficiencies of producing only financial accounting–based information for management accounting purposes, and the need to produce more relevant product cost information for the business. He said:

> I'm the only financially qualified person in the company. So obviously my primary role, like it or lump it, is to produce a set of financial accounts every month. If I don't do it, we don't know where we are, and we don't know where we're going, and, obviously, that's the primary function of any accounts department — to produce the monthly P&L, and the balance sheet, and all the rest of it. So that obviously dominates my time and my focus for the first two weeks of any month....And then it's a matter of everything else tags on the end. And due to the way we've worked, and due to the nature of other things that have been going on, it has been dominated by the financial side of things. One of my tasks for this year is to change the focus of what I do and start moving away from focusing on the financial stuff. Oh yes, I've got to produce the financial stuff and get it done and get it done on time, but to move to producing more costing information, more marginal analysis information for decision-making to pass around to the sales team and sales director and the production side of things. So at the moment it is dominated by financial, but I've got a task to change that around.

This was the only interviewee who discussed the possibility of preparing relevant costs for decision-making and producing different cost information for different decisions.

The interviewees in these two small operating units are the only operating units using single systems that acknowledge the deficiencies of their single systems for the preparation of product costs for decision-making. Their concern about the use of financial accounting information in product costing is not due to the domination of financial accounting, but rather the lack of resources to invest in a product costing system that could produce more relevant product costs for decision-making. This means that only financial accounting–based information can be produced because of the statutory require-

ment to produce it, after which there are no extra resources to produce separate management accounting information for use within the organization. In all of the larger operating units using absorption costing, and with financial accounting having an influence over product costing, the interviewees seemed relatively content with the financial accounting–based product cost information and did not consider the need to invest in a separate system or database system or use ABC or direct costing to produce more relevant costs for decision-making.

The interviewee from the only operating unit using a database system felt that financial accounting dominates product costing but not because of issues relating to financial accounting. This interviewee from an aerospace manufacturer felt that, although adjustments are made to financial accounting–based product costs in order to provide more relevant product cost information for decision-making, these costs cannot be used outside the accounting department. This is because of the problem with non-accounting staff not being able to understand the cost information. In order to maintain the understandability of the product cost information, fewer adjustments are made to financial accounting–based costs, which reduces the availability of relevant cost information. The preparation of more relevant costs for decision-making is regarded as counterproductive as it is likely to confuse non-accounting staff. Thus, the issue is not about the influence of financial accounting over product costing, but the lack of accounting knowledge of non-accounting staff.

Conclusion

The findings reveal that there is little support for the notion that financial accounting dominates product costing, and even where it does, it appears to be an issue of little concern. This is largely because management accountants are satisfied, in general, with the product cost information produced. This result is significant because the present research shows that it holds regardless of the methods used to calculate product costs.

When operating units calculated product costs using ABC or direct costing, the issue of financial accounting domination was irrelevant. Operating units used direct costing or ABC because this was regarded as providing useful information for decision-making. The emphasis on calculating costs in ways that were relevant for decision-making purposes was also evident in operating units using absorption costing with a product cost system that was separate from the FAS; to a large extent, this applied also to operating units using database systems. There were more mixed results in operating units using absorption costing with single systems. In the operating units that considered absorption-based product costs as relevant costs, there was no evidence of any financial accounting domination. Financial accounting did appear to dominate, however, in situations where product costs were produced in a single system from financial accounting information that was not deemed capable of producing relevant information for decision-making. In these situations, the management accountants seemed to perceive their product costing information in terms of financial accounting requirements. Nevertheless, they were still satisfied with the product costs produced and did not regard the domination of financial accounting as an issue of concern. The only instance where financial accounting domination caused concern about the calculation of product costs was in small operating units using absorption costing that did not have the resources to invest in product costing systems to produce more relevant product costs for decision-making.

THE PREPARATION OF MORE RELEVANT COSTS FOR DECISION-MAKING IS REGARDED AS COUNTERPRODUCTIVE AS IT IS LIKELY TO CONFUSE NON-ACCOUNTING STAFF.

In future research, it is necessary to emphasize the extent to which the domination of financial accounting can vary with the extent to which cost information is used in decision-making. Thus, in some organizations domination may be high because little use is made of product costs in decision-making, and then management accountants prepare product costs using financial accounting information. In contrast, if product

costs are used all of the time in decision-making, they may take more care in the preparation of product costs to ensure that relevant costs are prepared for decision-making using methods such as ABC or direct costing. In addition, the research should consider if the extent of domination varies between different decisions. For example, it may be that for so-called "important" organizational decisions, tailored product costs are prepared for these decisions, and hence domination is low. Whereas for more routine decisions, when such costs are not prepared, then financial accounting information may be more likely to dominate.

In addition, it is necessary to extend the research to nonmanufacturing organizations to assess the extent to which the notion of financial accounting domination exists in organizations that have different cost structures than manufacturing firms and whether the results of this research relating to manufacturing firms are replicated in nonmanufacturing firms.

Overall, it can be concluded that there is little evidence to suggest that the methods used to calculate product costs are unduly influenced by financial accounting considerations. Although financial accounting domination has been regarded as being the reason for the lack of innovation in U.S. management accounting for much the 20th century, the results of this research show that British management accountants do not regard financial domination as an issue, even when they are using traditional absorption costing to calculate product costs.[23] The results demonstrate that the most important influence on the methods used to calculate product costs and the degree of contentment with those costs is the particular context facing operating units. Notwithstanding the variety of contexts in which they operate, management accountants are generally happy with their product cost information. ■

NOTES

[1] Kaplan, R.S., The evolution of management accounting, *The Accounting Review* 59, no. 3 (1984): 390–418; Johnson, H.T. and Kaplan, R.S., *Relevance Lost: The Rise and Fall of Management Accounting*. (Boston, M.A.: Harvard Business School Press, 1987).

[2] Kaplan, R.S., One cost system isn't enough, *Harvard Business Review* 66, no. 1 (1988): 61–66; Kaplan, R.S. and Cooper, R., *Cost and Effect: Using Integrated Cost Systems to Drive Profitability and Performance*. (Boston, M.A.: Harvard Business School Press, 1998).

[3] *Ibid.*

[4] *Op. cit.* note 2 *Cost and Effect: Using Integrated Cost Systems to Drive Profitability and Performance.*

[5] *Op. cit.* note 2 Kaplan.

[6] *Op. cit.* note 2 *Cost and Effect: Using Integrated Cost Systems to Drive Profitability and Performance.*

[7] Drury, C., Braund, S., Osborne, P., and Tayles, M., *A Survey of Management Accounting Practices in UK Manufacturing Companies*. (London: The Chartered Association of Certified Accountants, 1993); Emore, J.R. and Ness, J.A., The slow pace of meaningful change in cost systems, *Journal of Cost Management for the Manufacturing Industry* (1991): 36–45; Friedman, A. and Lyne, S., *Activity-based Techniques*. (London: The Chartered Institute of Management Accountants, 1995).

[8] Dugdale, D., Jones, C., and Green, S., *Contemporary Management Accounting Practices in UK Manufacturing*. (London: The Chartered Institute of Management Accountants, 2005); Hopper, T., Kirkham, L.A., Scapens, R.W., and Turley, S., Does financial accounting dominate management accounting? A research note, *Management Accounting Research* 3, no. 4 (1992): 307–311; Scapens, R.W., Turley, S., Burns, J., Lewis, L., Joseph, N., and Southworth, A., *External Reporting and Management Decision: A Study of their Interrelationship in U.K. Companies*. (London: The Chartered Institute of Management Accountants, 1996).

[9] *Op. cit.* note 7 Drury.

[10] *Op. cit.* note 8 Hopper; *Op. cit.* note 8 Scapens.

[11] *Ibid.* Scapens.

[12] *Op cit.* note 8 Scapens.

[13] Kaplan, R.S., The four-stage model of cost system design, *Management Accounting* (Feb 1990): 22–26; *Op. cit.* note 2 *Cost and Effect: Using Integrated Cost Systems to Drive Profitability and Performance.*

[14] *Op. cit.* note 2 *Cost and Effect: Using Integrated Cost Systems to Drive Profitability and Performance.*

[15] *Ibid.*

[16] Cooper, R. and Kaplan, R.S., The promise — and peril — of integrated cost systems, *Harvard Business Review* 76, no. 4 (1998): 109–119; *Op. cit.* note 2.

[17] *Ibid.* Cooper; *Op. cit.* note 2 *Cost and Effect: Using Integrated Cost Systems to Drive Profitability and Performance.*

[18] *Ibid. Cost and Effect: Using Integrated Cost Systems to Drive Profitability and Performance.*

[19] Dedera, C.R., Harris semiconductor ABC: Worldwide implementation and total integration, *Journal of Cost Management* 10, no. 1 (1996): 44–58; Kaplan, R.S., "AT&T Paradyne." Harvard Business School Case 195-165 (May 1995).

[20] *Op cit.* note 8 Scapens.

[21] *Ibid.*

[22] *Op cit.* note 8 Scapens.

[23] *Op. cit.* note 1 Johnson.

ACTIVITY-BASED COSTING SYSTEMS:

The primary objective is to provide current accounting students and cost accounting professionals a reasoned argument for why some facility-level activities should be allocated to a product using a certain comprehensive activity driver.

SHOULD FACILITY-LEVEL ACTIVITY COSTS BE ALLOCATED AND, IF SO, HOW?

PARVEZ R. SOPARIWALA

Despite the corporate world's general enthusiasm for activity-based costing (ABC) systems, Stratton, Desroches, Lawson, and Hatch find that between 60 and 70 percent of their ABC-user respondents feel the "need to find better ways to allocate cost accurately."[1] Considering that a discussion of ABC is included in practically every cost accounting and managerial accounting textbook, one would think that the principles of ABC allocations have been clearly conveyed to the readers of these textbooks.

Unfortunately, this is not the case. It is true that cost accounting and managerial accounting textbooks by and large suggest similar treatments for unit-level activities (supplies, energy, lubricants, etc., for which costs are charged to products using unit-level activity drivers like number of units, direct labor hours, or machine hours), batch-level activities (setups or sales invoicing for which costs are charged to products using batch-level activity drivers like number of setups or sales invoices, respectively), and product- or customer-level activities (where product advertising or design costs are traced or charged to product lines). The inconsistency arises with what to do with facility-level or organization-sustaining activities (hereafter, facility-level activities) where cost accounting and managerial accounting textbooks disagree on the following:

1. whether these facility-level activities should include just manufacturing activities or both manufacturing and nonmanufacturing activities; and
2. whether the costs relating to these facility-level activities should be

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EXHIBIT 1 Five Best-selling Cost and Managerial Accounting Textbooks (2012)

Names of top five best-selling cost and managerial accounting textbooks	What do costs relating to facility- or organization-level activities include?	Should these costs be allocated to the product/service?
Blocher, E., Stout, D., Juras, P., and Cokins, G., *Cost Management: A Strategic Emphasis*. 6th ed., (New York: McGraw-Hill Irwin, 2012).	Only manufacturing costs	Not clear
Brewer, P., Garrison, R., and Noreen, E., *Introduction to Managerial Accounting*. 5th ed., (New York: McGraw-Hill Irwin, 2009).	Only manufacturing costs	Only allocate for financial reporting
Edmonds, T.P., Tsay, B., and Olds, P.R., *Fundamental Managerial Accounting Concepts*. 5th ed., (New York: McGraw-Hill Irwin, 2009).	Only manufacturing costs	Allocate
Eldenburg L.G. and Wolcott, S.K., *Cost Management: Measuring, Monitoring, and Motivating*. 2nd ed., (Hoboken, N.J.: John Wiley & Sons, 2011).	Manufacturing costs Nonmanufacturing costs	Typically not allocated Do not allocate
Garrison, R., Noreen, E., and Brewer, P., *Managerial Accounting*. 15th ed., (New York: McGraw-Hill Education, 2015).	Manufacturing and nonmanufacturing costs	Do not allocate
Horngren, C.T., Datar, S.M., and Rajan, M.V., *Cost Accounting: A Mangerial Emphasis*. 15th ed., (Upper Saddle River, N.J.: Pearson, 2015).	Manufacturing and nonmanufacturing costs	Either treatment, as long as pros and cons of allocation are recognized
Kinney, M.R. and Raiborn, C.A., *Cost Accounting: Foundations and Evolutions*. 9th ed., (Mason, O.H.: South-Western CENGAGE Learning, 2013).	Manufacturing and nonmanufacturing costs	Do not allocate
Lanen, W., Anderson, S., and Maher, M., *Fundamentals of Cost Accounting*. 4th ed., (New York: McGraw-Hill Irwin, 2014).	Only manufacturing costs	Allocate
Mowen, M.M., Hansen, D.R., and Heitger, D.L., *Cornerstones of Managerial Accounting*.6th ed., (Boston: CENGAGE Learning, 2016).	Only manufacturing costs	Not clear
Weygandt, J.J., Kimmel, P.D., and Kieso, D.E., *Managerial Accounting: Tools for Business Decision Making*. 7th ed., (Hoboken, N.J.: John Wiley & Sons, 2015).	Only manufacturing costs	Not clear

EXHIBIT 2 An Extremely Simple Situation of a Manufacturing Company: Facts and Workings

Stage two: Tracing and allocating activity costs to products

Activity type	Activity driver	Activity use, direct and allocated costs: Total	Product A	Product B
Direct material		$400,000	$ 100,000	$ 300,000
Direct labor		$240,000	$ 180,000	$ 60,000
Per-unit inspection	Units produced	5,000	1,000	4,000
Allocations		$ 15,000	$ 3,000	$ 12,000
Purchasing	Purchase orders	400	100	300
Allocations		$ 10,000	$ 2,500	$ 7,500
Design	Design hours	800	200	600
Allocations		$ 11,000	$ 2,750	$ 8,250
Factory-related activities	Direct labor hours	12,000	9,000	3,000
Allocations		$ 80,000	$ 60,000	$ 20,000
Corporate management	Direct labor hours	12,000	9,000	3,000
Allocations		$ 20,000	$ 15,000	$ 5,000

allocated to the product or merely written off to the income statement.[2]

As most, if not all, practicing corporate cost accountants learned ABC in their undergraduate or graduate cost accounting or managerial accounting courses, their knowledge of ABC depends on the treatment of facility-level activities illustrated in their textbooks. Hence, our primary objective is to provide current accounting students and cost accounting professionals who read *Cost Management* a reasoned argument for why some facility-level activities (those such as factory supervision that are primarily manufacturing- or factory-related) should be allocated to a product using a certain comprehensive activity driver, in contrast to other facility-level activities that are primarily administrative or corporate activities, which should not be allocated to a product.[3] This issue is important as a business without accurate product costs is likely to make regrettable business decisions, such as continuing to produce and sell an unprofitable product or provide an unprofitable service.

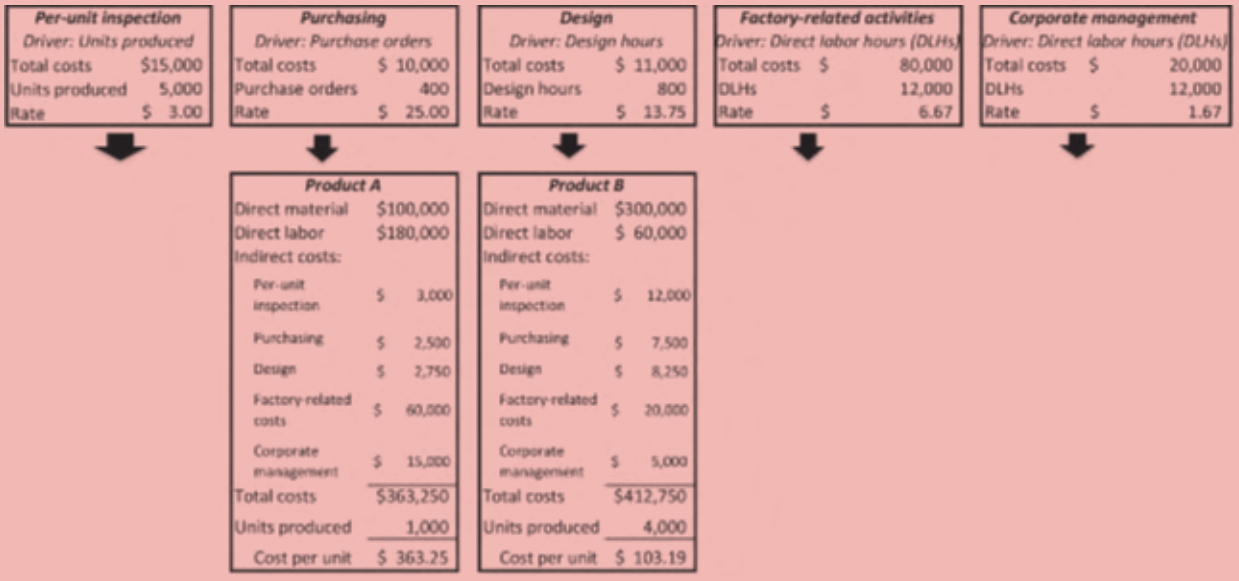
Stratton et al. echo this sentiment: "Our results provide ample support for the conclusion that ABC methods do indeed provide significant value to managers. We believe the use of ABC provides companies with superior cost- and profitability-measurement systems."[4]

How do cost accounting and managerial accounting textbooks treat costs relating to facility-level activities?

Exhibit 1 lists the five best-selling managerial accounting textbooks and the five best-selling cost accounting textbooks in alphabetical order and reveals those that:

1. consider facility-level activities to be manufacturing or both manufacturing and nonmanufacturing; and
2. recommend allocating costs relating to facility-level activities, recommend not allocating costs relating to facility-level activities, or were unclear about allocations.[5]

EXHIBIT 3 Stage Two Allocations: Costs Relating to Factory and Corporate Management Activities Allocated to Products



The following section evaluates the two prominent treatments of facility-level activities used in this sample of 10 cost accounting and managerial accounting textbooks.

An evaluation of the two prominent textbook treatments of facility-level activities

Exhibit 2 reveals an extremely simple situation of the stage two allocation for a manufacturing company for which all factory and administrative operations (e.g., accounting, payroll, and corporate management) are under the same roof.[6] This company manufactures two products — Product A and Product B. Product A is assembled from basic raw materials and requires extensive assembly, whereas Product B is assembled using finished components and hence requires less assembly.

In addition, Exhibit 2 reveals the stage two allocation process wherein activity costs, along with direct material and direct labor costs, are assigned to each product using the following activity drivers:

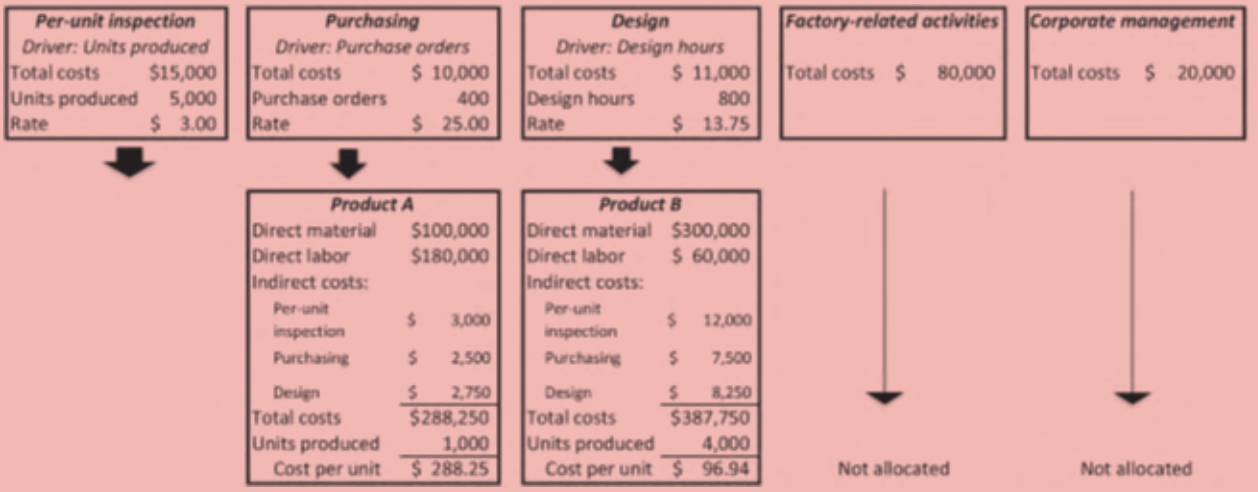
- number of units produced for per-unit inspections (a representative unit-level activity);
- number of purchase orders for purchasing (a representative batch-level activity);
- number of design hours for design (a representative product-level activity); and
- direct labor hours for two examples of facility-level activities — factory-related and corporate management activities.[7]

While the stage two treatments for per-unit inspections, purchasing, and design are not an issue here, the treatments for factory-related and corporate management activities are, and their different influences on product costs are now discussed in the following two scenarios.[8]

Costs relating to factory-related and corporate management activities allocated to products. Using all the data from Exhibit 2, Exhibit 3 allocates all activity costs to Products A and B and reveals that total costs of $363,250 and $412,750 and unit costs of $363.25 and $103.19 are charged to Products A and B, respectively. Unfortunately, this treatment has the following two flaws.

Allocating costs relating to corporate management activities to products. Since corporate management activities have no relationship to either product, their costs

EXHIBIT 4 Stage Two Allocations: Costs Relating to Factory and Corporate Management Activities Not Allocated to Products



cannot be considered resources used in the manufacture and sale of these products. As a result, these corporate management costs should not be allocated to the two products.

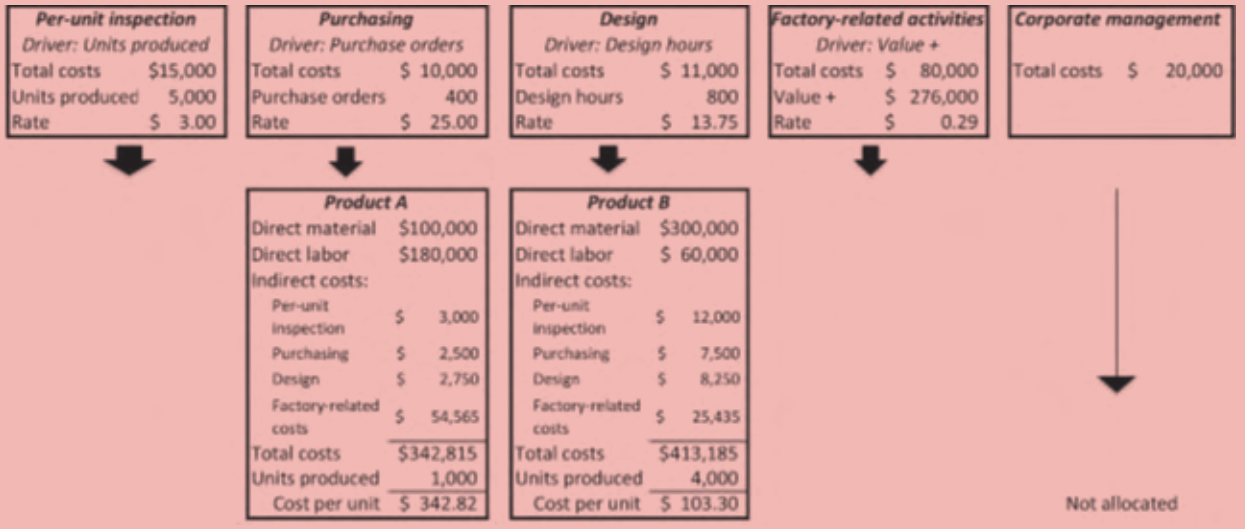
Using a volume-based activity driver to allocate costs relating to factory-related activities. In contrast to corporate management activities, costs relating to factory-related activities should be included in the cost of each product since these factory-related costs represent resources used in the manufacture of these products. However, the problem is in determining the appropriate activity driver to allocate these costs. Our example in Exhibit 2 allocates these costs using direct labor hours, thereby implying that Products A and B used factory-related activities in a ratio of 3:1 (9,000 direct labor hours for Product A vs. 3,000 direct labor hours for Product B) because the work done in the factory was 75 percent for Product A and 25 percent for Product B. Unfortunately, that assumption is not correct because the work done in the factory was not only direct labor–oriented but also included inspections, purchasing, and design, all of which favored Product B.[9] As a result, ignoring activities such as inspections, purchasing, and design could have effectively overstated the allocation of the costs of factory-related activities to Product A and understated the allocation to Product B. Hence, a more appropriate activity driver would find some way to incorporate the influences of these three omitted activities in the allocation of the costs of factory-related activities.[10]

Costs relating to factory-related and corporate management activities not allocated to products. Using the data from Exhibit 2, Exhibit 4 allocates all activity costs, except those related to factory and corporate management activities, to Products A and B and reveals that total costs of $288,250 and $387,750 and unit costs of $288.25 and $96.94 are charged to Products A and B, respectively. Not allocating the costs relating to corporate management activities to products is appropriate since, as discussed previously, these activities do not in any way contribute to the manufacture and sale of the two products.

On the other hand, not allocating the costs of factory-related activities to products is not appropriate since these activities do contribute to the manufacture of the products, and as discussed, these costs should be allocated to the products even though such allocation may use a flawed activity driver like direct labor hours.

As might be expected, the total costs charged to each product and its respective

EXHIBIT 5 Stage Two Allocations: Costs Relating to Factory Activities Allocated but Costs Relating to Corporate Management Activities Not Allocated to Products



unit costs vary between the two interpretations, as one interpretation allocates all costs relating to facility-level activities to the products whereas the other does not. Since both interpretations are inconsistent with cost accounting and managerial accounting principles, the following section recommends an interpretation more in concert with these principles.

What do we recommend?

This article recommends that costs relating to corporate management activities should not be allocated since these activities do not contribute in any way to the manufacture and sale of the product. On the other hand, it is recommended that costs relating to factory-level activities should be allocated to products since these activities do contribute to the manufacture of the products. However, there is justifiable concern that activity drivers (such as direct labor hours) do not always represent all the work done in the factory for each product.

What if there was a methodology that could incorporate all the work done in the factory (i.e., direct labor plus activities such as inspections, purchasing, and design)? Since the activity drivers for these four activities are different, they are not additive. Hence, the best way to determine the work done in the factory is to add the costs of all these activities. Actually, the 1998 John Deere Component Works (A) case used value-added costs to allocate costs relating to factory-related activities to products. [11] Hence, the employment of value-added costs allows the inclusion of all activities (i.e., direct labor, inspections, purchasing, and design) that presumably influenced the costs of factory-related activities.[12]

Using the data from Exhibit 2, Exhibit 5 allocates unit-, batch-, and product-level activity costs, as done in Exhibits 3 and 4. However, the value-added costs for Products A and B need to be determined in order to allocate the costs relating to factory-level activities. The value-added costs in the factory for Product A include a direct labor cost of $180,000, an inspection cost of $3,000, a purchasing cost of $2,500, and a design cost of $2,750 for a total value-added cost of $188,250. Similarly, the value-added costs for Product B can be determined at $87,750, leading to total value-added costs for both products of $276,000. Since the costs relating to factory-level activities are $80,000, the factory-related costs per value-added dollar are about $0.29, lead-

ing to allocations of $54,565 and $25,435 for Products A and B, respectively.

Hence, Exhibit 5 reveals that total costs of $342,815 and $413,185 and unit costs of $342.82 and $103.30 are charged to Products A and B, respectively. Not surprisingly, these total and unit costs are different from those computed in Exhibits 3 and 4, as all three interpretations are different.

Summary and conclusion

Exhibits 3, 4, and 5 reveal that using different methods of treating the costs relating to facility-level activities can produce widely different total costs and unit costs for Products A and B, thereby leading to potential problems for business decision-making. We suggest that the issue of whether and how the costs relating to facility-level activities are allocated be resolved as follows: First, costs relating to corporate management activities should not be allocated because corporate management activities have no relationship to either product, and hence its costs cannot be considered resources that were used in the manufacture and sale of these products. In contrast, the costs relating to factory-level activities should be allocated, as they represent resources that were used in the manufacture of these products. In addition, we suggest that a comprehensive activity driver, such as value-added costs, be used to allocate costs relating to factory-level activities to different products. ■

NOTES

[1] Stratton, W.O., Desroches, D., Lawson, R.A., and Hatch, T., Activity-based costing: Is it still relevant? *Management Accounting Quarterly* 10, no. 3 (2009): 36.

[2] While we use a manufacturing environment to determine facility-level activities with costs that should be allocated or written off, the principles outlined here apply equally to a nonmanufacturing or service environment.

[3] The corresponding facility-level cost to factory supervision in a certified public accounting (CPA) firm would be the office manager, one whose job would be to ascertain that appropriate facilities are available to support the accounting professionals in their audit, tax, and other responsibilities. The corresponding corporate facility-level activity in a CPA firm would be the managing partner, one whose responsibilities, among others, include planning the firm's future strategy, maintaining client relations, and being the outside partner, (i.e., the face of the firm to the outside world). In a smaller CPA firm, a senior partner might take on the dual role of office manager and outside partner. In this case, such an individual's compensation relating to his or her duties as the office manager should be allocated to the audit, tax, and other activities, whereas that relating to his or her duties as the managing partner should not be allocated.

[4] *Op. cit.* note 1, p. 39.

[5] The names of the five best-selling managerial accounting textbooks and the five best-selling cost accounting textbooks for 2012 were provided by one of the major textbook publishers. It is possible that other textbook publishers could have used lists and years revealing the names of textbooks that are different from the ones used here. However, the diversity of treatments exhibited in the chosen sample in Exhibit 1 strongly suggests that such diversity would be present in any other list of best-sellers.

[6] According to Brewer, Garrison, and Noreen, "In the first stage, overhead costs are assigned to the activity cost pools. In the second stage, the costs in the activity cost pools are allocated to products using activity rates and activity measures." Since this article relates to facility-level activities and whether and how their costs should be allocated to products, we concentrate on the second stage; Brewer, P., Garrison, R., and Noreen E., *Introduction to Managerial Accounting*. 5th ed., (New York: McGraw-Hill Irwin, 2009).

[7] Some textbooks include direct materials and direct labor as unit-level activities; see: Kinney, M.R. and Raiborn, C.A., *Cost Accounting: Foundations and Evolutions*. 9th ed., (Mason, O.H.: South-Western CENGAGE Learning, 2013). Others appear to limit the definition of unit-level activities to overhead activities; see: Lanen, W., Anderson, S., and Maher, M., *Fundamentals of Cost Accounting*. 4th ed., (New York: McGraw-Hill Irwin, 2014). Since the treatment of direct materials and direct labor is not an issue here, we adopt the second interpretation and limit the definition of unit-level costs to overhead activities.

[8] We assume that all activities that can reasonably classified as unit-level, batch-level, and product-level have already been so classified. Hence, we focus on the remaining activities (i.e., those that cannot be so conveniently classified since they have no causal relationship with an activity driver).

[9] Units produced are in the ratio of 1:4 (1,000 units of Product A vs. 4,000 units of Product B), purchase orders are in the ratio of 1:3 (100 purchase orders for Product A vs. 300 purchase orders for Product B), and design hours are also in the ratio of 1:3 (200 design hours for Product A vs. 600 design hours for Product B).

[10] Using direct labor hours in this example is not a validation that direct labor hours are an appropriate activity driver for all costs relating to facility-level activities, but a recognition that using even a flawed activity driver (like direct labor hours) is preferable to not using one and, consequently, not allocating any costs relating to factory-level activities to each product.

[11] Kaplan, R.S., "John Deere Component Works (A)." Harvard Business School Case 187-107 (May 1987); this value-added methodology is mentioned in Lanen, Anderson, and Maher (*Op. cit.* note 7 Lanen, p. 337).

[12] Applying this methodology to a service environment like a CPA firm could require the CPA firm to use either the total direct costs or the total billings from its audit, tax, and other activities as the base and allocate the salary of the firm's office manager to audit, tax, and other activities in the ratio of total direct costs or the total billings.

GENERAL INFORMATION FOR AUTHORS

We welcome the submission of articles on any topic related to cost management. Case studies are also welcome.The article should be written with an eye toward aiding the reader in improving the financial and nonfinancial performance of his or her business using cost management techniques.

Manuscripts for publication, and correspondence relating to them, should be sent to:

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