CHAPTER 23

# MANAGEMENT ACCOUNTING, COSTING, AND BUDGETARY CONTROL

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## ABSTRACT

Management accounting enables enterprise decisions before their financial consequences become visible in published accounts. Yet apparently precise cost figures can mislead when classification, capacity assumptions, causal attribution, managerial incentives or uncertainty are poorly specified. This chapter critically develops management accounting, costing and budgetary control as an integrated system of decision support, organizational coordination and accountability. A transparent, purposive synthesis brings marginal economics, cost-behaviour research, agency theory, interpretive accounting theory, contingency perspectives, activity-based management, budgeting scholarship and performance-control theory into dialogue with professional guidance. Twelve approved domains cover cost concepts, conventional and activity-based costing, cost-volume-profit analysis, constrained decisions, customer profitability, operating and cash budgets, standards and variances, multidimensional controls, analytics and ethics. Official Rwandan enterprise evidence situates the argument in a business environment characterized by extensive informality and heterogeneous productive capacity. A fully hypothetical Kigali food manufacturer supports reconciled product-cost, contribution, process-costing, break-even, flexible-budget, variance, customer-profitability and make-or-buy calculations, supplemented by an activity-based costing extension. International comparisons assess the transferability of sophisticated costing systems to resource-constrained enterprises. The principal thesis is that management accounting becomes useful not through ever finer numerical detail, but through fit between a decision, its relevant economic consequences, sufficiently credible information, organizational authority and legitimate stakeholder constraints. The proposed integration is an analytical synthesis, not a newly empirically validated model.

**Keywords:** management accounting; cost behaviour; activity-based costing; contribution margin; cost-volume-profit analysis; budgetary control; variance analysis; management control systems; management analytics; Rwanda.

## LEARNING OUTCOMES AND CHAPTER ROADMAP

Upon completing the chapter, readers should be able to (LO1) distinguish management accounting from external financial reporting, and defend the relevance and limitations of internal information; (LO2) classify costs by traceability, behaviour, controllability and decision relevance, estimating costs under explicit assumptions; (LO3) construct and critically evaluate job, process, absorption, variable and activity-based product or service costs; (LO4) calculate and interpret contribution, break-even, target profit, margin of safety and constrained-resource choices; (LO5) prepare and reconcile operating, flexible and cash budgets, with properly attributed price, usage, efficiency and spending variances; (LO6) design performance indicators and decision-support analytics that address managerial incentives, information integrity and uncertainty; (LO7) appraise a Rwandan enterprise case against defensible international theory and practice, recognizing institutional transfer constraints; and (LO8) present an integrated, ethically accountable cost-and-control decision memorandum with sensitivity, implementation and review criteria.

The progression begins with the epistemic role of management accounting (23.0–23.1), establishes cost concepts and their measurement (23.2–23.4), develops decisions using contribution and incremental analysis (23.5–23.7), and moves to coordinated planning and control (23.8–23.10). Decision analytics and professional responsibility (23.11–23.12) then connect the techniques to governance and technology. A Rwanda-centred integrated case, comparative interpretation, theoretical synthesis, terminology, assessment materials and references close the chapter. Chapter 22 addresses publicly reported accounts; Chapter 23 concerns internal information for feasible decisions. Discounted investment appraisal and financing belong to Chapter 24, while taxation and audit systems are treated in Chapter 26.

## 23.0 INTRODUCTION: THE COST OF A DECISION IS NOT NECESSARILY THE COST IN THE LEDGER

A hypothetical Kigali producer of packaged porridge receives an order for 2,000 additional units. Its bookkeeper reports a full production cost of RWF 1,610 per unit, while sales proposes a negotiated price of RWF 1,700. One manager describes the order as profitable, another rejects it because the quoted price scarcely exceeds the full cost, and the operations supervisor warns that the packaging line is approaching capacity. Their disagreement is not resolved by finding a more accurate average cost. They must establish which expenditures would actually change, whether the order displaces alternative sales, when cash would be received, which quality commitments apply, and whether the existing cost model has assigned unused capacity and shared overhead sensibly. This case is invented for educational analysis. It isolates the chapter's organizing question: how can managers use cost and performance information to plan, control and improve enterprise decisions without confusing an accounting allocation with an economic consequence?

Financial accounting and management accounting share a transaction base but differ in decision horizon and audience. External financial reporting communicates structured claims about recognized economic events to outside users within specified standards and disclosure obligations. Management accounting designs information for prospective choices, internal coordination, operational learning and evaluation. A management accountant may prepare a full manufacturing cost to support inventory valuation, a contribution margin to evaluate a special order, and a customer-level cost-to-serve estimate to reconsider distribution arrangements. These figures can differ without any being inherently fraudulent: each answers a different question. The error occurs when managers conceal their purpose, assumptions or reconciliation (Kaplan & Cooper, 1998; International Accounting Standards Board [IASB], n.d.).

The resulting discipline is simultaneously technical, organizational and normative. Technical validity concerns whether costs are measured at a relevant grain and whether models preserve units, time horizons and causal assumptions. Organizational validity concerns whose information is recorded, who can challenge targets, and

which decisions managers can actually implement. Normative validity concerns whose welfare is captured by the calculation and whose rights cannot legitimately be traded away for profit. A proposal to lower unit cost by ignoring unpaid overtime, transferring waste-disposal costs to a community or accelerating unsafe production may improve a narrow dashboard while degrading enterprise performance. Accordingly, no cost calculation can substitute for an explicit statement of lawful and ethically defensible boundaries (Institute of Management Accountants [IMA], 2022; Malmi & Brown, 2008).

### 23.0.1 Evidence design and scope of inference

This chapter uses a transparent, purposive critical synthesis of secondary literature and official documentation, rather than a systematic review or an original firm-level empirical study. The search strategy prioritized distinct theoretical contributions, empirical tests of cost behaviour and control systems, authoritative professional guidance, and comparable official Rwanda data, with source dates and applicable technical requirements checked to 2 November 2026. Core intellectual strands include Cooper and Kaplan's costing critique, Anderson et al.'s empirical test of asymmetric cost behaviour, Chenhall's contingency synthesis, Otley's management-control framework, budgeting studies and work on digital management accounting. Institutional evidence is taken from the National Institute of Statistics of Rwanda (NISR) and standards bodies, with a preference for official original documents. Sources were chosen for theoretical relevance, methodological distinction and transferability, not to estimate a pooled treatment effect. The selection was not exhaustive, screening counts were not maintained, and no meta-analytic or causal inference is claimed.

The recurring numerical enterprise is explicitly constructed; its prices, wages, demand, factory costs, process times, supplier quotations and outcomes are not observed Rwandan statistics. Official Rwanda indicators describe contextual constraints and must not be represented as evidence about the fictitious enterprise's productivity, profitability or use of management accounting. International findings require special care when moved from large, diversified companies to small firms with limited records, shared roles and volatile cash flows. This source and inference discipline follows the evidence-based principles developed in Chapter 4 and the accounting representational discipline of Chapter 22.

The review evaluates three classes of claim separately. Definitions, arithmetic identities and standards-based rules are assessed for conceptual and technical correctness; empirical associations are considered in light of research designs, populations, periods and plausible confounding; and prescriptions are judged for feasibility, transparency and the distribution of consequences. This division is essential because the fact that a cost driver predicts allocated overhead does not prove that eliminating a transaction will release the same amount of cash. Similarly, a budgeting practice associated with performance in an observational study does not establish that adopting it in a different institution will cause improvement. Each illustrative computation below therefore supplies its cost object, temporal boundary, assumptions and reconciliation, allowing readers to reproduce the calculation while withholding unwarranted causal claims.

## 23.1 INTERNAL ACCOUNTING AND DECISION SUPPORT

### 23.1.1 The function, users and information architecture

Management accounting is the purposeful identification, measurement, analysis, interpretation and communication of financial and non-financial information for internal choices and organizational stewardship. Its distinctive output is not a statement but a defensible answer to a question. Should the enterprise expand output, change its mix, discontinue a product, renegotiate an account, use scarce machine hours differently or reconsider a budget? Those questions require different cost objects, time horizons, confidence intervals and responsibilities. The same enterprise therefore needs multiple internally consistent representations rather than one universally correct unit cost.

The informational route normally connects primary evidence, accounting and operational records, decision-specific transformations, managerial challenge and subsequent learning. Primary evidence includes supplier invoices, work orders, employee time logs, batch records, service tickets, digital payments, customer contracts and physical measurements of inputs, waste or energy. A cost ledger aggregates monetary claims; operational systems provide resource and activity drivers; managerial models distinguish avoidable cost, capacity and uncertainty. A report becomes decision-supporting only when its intended user can inspect the provenance, assumptions, version and authorized action. The controlling analytical question is not simply whether information is timely, but whether it is sufficiently accurate and relevant for the consequence being assessed (Bhimani, 2020; Granlund, 2011).




**Figure 23.1. Evidence-to-decision architecture for management accounting.** Transaction and operational evidence → verified cost and capacity model → decision-specific incremental or full-cost view → cross-functional challenge → authorized action → realized outcome and learning. Feedback returns both to source data and model assumptions. *Source: Original analytical synthesis informed by Kaplan and Cooper (1998), Otley (1999) and IMA (2022); the sequence is conceptual rather than empirically validated.*

### 23.1.2 Decision relevance, controllability and information economics

An item may be material for an external financial statement yet irrelevant to a particular decision, while a nonrecorded opportunity cost may be indispensable internally. Depreciation is relevant to financial statements but is normally not an avoidable cash flow in deciding whether to accept a one-time order using installed equipment; a genuinely avoidable repair or foregone contribution may be relevant. Equally, 'controllable cost' must be defined against an actor and horizon: a warehouse manager may influence overtime this week but not the inherited building lease. Managers should not be evaluated as though they could change contractual commitments set by others.

Information itself incurs acquisition, validation and maintenance costs. A small cooperative may benefit more from disciplined daily cash and stock reconciliation than from a multilayer activity-costing application with unreliable driver data. A larger manufacturer with frequent engineering changes and heterogeneous products may face expensive distortions if it retains a single labour-hour overhead rate. The appropriate system is therefore contingent on complexity, decision frequency, materiality, exposure and organizational capability.

This is consistent with contingency scholarship, which rejects the idea of one optimal control-system design for every enterprise (Chenhall, 2003; Langfield-Smith, 1997).

### 23.1.3 Intellectual history and theoretical tensions

Early industrial cost accounting sought to record material and labour use and assign production expenditure to output. Standard costing, variance reports and annual budgets subsequently embedded accounting in managerial supervision. Johnson and Kaplan (1987) argued that conventional management accounting became progressively disconnected from changing production processes and competitive requirements; Cooper and Kaplan (1988) demonstrated how volume-based allocations can distort decisions about product diversity. Activity-based costing responded by relating resource consumption to differentiated activities, while time-driven activity-based costing later addressed the maintenance burden of detailed activity models (Kaplan & Anderson, 2004). Digital transaction records can now support closer-to-real-time measurement, but data abundance does not resolve the underlying questions of model validity, incentives and causal attribution (Bhimani, 2020).

Agency theory highlights divergent incentives and information asymmetry among owners, managers and workers. It explains why budgets can be manipulated and why performance contracts may prompt gaming. Its strength is to make incentive compatibility an analytical issue; its limitation is the tendency to privilege measurable individual utility and contractual enforcement over institutional trust, professional duty or intrinsic motivation. Contingency theory instead expects control efficacy to vary with environment, technology, scale and organizational structure, yet has struggled with heterogeneous measures and identifying causal effects. Simons (1995) emphasizes diagnostic controls, strategic boundaries, organizational beliefs and interactive dialogue; Malmi and Brown (2008) argue that accounting controls interact with cultural, administrative and reward systems. Together these accounts suggest that no spreadsheet controls an enterprise independently of its authority, relationships and culture.

The intellectual divide is also philosophical. In a representational view, accounting attempts to measure antecedently existing resource consumption sufficiently faithfully for a stated purpose. In an interpretive and constitutive view, classifications and comparisons help create the organizational realities to which workers and managers respond: the decision to call one department a cost centre, to make idle time visible, or to rank staff by unit output changes attention, identity and bargaining power. Morgan (1988) challenged the claim that accounting descriptions are neutral mirrors of organizations, while Miller and O'Leary (1987) situated standard costing and budgeting within the historical construction of administratively governable workers. Their contributions do not imply that every measurement is arbitrary or that arithmetic lacks objective constraints. Rather, they reveal an asymmetry between the numerical truth of an entry and the selection of what deserves to be measured. A credible management accounting system must consequently combine accurate measurement with reflective scrutiny of the categories, power relations and interests embedded in its use.

This chapter adopts a fallibilist, decision-oriented position between uncritical measurement realism and unrestricted relativism. Kilograms issued, hours paid and invoices received can be checked against physical and documentary evidence, although their meaning as 'waste', 'inefficiency' or 'unprofitability' depends on a declared model and purpose. Multiple cost representations may be warranted simultaneously, but they are not equally useful for every decision. Model choice must be defensible through explanatory fit, traceability, uncertainty disclosure and susceptibility to challenge rather than managerial convenience. This position strengthens, rather than weakens, the obligation to reconcile internal accounting to financial statements and cash records.

## 23.2 COST CONCEPTS AND CLASSIFICATIONS

### 23.2.1 Cost objects, traceability and purposes

A cost is an economically interpreted sacrifice of resources in pursuit of a defined object and period. The cost object may be one product, service visit, customer, production batch, branch, project, distribution route or business decision. Direct cost can be traced economically and sufficiently reliably to that object; indirect cost requires allocation or a different causal representation. A manufacturer's flour used for a documented batch is generally directly traceable to that batch, while the plant manager's salary is often indirect to individual units but directly attributable to the factory as a department. Traceability is therefore relational, not an inherent physical property of a cost.

Product costs may include direct materials, direct labour and manufacturing overhead, whereas period expenses, such as selling and administration under common external-reporting conventions, are expensed as incurred. However, a commercial decision still needs delivery, financing, claims management and customer service costs even when they are excluded from reported inventory. IAS 2 requires eligible conversion costs, including systematic allocation of fixed and variable production overhead, to be reflected in inventory cost and prescribes normal-capacity discipline for allocating fixed production overhead. This reporting treatment should be reconciled with, but not mechanically reused as, an incremental decision model (IASB, n.d.).

### 23.2.2 Behaviour, capacity and the relevant range

For a specified relevant range and time horizon, a conventional linear cost model is $C(Q) = F + vQ$, where C is total cost, F is fixed cost within the range, v is variable cost per unit and Q is activity. Average total cost is $C(Q)/Q = F/Q + v$, which falls as fixed cost is spread over additional units. The linear relationship is an approximation, not a natural law. Piecewise fixed costs emerge when an extra shift, warehouse or supervisor becomes necessary; overtime, scarcity, bulk purchasing and yield losses change variable rates. Classification also depends on horizon: a lease may be fixed next month and avoidable at renewal. Economic scale, technological learning and input-price movements further invalidate naive extrapolation beyond observed operations.

Empirical research shows why the conventional symmetric assumption must be interrogated. Anderson, Banker and Janakiraman (2003) studied a large panel of companies and reported that selling, general and administrative costs increased more readily with rising activity than they declined with comparable decreases. The authors related this asymmetry to managerial decisions about retaining committed resources rather than immediately reversing them. Their study offers evidence against universal proportionality; it does not establish the same coefficients for a Rwandan SME, another time period or an individual cost pool. A responsible cost model distinguishes activity changes, managerial adjustment costs and the timing of capacity release.

### 23.2.3 Relevance, avoidability and opportunity costs

Relevant costs and benefits are future consequences that differ across feasible alternatives. Sunk expenditure has already been irreversibly incurred and ordinarily should not alter a forward-looking choice, although its contractual consequences or the future cash flows associated with an asset may matter. An opportunity cost is the value of the best genuinely forgone alternative; it need not appear in the accounting ledger. Differential cost is the change between alternatives; avoidable cost is a future expenditure that an alternative can eliminate. Committed costs, allocated shared overhead and noncash charges are not automatically irrelevant: the question is whether their underlying resources or future payments change under the decision and horizon being studied.

**Table 23.1. Cost lenses and their decision implications**

| Lens | Managerial meaning | Typical use | Primary misinterpretation |
|---|---|---|---|
| Direct / indirect | Traceability to a specified cost object | Product, customer and job costing | Treating an allocation as causal resource consumption |
| Variable / fixed | Response to an activity driver over a relevant range | CVP and flexible budgets | Assuming perfect proportionality and unlimited capacity |
| Product / period | Reporting treatment under applicable standards | Inventory and profit reconciliation | Mistaking reporting cost for incremental cost |
| Avoidable / committed | Whether future resource expenditure can change | Closure, outsourcing and capacity choices | Counting unavoidable common cost as savings |
| Sunk / opportunity | Irreversible past outlay versus best forgone option | Investment continuation and constrained resources | Ignoring opportunity contribution because it is unrecorded |
| Controllable / noncontrollable | Scope of a specified decision maker's authority | Responsibility evaluation | Penalizing managers for inherited or external constraints |

*Note.* Categories overlap rather than form mutually exclusive sets. *Source:* Original teaching synthesis of marginal cost reasoning, IAS 2 and management-control scholarship.

### 23.2.4 Measuring cost functions and uncertainty

The high-low approach estimates v as (highest cost − lowest cost)/(corresponding activity difference), then F from a selected observation. It is accessible but vulnerable to atypical endpoints and changes in price or process. Scatter plots, engineering standards and ordinary least squares may support better estimates when observations are consistent and the functional form is plausible. A regression $C_t = \alpha + \beta Q_t + \varepsilon_t$ gives conditional association, not automatic proof that Q causes changes in C; omitted seasonality, product mix, price inflation or delayed adjustment can bias β. The model's residuals and sensitivity to capacity shifts matter as much as a point estimate. For planning, managers should report credible cost ranges and scenario assumptions rather than convert historical noise into unwarranted decimal precision.

A compact calculation demonstrates both the utility and fragility of the high-low estimator. Suppose a **separate illustrative service enterprise**, unrelated to Imena Foods, recorded monthly operating cost of RWF 13,500,000 at 8,000 service transactions and RWF 17,900,000 at 12,000 transactions, with comparable input prices and process technology. The two-point estimated variable cost is (17,900,000 − 13,500,000)/(12,000 − 8,000) = RWF 1,100 per transaction, implying fixed cost of RWF 4,700,000 in either observation. At 10,000 transactions the fitted cost is RWF 15,700,000. This identity does not establish the true cost function: either observation could contain unusual repairs, service-mix changes or delayed resource adjustment. Before using the estimate, a manager would inspect all monthly observations, capacity thresholds, price inflation and residual patterns, then compare the regression-based and engineering-based estimates with the high-low result.

## 23.3 PRODUCT AND SERVICE COSTING

### 23.3.1 The cost accumulation problem

Costing connects economic resources to work performed and outputs delivered. The minimum architecture distinguishes source expenditures, resource pools, operational activities, cost objects and reconciliation to the financial ledger. Job-order costing accumulates materials, labour and overhead for distinguishable assignments such as a customized school-furniture contract, an audit engagement or a repair order. Process costing aggregates expenditure over a repetitive homogeneous process, then assigns cost to units passing through specified production stages. A food plant may use process costing for mixing and packaging but job-level records for special batches or individually commissioned packaging. A clinic may cost consultations by service

pathways and case complexity, while a university may cost programmes by teaching hours, facilities, academic support and student-service intensity. These choices depend on the heterogeneity of resource consumption, not on whether an output is tangible.

In a conventional job system, direct materials and labour are assigned from requisition and time records. Indirect manufacturing expenditure is allocated through an overhead rate, conventionally predetermined as budgeted overhead divided by budgeted allocation-base activity. Applied overhead equals that rate multiplied by the actual driver consumed. The predetermined rate enables timely estimates before actual monthly overhead is known, but it creates over- or under-application that must be reconciled, investigated and, where appropriate, adjusted. Machine hours may be more defensible than labour hours in capital-intensive processing; neither should be chosen merely because a payroll system happens to provide readily available data (Banker et al., 1995; Cooper & Kaplan, 1988).

### 23.3.2 Process costing, equivalent units and losses

Process costing becomes difficult when units are partially completed at period-end. Equivalent units convert partly completed work into an estimated quantity of fully completed input effort. Under weighted-average treatment, equivalent units generally equal completed units plus closing work-in-process units multiplied by their stage of completion for the specific cost category. Materials and conversion costs may have different completion degrees. For example, if 8,000 units are completed and 1,000 remain 100% complete for materials but 40% complete for conversion, materials equivalent units are 9,000 and conversion equivalent units are 8,400. The resulting per-equivalent-unit calculations require reconciled physical flow, opening balances and costs. A first-in, first-out method distinguishes current-period effort from work performed previously. Managers must disclose which method is used and avoid false precision in completion estimates.

The equivalent-unit quantities can be completed into a reconciled production-cost statement. Assume this **separate constructed process-costing exercise** has no opening work in process, with RWF 6,300,000 of materials and RWF 4,200,000 of conversion expenditure incurred for 8,000 completed packs and the 1,000 partly finished packs. Weighted-average cost per materials equivalent unit is RWF 6,300,000/9,000 = RWF 700; conversion cost per equivalent unit is RWF 4,200,000/8,400 = RWF 500. Completed output therefore receives 8,000 × (700 + 500) = RWF 9,600,000. Closing work in process receives (1,000 × 700) + (400 × 500) = RWF 900,000. The reconciliation is exact: RWF 9,600,000 + RWF 900,000 = RWF 10,500,000 of costs to account for. The conversion percentage remains a management estimate; if it is materially wrong, the apparent precision of the unit rates cannot rescue the valuation.

Normal spoilage, avoidable defects, rework, joint production and by-products require explicit causal and reporting treatments. If management silently increases the unit cost of good output after a controllable quality failure, the cost may be absorbed into inventory without exposing the process defect. Quality and operations specialists should distinguish inherent process yield, abnormal losses and unsafe output, while the accounting team makes the permitted financial-reporting adjustments. This interface illustrates why costing cannot substitute for quality diagnosis (Chapter 20) or external-reporting compliance (Chapter 22).

### 23.3.3 Variable costing, absorption costing and profit interpretation

Variable costing charges only variable manufacturing costs to inventory and treats fixed manufacturing overhead as a period expense for internal contribution analysis. Absorption costing assigns eligible fixed production overhead to produced units alongside variable manufacturing costs for external reporting under IAS 2. Consequently, when production exceeds sales and inventory rises, absorption costing may defer some fixed production cost into inventory, producing a different accounting profit from internal variable costing. When inventory declines, the direction can reverse. The difference is not a second cash flow but a timing difference in expense recognition, subject to policy and normal-capacity constraints.

Suppose a hypothetical plant has RWF 3,900,000 monthly fixed manufacturing overhead and normal production of 10,000 units. The illustrative normal-capacity rate is RWF 390 per unit. If direct material, direct labour and variable manufacturing overhead total RWF 1,220, a standard full manufacturing unit cost is RWF 1,610. That does not mean making one more unit necessarily costs RWF 1,610. Subject to capacity, a marginal unit may consume approximately RWF 1,220 of variable manufacturing resources, with additional selling, quality, financing or risk costs depending on the order. Nor may the manager always multiply RWF 390 by arbitrarily high production volumes; fixed-overhead allocations for reporting are subject to IAS 2's normal-capacity and high-production provisions (IASB, n.d.).

The difference between internal and external profit measures becomes visible when production and sales diverge. Suppose, in another **isolated illustrative month** with no opening inventory, 10,000 packs are produced but only 8,000 are sold; unit variable manufacturing costs are RWF 1,220, the normal-capacity fixed manufacturing overhead rate is RWF 390, and there are no other recognition differences. Absorption costing carries RWF 780,000 of fixed production overhead in the 2,000 unsold units, whereas internal variable costing expenses the whole month's fixed manufacturing overhead. Under these conditions absorption-costing operating profit exceeds variable-costing operating profit by RWF 780,000, even though cash received and paid does not change because of this classification. This is a timing reconciliation, not an encouragement to manufacture surplus units. The enterprise must still consider inventory recoverability, the cost of storage and disposal, and IAS 2's normal-capacity rules for financial reporting.

### 23.3.4 Costing credibility in service and public-interest organizations

Service costing requires special attention to customer participation, heterogeneous time requirements and idle capacity. Time sheets may measure client-contact hours but omit preparation, regulatory documentation, travel, service recovery and supervision. Allocating all shared costs by visits can encourage avoidance of difficult clients or underfunding of essential access. In education, a programme's average cost per registered learner is not identical to its incremental cost of one enrolment or the full social cost of achieving an educational outcome. For public and nonprofit institutions, financial sustainability must be assessed alongside legally assigned duties, access, educational or social purpose and appropriate quality thresholds. Cost classifications should clarify choices rather than determine whose needs deserve service.

## 23.4 ACTIVITY-BASED COSTING

### 23.4.1 Why a single overhead rate can distort product economics

Traditional volume-based allocation uses one or a few measures, such as labour or machine hours, to distribute heterogeneous indirect costs. It can work adequately where products consume activities in roughly similar proportions. It becomes less reliable when low-volume specialized products trigger more setup changes, inspections, procurement orders, engineering work or customer support per unit. Cooper and Kaplan (1988) argued that this distortion can cross-subsidize complex products and undermine product-mix or pricing choices. Banker et al. (1995), using 32 manufacturing plants from selected industries, found that transaction-related production complexity explained substantial manufacturing overhead variation. This evidence supports the plausibility of non-volume cost drivers, while its industry and period limit universal inference.

Activity-based costing (ABC) first assigns resource costs to meaningful activities, then allocates those activity costs to objects according to measured drivers. A basic driver rate is pool cost divided by driver quantity. Unit-level drivers include operating hours; batch-level drivers include setups and inspection lots; product-sustaining drivers include engineering changes; facility-sustaining costs may be difficult to trace to particular products without arbitrary allocations. ABC is most valuable where the decision benefit of greater discrimination exceeds its design, measurement and behavioural costs. Gosselin (1997) showed that

implementation is related to strategy and organizational features, cautioning against viewing the choice as a software purchase alone.

### 23.4.2 Reproducible two-product activity-costing extension

Consider a distinct hypothetical diversification scenario in which one factory makes 10,000 standard packs (Product A) and 2,000 customized packs (Product B) while incurring RWF 3,900,000 of relevant overhead. Its traceable or estimated activity pools are RWF 1,200,000 for setups, RWF 900,000 for quality tests and RWF 1,800,000 for machine support. Across both products, there are 12 setups, 90 tests and 3,000 machine hours. Rates therefore equal RWF 100,000 per setup, RWF 10,000 per test and RWF 600 per machine hour. These categories and quantities are deliberately selected for teaching, not drawn from plant records.

**Table 23.2. Activity-based overhead attribution in the separate two-product scenario (RWF)**

| Pool or result | Rate | Product A usage | Product A cost | Product B usage | Product B cost |
|---|---|---|---|---|---|
| Setups | 100,000/setup | 4 | 400,000 | 8 | 800,000 |
| Quality tests | 10,000/test | 30 | 300,000 | 60 | 600,000 |
| Machine support | 600/hour | 2,000 | 1,200,000 | 1,000 | 600,000 |
| Total overhead | — | — | 1,900,000 | — | 2,000,000 |
| Units | — | 10,000 | 190 per unit | 2,000 | 1,000 per unit |

*Note.* Pool totals equal RWF 3,900,000. A uniform volume-based rate would be RWF 325 per unit (3,900,000 / 12,000), overstating A's unit overhead by RWF 135 and understating B's by RWF 675. The aggregate reallocations reconcile: 10,000 × 135 = 2,000 × 675 = RWF 1,350,000. *Source:* Author's fully hypothetical calculation, following the conceptual logic of Cooper and Kaplan (1988).

The important finding is not that ABC has discovered an objectively true cost. The same activity quantities could be proxies rather than actual causes: tests may rise because products are inherently risky, because a quality programme demands them or because scheduling is poor. A product's assigned share of facility support may not be avoidable if the product is discontinued. Therefore ABC informs the questions to investigate, rather than establishing that the high-allocated-cost product should be abandoned. Strategic customers may also create value through portfolio complementarity or learning that the unit-cost statement does not represent.

A deeper limitation is formal rather than merely practical. Noreen (1991) demonstrated that the circumstances in which an activity-costing system supplies decision-relevant incremental costs are demanding: cost pools must be specified consistently, pool expenditure must respond to the modeled activity, and product-related activity must be suitably separable and additive. Joint production, congestion, fixed commitments and nonlinear scale effects violate these convenient conditions. An ABC rate can therefore be a more informative attribution than a plantwide rate and still be a poor estimate of a cost that would disappear if Product B were discontinued. This insight qualifies any inference that more differentiated cost allocations automatically improve decisions.

Organizational implementation adds another level of contingency. In a study of 143 firms, Shields (1995) associated perceived ABC implementation success with management support, training, strategic alignment and involvement beyond the accounting department, while the observed success was not explained simply by the choice of software or external consultants. Its cross-sectional, self-reported design does not identify a universal treatment effect, but its mechanisms are plausible: managers will not change schedules, specifications or customer relationships merely because accountants have drawn a more elegant cost diagram. A sound implementation begins with a particular disputed decision and audits whether better drivers alter a feasible choice.

### 23.4.3 Time-driven ABC and unused capacity

Kaplan and Anderson (2004) proposed time-driven activity-based costing (TDABC) to reduce extensive interviews and model-maintenance burden. Its primary parameters are the cost per practical unit of supplied capacity and estimated time required for an activity, possibly expressed as a time equation sensitive to transaction characteristics. If a service centre supplies 6,000 practical labour minutes at RWF 600,000, the capacity cost rate is RWF 100 per minute. A routine order taking eight minutes consumes an estimated RWF 800 of service capacity, while a complicated order needing twenty minutes consumes RWF 2,000. If used time is only 4,500 minutes, the model attributes RWF 450,000 to used capacity and identifies RWF 150,000 as unused supplied capacity, subject to the cost pool and capacity assumptions. Treating all supplied cost as though used can distort pricing; treating unused capacity as instantly avoidable can be equally misleading.

ABC and TDABC have important implementation conditions: consistent process definitions, accurate time and driver records, adequate training, stakeholder engagement, periodic recalibration and a clear decision purpose. Their apparent sophistication can create false certainty when the enterprise's recordkeeping is weak. A pragmatic Rwandan SME may first distinguish material, labour, setup and delivery activities in a validated spreadsheet before expanding to integrated systems. A high-complexity enterprise may justify more granular data and automated transaction capture, but must retain review of exceptions and data rights.

## 23.5 COST–VOLUME–PROFIT ANALYSIS

### 23.5.1 Contribution and break-even logic

Cost–volume–profit (CVP) analysis investigates how sales price, quantity, variable resource use and fixed commitments jointly determine operating profit. For a single product with constant unit price p, unit variable cost v and period fixed costs F, operating profit is $\pi = (p - v)Q - F$. Unit contribution margin, $c = p - v$, is the amount each unit provides toward fixed costs and operating profit. If $c > 0$, break-even volume is $Q_{BE} = F/c$, rounded up to a feasible whole unit; for target operating profit T, $Q_T = (F + T)/c$. Margin of safety is actual or expected units minus break-even units, expressed also as a percentage of actual or expected volume. The contribution-margin ratio is $c/p$ and may convert break-even units into sales value where product and mix assumptions hold.

These formulas are conditional. They assume a relevant operating range, stable unit price and variable cost, no material product-mix shift, stable fixed-cost commitment, and consistent treatment of production and sales. Above a capacity threshold, a new shift or machine can create a step cost; promotions can reduce realized price; higher output can increase scrap or overtime. Sales, production and collections may also diverge. CVP is a useful scenario language because its assumptions can be challenged; it is not a forecast simply because the algebra is exact.

### 23.5.2 Fully worked base model for the Kigali manufacturer

The main teaching enterprise, provisionally named **Imena Foods Ltd**, is entirely fictional. It produces and sells one packaged porridge product. Its normal planning assumptions are a selling price of RWF 2,000, direct materials of RWF 720, direct labour of RWF 360, variable manufacturing overhead of RWF 140 and variable selling cost of RWF 100 per unit. Monthly fixed manufacturing overhead is RWF 3,900,000 and fixed selling and administration is RWF 1,200,000. All figures are Rwandan francs (RWF), before any income tax or financing cost; the standard model assumes units produced equal units sold, no opening or closing inventories, and adequate capacity to deliver the stated range.

**Table 23.3. Main fictional manufacturer's contribution and break-even model**

| Component | RWF per unit or monthly total | Calculation and meaning |
|---|---|---|
| Selling price | 2,000 per unit | Assumed realized invoice price |
| Direct materials | 720 per unit | Assumed consumption at standard efficiency |
| Direct labour | 360 per unit | 0.30 standard hour × RWF 1,200/hour |
| Variable manufacturing overhead | 140 per unit | Activity-sensitive production support |
| Variable selling expenditure | 100 per unit | Fulfilment and sales activity |
| Total variable cost | 1,320 per unit | 720 + 360 + 140 + 100 |
| Contribution margin | 680 per unit | 2,000 − 1,320 |
| Fixed manufacturing + selling/admin | 5,100,000 per month | 3,900,000 + 1,200,000 |
| Break-even quantity | 7,500 units | 5,100,000 / 680 |
| Contribution-margin ratio | 34.0% | 680 / 2,000 |
| Target operating profit of RWF 2,040,000 | 10,500 units | (5,100,000 + 2,040,000) / 680 |
| Profit at 12,000 sold units | 3,060,000 | 12,000 × 680 − 5,100,000 |
| Margin of safety at 12,000 units | 4,500 units (37.5%) | 12,000 − 7,500; divide by 12,000 |

*Note.* Exact arithmetic follows disclosed assumptions and excludes financing, income tax and inventory movement. *Source:* Author's constructed educational scenario.

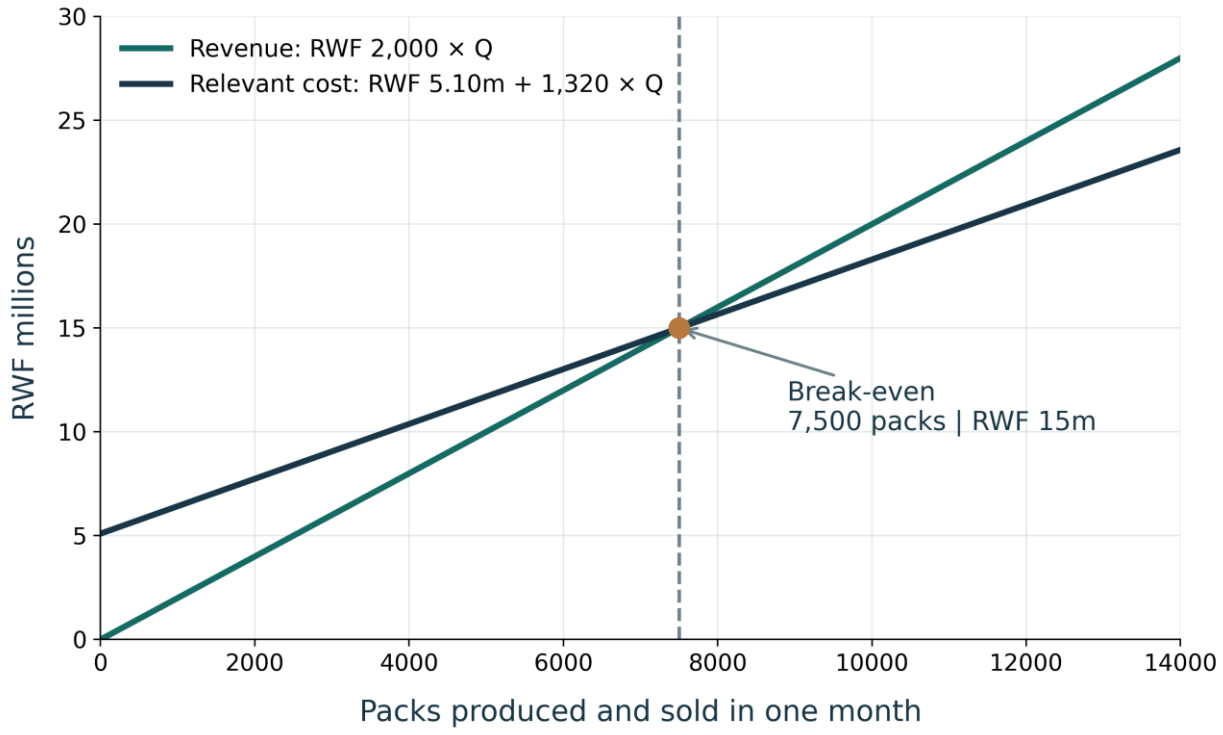



**Figure 23.2. Revenue and total relevant cost in the main fictional manufacturer's CVP model.** Revenue and total cost intersect at 7,500 packs and RWF 15 million. The visual is defined only over the illustrated activity range. *Source: Author's hypothetical model, derived directly from Table 23.3.*

At 12,000 units, revenue is RWF 24,000,000, variable cost is RWF 15,840,000, contribution is RWF 8,160,000 and operating profit is RWF 3,060,000. Break-even sales revenue is RWF 15,000,000. The 37.5% margin of safety means expected volume could fall by 4,500 units, other assumptions held, before the modeled operating

result reaches zero. It does not imply a 37.5% probability of safety, nor does it protect the enterprise against slow collections, equipment failure, quality losses or changes in price and input costs.

### 23.5.3 Sensitivity, operating leverage and multiple products

The model exposes risks that a single profit estimate conceals. A 5% reduction in selling price (RWF 100) lowers contribution to RWF 580, increases break-even volume to approximately 8,794 units and reduces profit at 12,000 units to RWF 1,860,000. A 10% rise in direct-material cost (RWF 72) lowers contribution to RWF 608 and raises break-even volume to approximately 8,389 units; profit at 12,000 units becomes RWF 2,196,000. If both occur simultaneously, contribution falls to RWF 508, break-even rises to approximately 10,040 units, and modeled profit at 12,000 units falls to RWF 996,000. These are controlled comparisons, not predictions of how demand would respond to price changes or cost inflation.

Degree of operating leverage at an observed volume is contribution divided by operating profit: 8,160,000 / 3,060,000 ≈ 2.67 in the base case. Locally, with fixed unit price and cost and unchanged capacity, a 1% volume increase produces an approximately 2.67% increase in operating profit. The measure becomes unstable near break-even and should not be mistaken for a physical elasticity or constant structural property across all volumes. In a multi-product business, break-even calculations require an explicit, stable sales-mix bundle or a separate optimization model. A weighted average contribution cannot reliably guide strategy when mix changes, capacity drivers differ or demand shifts between customer segments. The additional ABC example in Section 23.4 illustrates precisely why complex products may require differentiated costs.

## 23.6 SHORT-RUN OPERATIONAL DECISIONS

### 23.6.1 Incremental logic and scarce resources

Short-run choices include accepting special orders, making or buying components, replacing or using equipment, processing jointly produced outputs further, retaining a product, and allocating scarce labour, machine time or materials. Their common method is to compare future cash flows and opportunity consequences that differ across feasible alternatives. Relevant benefits are not necessarily recognized revenue, and relevant costs are not necessarily averages. Any calculation is subordinate to enforceable contract requirements, supplier reliability, quality and safe work. Such decisions can change demand, capacity and stakeholder relationships beyond the immediate period, so the label 'short run' defines the model's horizon rather than eliminating strategic consequences.

For a scarce resource measured consistently, contribution per limiting-factor unit is unit contribution divided by the units of scarce resource consumed. Suppose a standard pack generates RWF 680 contribution using 0.20 bottleneck machine hour, while a special product generates RWF 900 using 0.50 hour. Contribution per bottleneck hour is RWF 3,400 and RWF 1,800 respectively. Subject to demand ceilings, minimum contracts, material availability and process compatibility, the standard pack has a higher contribution opportunity per scarce hour. However, one cannot rank products solely by that ratio when several independent constraints, setup batches or interdependent demand relationships exist; linear programming, integer decisions or robust scenario optimization may then be necessary.

### 23.6.2 Auditable make-or-buy decision memorandum

**Decision question.** Should Imena Foods continue producing 4,000 monthly packaging sleeves internally or purchase them from an external supplier? The following additional scenario does not alter the base product's contribution model; it isolates a separable packaging activity to teach a differential decision. The internal activity uses RWF 340 variable manufacturing resources and RWF 30 inspection resources per sleeve; outsourcing would eliminate a specific RWF 400,000 monthly supervisory cost. The supplier quotes RWF 450 per sleeve, with RWF 50,000 total freight and RWF 35,000 receiving inspection. The plant could alternatively

employ capacity released by buying to earn RWF 440,000 additional net contribution each month, but only if a second order is actually won and can be fulfilled safely.

**Table 23.4. Make-or-buy memorandum: 4,000 sleeves per month (RWF)**

| Relevant item | Make | Buy |
|---|---|---|
| Internal variable manufacture: 4,000 × 340 | 1,360,000 | 0 |
| Internal inspection: 4,000 × 30 | 120,000 | 0 |
| Avoidable supervision | 400,000 | 0 |
| Supplier purchases: 4,000 × 450 | 0 | 1,800,000 |
| Freight and receiving inspection | 0 | 85,000 |
| Direct relevant cost | 1,880,000 | 1,885,000 |
| Economic cost of forgone alternative contribution | 440,000 | 0 |
| Cost including realizable opportunity | 2,320,000 | 1,885,000 |

*Note.* Make has a RWF 5,000 advantage if no alternative capacity use is genuinely realizable. With the fully realizable RWF 440,000 alternative contribution, buying has a RWF 435,000 advantage. Do not record opportunity contribution as a supplier invoice. *Source:* Original hypothetical decision memo.

**Recommendation and conditions.** Buy only if the supplier passes quality, delivery, continuity and contract checks, and management can substantiate the alternative order and capacity release. The economic conclusion reverses if the additional contribution cannot be captured, if inspection and transport costs are understated, or if outsourced capacity is needed to preserve resilience. The decision owner should document validated supplier samples, claims responsibility, alternative-order evidence, forecast volumes, downside exposure, a trial period and an explicit stop rule. The model intentionally does not assign unavoidable general factory overhead as a supposed outsourcing saving.

### 23.6.3 Special orders, discontinuation and sequencing

For a special order in unused capacity, incremental contribution may be positive even when the unit price is below full absorbed cost, provided it covers all avoidable order-related costs and does not undermine existing market prices, contractual commitments or product integrity. When capacity is constrained, displaced contribution belongs in the calculation. A discontinued product may release traceable expenditures and capacity but not necessarily shared rent or management salary. A product reported as 'loss-making' after allocated overhead can therefore remain economically valuable. Conversely, positive contribution cannot justify continued operation when it depends on unsafe labour intensity, false quality claims or permanent failure to fund necessary replacement capacity. The analytic task is to identify which circumstances can change, over what horizon and subject to what legitimate commitments.

The opening special-order question can now be resolved under transparent alternatives. Assume the proposed 2,000-pack order would be sold at RWF 1,700 per pack, use the base manufacturing variable cost of RWF 1,220 per pack and incur **an additional order-specific** RWF 40 selling/dispatch cost per pack rather than the ordinary RWF 100 selling cost. The order requires a further RWF 100,000 batch-testing expenditure; no extra fixed capacity is needed in the first scenario. Incremental contribution before testing is 2,000 × (1,700 − 1,220 − 40) = RWF 880,000, leaving RWF 780,000 incremental operating benefit. Thus its price being near the RWF 1,610 absorbed manufacturing cost is not the determining criterion. The order should nevertheless be accepted only if it is legally and operationally feasible, collected on acceptable terms, and does not undermine normal sales.

Now suppose the packaging constraint displaces 800 ordinary packs whose contribution would have been RWF 680 each. The order's relevant benefit falls to 880,000 − 100,000 − (800 × 680) = **RWF 236,000**. If 1,500

normal packs must instead be displaced, the same calculation yields **RWF 240,000 adverse**, making rejection preferable under the stated assumptions. This is not evidence that the firm's capacity actually behaves in either way. The correct operational inquiry concerns the packaging station's effective throughput, sequencing, rework, promised contracts and the probability of the additional order being collected. Such evidence, together with potential customer-price effects beyond the month, can reverse a superficially convincing calculation.

## 23.7 PRICING AND PROFITABILITY ANALYSIS

### 23.7.1 Cost information is necessary but insufficient for price setting

Cost-based pricing begins with a defined cost and a chosen markup or target margin. A markup on cost differs from a margin on sales: if cost is RWF 1,600 and a 25% markup applies, price is RWF 2,000 and gross margin on sales is 20%, not 25%. Customer value, competitive alternatives, willingness to pay, contract terms, price elasticity and regulatory requirements constrain which prices are feasible. Price choices affect volume, which changes cost absorption, bottleneck loading and cash requirements. The coherent sequence is thus iterative: understand demand and customer benefit; estimate avoidable and full lifecycle resources; evaluate contribution under plausible prices and volumes; test delivery and liquidity; and inspect fairness and legal constraints. Chapter 15 owns pricing strategy and customer-value propositions; the present chapter provides the underlying cost architecture.

### 23.7.2 Cost-to-serve and customer profitability

Customer profitability is not sales revenue minus a generic percentage of manufacturing overhead. It requires relevant costs of acquisition, order processing, picking, storage, returns, credit, collections, delivery frequency and after-sales response. Two customers buying equal annual quantities at equal prices may create different economic consequences if one consolidates orders and pays promptly while the other requests urgent small deliveries and extended credit. ABC or TDABC can identify service activities, yet an allocated customer loss does not establish that ending the relationship will save the assigned cost. Customer-based analysis should identify avoidable service costs, capacity consequences, future retention value and strategic relationships (Kaplan & Anderson, 2004).

An analytically useful customer statement separates gross invoice revenue, actual discounts and returns, product variable cost, order-specific delivery and handling, account-specific support, credit and collections cost, resulting customer contribution, and disclosed shared or sustaining costs where relevant. It should preserve negative findings rather than hide them in consolidated sales figures. Small enterprises can begin with a transparent monthly customer or route-level table; data-intensive companies may use transaction-level service-cost models with exception controls. In each setting, privacy and fair access matter. A cost-to-serve model can reveal expensive barriers affecting rural, low-income or disabled customers, but it does not establish that those customers should be abandoned. Pricing and service decisions must consider obligations and equitable treatment alongside margins.

Consider two **fictional customer accounts** each purchasing 2,000 packs monthly at RWF 2,000. Each generates RWF 4,000,000 invoiced revenue and RWF 2,640,000 contribution after the baseline RWF 1,320 unit variable cost, leaving RWF 1,360,000 before incremental account-specific activities. Customer A requires 12 special deliveries at RWF 18,000 per delivery and RWF 30,000 in incremental collection and service costs, producing RWF 1,114,000 account contribution. Customer B requires 48 otherwise identical special deliveries and RWF 90,000 in additional service/collection costs, producing RWF 406,000. These **extra** delivery charges explicitly exclude the fulfilment activity already contained in the common RWF 100 unit variable selling cost, so there is no double counting. The example isolates a RWF 708,000 difference in account-specific contribution despite identical invoice revenue. Whether the enterprise can save that expenditure by changing service terms

or ending a relationship is a further empirical and contractual question. Shared fixed costs should not be arbitrarily presented as avoidable savings.

### 23.7.3 Life-cycle, capacity and strategy-informed profitability

Product profitability can be measured at contribution, avoidable traceable profit or full allocated profit levels, each of which serves a different purpose. Development, warranty, disposal, supplier dependency and regulatory compliance may occur outside the accounting month. Lifecycle analysis is valuable where early low-cost estimates overlook later service or waste costs. Pricing under capacity constraints also requires opportunity costs: a scarce packaging hour committed to a low-price order may preclude a higher-contribution order. Conversely, a seemingly unprofitable product may support customers' purchasing bundles or learning; such complementarities require evidence rather than speculative assertions. Management accounting should reveal the trade-offs to strategic management (Chapter 6) and marketing (Chapters 13–16), not dictate them independently.

## 23.8 BUDGET DESIGN AND COORDINATION

### 23.8.1 What a budget can and cannot do

A budget is a documented, quantified and time-bounded plan expressing assumptions, priorities, assigned resources and intended outcomes. It coordinates sales, production, procurement, staffing, cash, maintenance and service obligations before those functions impose incompatible commitments. Budgets also provide a basis for monitoring and accountability. These purposes can conflict. Forecasts should express expected outcomes, targets may deliberately stretch performance, resource authorizations determine permission to commit funds, and performance contracts specify evaluation consequences. Combining all four into one number can encourage managers to conceal unfavorable information or negotiate convenient targets. Hansen, Otley and Van der Stede (2003) distinguish approaches that improve budgeting from approaches that substantially replace annual budget-based performance evaluation; neither is a universally valid institutional solution.

Participative budgeting may improve local information sharing, ownership and feasibility, yet can also facilitate slack when employees anticipate punitive evaluation. Top-down budgeting can maintain strategic discipline but overlook local constraints and discourage challenge. Van der Stede (2000) found in an empirical investigation that restrictive budget practices can shift dysfunctional behaviour between slack and short-term orientation. Libby and Lindsay (2010) reported continuing budget use in surveyed North American organizations despite criticism, highlighting the importance of how budgets are applied. These studies do not imply that Rwandan firms experience identical incentive effects. The robust implication is procedural: assumptions and decision rights should be visible, competing information should be reconciled, and targets should be revisable when their causal conditions change.

### 23.8.2 The operating budget as a connected enterprise model

A master operating budget begins with demand and the sales plan, then derives production, materials, workforce, manufacturing overhead, inventory, selling, administration and expected operating results. Production quantity is planned sales plus desired closing finished units minus opening finished units. Materials to purchase are planned consumption plus desired closing raw materials minus opening raw materials. Staffing requirements incorporate standard hours, shift coverage, skill differences and realistic absence. Each sub-budget therefore depends on previously established assumptions and must be reconciled with resource availability and agreed service standards. A 'sales budget' that does not identify production capacity and collection terms is an aspiration rather than an authorized operating plan.

The production and purchasing sub-budgets can be traced with the same dimensional discipline. If the 10,000-pack sales plan requires no change in finished-goods inventory, planned production is 10,000 packs and standard flour input is 0.80 kg per pack, or 8,000 kg. Suppose opening usable flour inventory is 900 kg and the enterprise responsibly plans to close with 1,200 kg; purchases must then equal 8,000 + 1,200 − 900 = 8,300 kg. At the RWF 900 standard price, the purchasing authorization is RWF 7,470,000, which is distinct from RWF 7,200,000 flour consumption expense. If the supplier is to receive 60% upon delivery and 40% in the following month, the current-month payment arising from these particular purchases is RWF 4,482,000, excluding settlement of earlier payables. This small linkage makes the conceptual difference among resource consumption, acquisition commitment and cash payment observable. It also explains why inventories and supplier terms must be owned jointly by operations, procurement and finance.

For Imena Foods, the original monthly static plan assumes 10,000 units sold at RWF 2,000 each, with per-unit variable cost RWF 1,320 and period fixed costs RWF 5,100,000. Budgeted sales are RWF 20,000,000, variable cost RWF 13,200,000, contribution RWF 6,800,000 and operating profit RWF 1,700,000. A flexible budget recalculates expected amounts at the realized activity level while retaining standard prices, cost rates and the approved fixed-cost envelope. It therefore separates the effect of selling more units from cost or price performance at the same volume. A forecast updates expected conditions; a flexible budget is a controlled analytical comparator. Managers should not quietly rewrite the original plan and thereby erase the accountability history.

### 23.8.3 Cash budgeting and financial viability

Profit budgets and cash budgets answer different questions. Accrual sales can be profitable while customer receivables postpone cash; inventory purchases, debt settlement, capital expenditure and tax payments can drain cash independently of the recognized operating result. A cash budget forecasts receipts, payments, financing and the minimum required balance by period. Payment terms, bad-debt exposure, value-added tax treatment where applicable, seasonality and exchange-rate-sensitive imports must be modeled rather than assumed away. Investment expenditure belongs in the capital-expenditure cash schedule, but discounted valuation and financing are treated comprehensively in Chapter 24.

To demonstrate a cash bridge without claiming actual financial data, consider a **separate next-month cash scenario** using Imena Foods' illustrative realized revenue of RWF 23,760,000 and its previous month's assumed sales of RWF 20,000,000. Suppose 70% of current-month invoices are collected during the month and 30% of the preceding month's sales are collected now, without default. Receipts equal 0.70 × 23,760,000 + 0.30 × 20,000,000 = RWF 22,632,000. Suppose the period's gross operating expenditures total RWF 22,025,200, but RWF 300,000 of fixed production cost is noncash depreciation; payments are therefore RWF 21,725,200, under the simplifying assumption that all remaining expenses are paid promptly. Net operating cash inflow is RWF 906,800. With opening bank RWF 1,000,000 and a planned cash purchase of equipment costing RWF 1,400,000, ending cash is RWF 506,800. A minimum policy balance of RWF 1,000,000 produces a potential funding or timing gap of RWF 493,200. This is not a claim that the business has made or will make these cash flows: it demonstrates why apparently positive operating results cannot establish liquidity sufficiency.

### 23.8.4 Alternative planning practices and budget governance

Rolling forecasts re-estimate near-term performance at regular intervals; flexible budgets normalize outcomes for the activity actually attained; zero-based budgeting asks managers to justify specified expenditures anew rather than automatically inherit prior envelopes; activity-based budgeting works backward from forecast output and activity demands to required capacity. Each technique has different information and transaction costs. Uncritical zero-based exercises can waste scarce management attention and undermine investment in long-term competence, while overly frequent forecast revisions can create instability. Budget design should

distinguish the baseline authorization, current forecast, resource-reallocation decisions and exception log. The board or owner should receive an account of meaningful deviations and their causes, not just a favorable or adverse total.

## 23.9 STANDARD COSTING AND VARIANCE ANALYSIS

### 23.9.1 Standards and the attribution problem

A standard cost specifies the expected price and quantity of an input for a given activity under a defined operating condition. A variance compares observed and benchmark values; it is a diagnostic prompt, not proof of employee fault. Standard material quantity may be derived from recipe requirements and normal process loss; labour hours from a defensible work method; overhead from capacity and activity assumptions. Standards should be attainable, periodically reviewed, and explicitly differentiated from aspirational improvement targets. A favorable variance can arise from quality-damaging substitution; an adverse variance can reflect procurement disruption, urgent safety measures, strategic improvement or defective standards.

For direct materials, with actual quantity AQ, actual price AP, standard price SP and standard quantity SQ allowed for actual good output, the price variance is AQ(AP − SP), and usage variance is SP(AQ − SQ). For labour, actual hours AH, actual rate AR, standard rate SR and standard hours SH for actual output give rate variance AH(AR − SR) and efficiency variance SR(AH − SH). Positive cost variances are termed adverse under the sign convention used here; negative cost variances are favorable. The arithmetic decomposition assumes compatible input units and stable definitions. When wages, grades, input mix or time systems change, simple attribution can become misleading and may require more discriminating mix, yield or spending analysis.

### 23.9.2 Fully reconciled actual and flexible results

Assume the company planned 10,000 packs but sold and produced 12,000. The actual unit selling price was RWF 1,980, so revenue was RWF 23,760,000. The material standard is 0.80 kg per good pack at RWF 900/kg, while actual usage was 9,900 kg at RWF 920/kg, costing RWF 9,108,000. Standard labour is 0.30 hour per pack at RWF 1,200/hour; actual labour is 3,720 hours at RWF 1,260/hour, totaling RWF 4,687,200. Actual variable manufacturing overhead was RWF 1,780,000 and variable selling RWF 1,260,000. Actual fixed manufacturing overhead was RWF 4,020,000, with fixed selling/administration RWF 1,170,000. The higher prices, input usage and expenditure are assumed figures, not documented real-company observations.

**Table 23.5. Static budget, activity-adjusted budget and illustrative actuals (RWF)**

| Measure | Static plan: 10,000 units | Flexible comparator: 12,000 units | Actual: 12,000 units |
|---|---|---|---|
| Sales revenue | 20,000,000 | 24,000,000 | 23,760,000 |
| Direct materials | 7,200,000 | 8,640,000 | 9,108,000 |
| Direct labour | 3,600,000 | 4,320,000 | 4,687,200 |
| Variable manufacturing overhead | 1,400,000 | 1,680,000 | 1,780,000 |
| Variable selling | 1,000,000 | 1,200,000 | 1,260,000 |
| Total variable costs | 13,200,000 | 15,840,000 | 16,835,200 |
| Contribution | 6,800,000 | 8,160,000 | 6,924,800 |
| Fixed manufacturing overhead | 3,900,000 | 3,900,000 | 4,020,000 |
| Fixed selling and administration | 1,200,000 | 1,200,000 | 1,170,000 |
| Operating profit | 1,700,000 | 3,060,000 | 1,734,800 |

*Note.* All three columns assume units produced equal units sold and no inventory movement. The flexible comparator uses original standard rates, not revised actual rates. Actual profit = 23,760,000 − 16,835,200 − 5,190,000 = RWF 1,734,800. *Source:* Author's internally reconciled fictional case.

### 23.9.3 Price, efficiency and spending components

The direct-material price variance equals 9,900 × (920 − 900) = RWF 198,000 adverse; material usage variance equals (9,900 − 9,600) × 900 = RWF 270,000 adverse. Their sum, RWF 468,000 adverse, exactly reconciles actual materials RWF 9,108,000 with the flexible standard RWF 8,640,000. Direct-labour rate variance is 3,720 × (1,260 − 1,200) = RWF 223,200 adverse; labour efficiency variance is (3,720 − 3,600) × 1,200 = RWF 144,000 adverse. Together they reconcile actual labour RWF 4,687,200 with standard flexible labour RWF 4,320,000. These calculations separate observed arithmetic differences, not necessarily the managerial causes of those differences.

**Table 23.6. Flexible-budget performance bridge for 12,000 packs**

| Component | Variation versus flexible comparator | Classification |
|---|---|---|
| Selling-price effect: (1,980 − 2,000) × 12,000 | −240,000 | Adverse revenue |
| Material-price variance | −198,000 | Adverse cost |
| Material-usage variance | −270,000 | Adverse cost |
| Labour-rate variance | −223,200 | Adverse cost |
| Labour-efficiency variance | −144,000 | Adverse cost |
| Variable manufacturing overhead spending | −100,000 | Adverse cost |
| Variable selling spending | −60,000 | Adverse cost |
| Fixed manufacturing overhead spending | −120,000 | Adverse cost |
| Fixed selling/admin spending | +30,000 | Favorable cost |
| Net actual-versus-flexible difference | −1,325,200 | Adverse profit |

*Note.* Flex operating profit RWF 3,060,000 minus RWF 1,325,200 = actual profit RWF 1,734,800. Static-to-flex volume effect = (12,000 − 10,000) × RWF 680 = RWF 1,360,000 favorable. Actual minus static profit = RWF 34,800 favorable after both effects. These are additive bridge components, not independent causal effects. *Source:* Original verified arithmetic.

The case exposes a central danger in budget evaluation. Comparing actual operating profit of RWF 1,734,800 with the original RWF 1,700,000 plan suggests that the enterprise slightly exceeded its financial target. Yet the appropriate flexible comparator for 12,000 packs is RWF 3,060,000, and the company underperformed that expectation by RWF 1,325,200. Increased volume concealed weaker price realization and higher resource costs. Conversely, a manager evaluated solely against the flexible target might be punished for safety-driven downtime, exchange-rate shocks or changed production specifications beyond that manager's control. Variances should trigger explanation, independent evidence and responsible correction, not automatic sanctions.

### 23.9.4 Volume, capacity and causation

Fixed-overhead volume variances depend on the denominator-level capacity used to establish an application rate and the chosen absorption convention. They are not equal to cash savings or losses. Producing more units can reduce absorbed fixed cost per unit while increasing inventory and cash tied up in materials; overproduction to improve reported unit cost may destroy economic value. Root-cause analysis should connect material usage to spoilage, batch mix, quality specifications and inventory records; labour efficiency to scheduling, rework, equipment reliability and safe working conditions; and price variance to supplier quotes, foreign-currency exposure, purchasing terms and input quality. An integrated monthly review should include production, purchasing, quality, sales, HR and finance rather than naming one departmental culprit from one accounting ratio.

## 23.10 PERFORMANCE MEASUREMENT SYSTEMS

### 23.10.1 From responsibility centres to organizational outcomes

Responsibility accounting organizes performance information around managers' actual decision rights. A cost centre is primarily accountable for specified resources and service obligations; a revenue centre for justified sales outcomes; a profit centre for revenues and controllable costs; an investment centre for economic results relative to assets or capital entrusted. These classifications guide evaluation, not the legal boundaries of a firm. In complex organizations, the procurement manager's cheaper material can increase production scrap, while a salesperson's rising revenue can create cash losses through weak credit terms. Local incentives should therefore be evaluated against enterprise-wide constraints and interdependencies.

Otley (1999) framed performance management through purposes, strategies, targets, rewards and information feedback. Simons (1995) distinguished diagnostic feedback from interactive use of information for strategic uncertainty. Malmi and Brown (2008) argued that accounting controls interact with administrative, cultural and reward mechanisms. These approaches reveal why a measurement system is not simply a list of indicators: it is an arrangement for directing attention, allocating authority, challenging assumptions, learning from exceptions and justifying consequences. A narrow reliance on variance-to-budget may neglect resilience, fairness, customer experience and long-term capability.

### 23.10.2 Balanced indicators and their validation

Kaplan and Norton (1992) introduced the balanced scorecard to connect financial results with customer, internal-process and learning perspectives. Its principal educational value is to make assumptions about prospective drivers of results explicit. However, the presence of a nonfinancial measure does not prove that improving it will improve profit or social outcomes. Ittner and Larcker (2003) examined failures to establish strategic causal links between metrics and outcomes. A useful scorecard should specify the hypothesized mechanism, operational definition, denominator, source owner, frequency, decision threshold, risk of gaming, and evidence required before attributing results to an intervention.

**Table 23.7. Cross-functional performance register for the illustrative manufacturer**

| Dimension | Indicator and definition | Intended decision | Potential distortion and safeguard |
|---|---|---|---|
| Financial | Contribution per delivered pack; profit versus flexible budget | Pricing, capacity and cost reviews | Do not reward volume without cash and quality checks |
| Customer | On-time and in-full orders / all due orders | Promise and delivery reliability | Verify order population and exception coding |
| Production | Saleable good units / units started | Material yield and process improvement | Audit reject standards and safety; avoid hidden rework |
| Supply | Accepted deliveries / deliveries due | Supplier continuity and specification | Check quality and lead times, not only purchase price |
| Workforce | Recorded paid hours and safety incidents per defined exposure | Safe staffing and process design | Protect reporting and employee voice against retaliation |
| Cash | Receivables overdue by specified days / credit receivables | Credit and collection action | Avoid indiscriminate exclusion of vulnerable customers |
| Environment | Material wasted in kg and associated RWF cost by process | Prevent loss and external harm | Verify mass balance and disposal records |

*Note.* This register is a proposed diagnostic instrument, not a validated composite performance index. Indicators require local definitions and documented measurement procedures. *Source:* Original synthesis informed by Kaplan and Norton (1992), Ittner and Larcker (2003) and ISO 14051:2011.

### 23.10.3 Gaming, target displacement and procedural justice

Metrics change behaviour. Targets for low inventory can increase stockouts; low purchasing prices can increase rejects; high equipment utilization can lengthen queues; short delivery times can encourage unsafe driving. A measure that is acceptable for learning may be inappropriate for high-stakes remuneration when attribution is uncertain. Management should separate diagnostic measures from contractual targets, protect good-faith reporting of hazards, and establish procedures for independent review. Performance evaluation should consider controllability and the evidence of causal mechanisms. Where multidimensional judgments remain unavoidable, the decision process should disclose them rather than conceal them behind pseudo-scientific scores.

This is also a problem of organizational power rather than only badly chosen indicators. Miller and O'Leary (1987) show historically how standard-cost and budget techniques helped render individual activity calculable and governable. Calculability creates possibilities for accountability, but it can also establish unequal capacities to define the standard and contest the exception. An appropriate system therefore identifies who sets the denominator, whose time is visible, whether staff may record interruptions without sanction, and whether a variance is attributable to an individual or to organizational conditions. Employees should be able to challenge data errors and safety-relevant targets without retaliation. Financial success at the expense of suppressed exceptions is not reliable evidence of control effectiveness.

## 23.11 DECISION-SUPPORT ANALYTICS

### 23.11.1 Dashboards, forecasts and decision models

Operational accounting increasingly draws on ERP systems, payment platforms, point-of-sale data, sensors, inventory scanners and cloud spreadsheets. These instruments can improve timeliness, link transactions to activities and enable granular variance monitoring. They can also reproduce incorrect master data at greater speed and turn arbitrary allocations into seemingly authoritative predictions. Granlund (2011) emphasizes the organizational and design work behind digital accounting systems, while Bhimani (2020) cautions that digital data change the methodological conditions under which accounting claims are studied. A dashboard should identify sources, periods, definitions, data cutoffs, missing values, reconciliations and authorized overrides, not merely display attractive colour-coded deviations.

A forecast should identify its target variable, horizon, base period, model and evaluation metric. Mean absolute error is MAE = Σ|A_t − F_t|/n; mean absolute percentage error is MAPE = 100Σ|A_t − F_t|/(n A_t) only where actual values are nonzero and consistently defined. MAPE can behave poorly near zero; intermittent demand may require other methods. Forecast accuracy is not itself proof of decision value: an almost perfect demand forecast may still produce poor output if lead times, prices, cash or capacity are omitted. Scenario analysis varies plausible assumptions jointly; sensitivity analysis varies selected drivers to identify fragile conclusions. Neither assigns a defensible probability without additional evidence.

A small forecast-error calculation makes the reporting obligation concrete. For three illustrative months, suppose actual orders were 1,000, 1,200 and 900, while forecasts were 950, 1,100 and 1,050. The absolute errors are 50, 100 and 150 orders, so MAE = (50 + 100 + 150)/3 = **100 orders**. Because all actual values are positive, MAPE is also calculable: (100/3) × (50/1,000 + 100/1,200 + 150/900) = **10.0%**. Reporting '10% error' without the denominator convention conceals that the largest relative error occurred in the lowest-volume month. Three observations are too few to establish stable predictive performance; a responsible evaluation also compares a simple seasonal or naive baseline, examines systematic overforecasting, and considers whether stockouts or lost sales make the observed order series a censored measure of demand.

### 23.11.2 AI assistance, model control and information security

Artificial intelligence can assist classification of transactions, exception detection, explanatory drafting, anomaly screening and scenario exploration. Where validated, such applications may release staff time for substantive judgment. They also create specific hazards: model hallucination, inconsistent reasoning, unauthorized exposure of supplier or employee data, biased anomaly flags, software dependency and automation complacency. Management accountants should treat AI outputs as hypotheses or computed proposals subject to reconciliation with primary records, transparent version control, human approval and documented error testing. A generated narrative that misstates the sign of a labour variance is not acceptable simply because it sounds plausible. Technology governance should distinguish model-generated content from verified transaction facts and track the identity of the person authorizing a financial commitment.

For resource-constrained enterprises, the optimal digital architecture may be a well-protected spreadsheet with a controlled chart of accounts, validated item master, reconciled bank data and a monthly exception meeting. At greater scale, integrated databases and automated exception rules may be worthwhile. The sequence should follow process stability and evidence quality rather than vendor marketing. Where cash records, point-of-sale receipts and inventory balances disagree, a more sophisticated algorithm can intensify, not remedy, the underlying evidence problem.

### 23.11.3 Environmental and sustainability accounting

Conventional product costing can omit the economic significance of wasted materials, energy, unsafe disposal, water and future remediation, particularly when costs are pooled or externalized. Material-flow cost accounting (MFCA) identifies physical material flows and allocates associated monetary costs to useful product and material losses. ISO 14051:2011 provides a general MFCA framework and confirms that the standard remains current; it is not a certification standard. The approach helps managers compare yield improvement, process redesign and material-loss reduction, while leaving unresolved the valuation of harms borne by people outside the enterprise (International Organization for Standardization [ISO], 2011). A process losing 100 kg of input at RWF 900/kg has at least RWF 90,000 in input-material cost associated with loss, before considering energy, handling or disposal. This simple physical-financial reconciliation can reveal value that a monthly account labelled 'production materials' obscures.

The governance relevance of MFCA lies in distinguishing an observable physical balance from a monetized environmental claim. Recording 1,000 kg of input, 900 kg of saleable output and 100 kg of material loss can verify mass balance if the process boundary is complete; valuing the 100 kg at RWF 900/kg yields RWF 90,000 of material-input value embedded in the loss. Yet it does not by itself measure the cost of water pollution, greenhouse-gas emissions, downstream disposal or public health. Those impacts require different boundary definitions, external evidence and valuation judgments. Managers should not label an internal RWF 90,000 material-loss estimate the 'total environmental cost' or use an apparent savings calculation to erase unpriced impacts. The strength of MFCA is to connect finance to measurable material stewardship while admitting what its financial scope omits.

## 23.12 ETHICAL MANAGEMENT ACCOUNTING AND RESPONSIBLE RESOURCE ALLOCATION

### 23.12.1 Technical accuracy does not settle moral legitimacy

Management accounting affects whose work is rewarded, whose customer is served, which supplier receives an order and whether environmental loss is recognized. Its ethical dilemmas arise precisely because management models necessarily simplify reality. Classification can conceal the distribution of burdens: overtime may be reported as a productivity gain while family care costs shift to workers; a cheaper supplier price may depend on unsafe conditions; 'customer unprofitability' may result from discriminatory

infrastructure. Profitability and social welfare are not identical constructs. Management accountants must be clear about empirical consequences, institutional duties and moral judgments instead of using apparently neutral cost figures to obscure disputed choices.

The IMA's Statement of Ethical Professional Practice, effective November 2022, identifies overarching principles of honesty, fairness, objectivity and responsibility, and standards concerning competence, confidentiality, integrity and credibility (IMA, 2022). These requirements offer a professional framework for accurate, timely communication; disclosing limitations; avoiding conflicts; protecting confidential records; and resisting selective presentation. A manager who suppresses material usage variances to preserve a bonus violates informational trust even when the accounting entries ultimately balance. Ethical responsibility also requires escalation and remedy when manipulation, retaliation or safety risks arise.

### 23.12.2 Cost shifting, gaming and short-termism

Costs can be shifted across products, periods, departments, subcontractors or society without changing underlying resource consumption. Allocating extra overhead to a small product can justify eliminating it even though the factory retains most costs. Delaying maintenance can produce a favorable spending variance while increasing failure probability. Capitalizing expenditure inappropriately can improve reported profit without improving cash or economic efficiency; the external reporting implications belong to Chapter 22. A punitive labour efficiency target can pressure employees to work off the clock or underreport defects. Such mechanisms show why financial statements, cost models and operational records must be reconciled while protecting worker voice and independent challenge.

The ethical decision procedure is substantive rather than ceremonial. Managers should first identify lawful and non-negotiable obligations, then define affected parties and feasible options, test evidence and distributional impacts, disclose conflicts and uncertainty, compare alternatives within admissible boundaries, assign responsibility and record mechanisms for appeal and correction. Quantified expected value may help rank options after constraints are respected, but cannot authorize breach of consent, unsafe products, fraudulent records or retaliation. This normative constraint is consistent with the book's integrated view of accountable enterprise performance and leaves comprehensive biblical analysis to Chapter 34.

### 23.12.3 Professional judgment under scarcity

Scarcity creates difficult choices between current liquidity, employee development, price accessibility, quality investment and environmental stewardship. A resource-allocation recommendation should distinguish unavoidable statutory duties, reversible operational decisions and long-term capabilities vulnerable to neglect. A small manufacturer's decision not to purchase an advanced costing system may be economically sound; its decision not to reconcile wages or material losses because it is small is not. Proportionate governance means accurate enough information for the stakes, credible accountability for those who can act, and safeguards against imposing unseen losses on less powerful stakeholders. Responsible managerial accounting is therefore an ongoing practice of tested judgment, not a moral label attached to a dashboard.

## 23.13 RWANDA-CENTRED APPLICATION AND INTERNATIONAL COMPARISON

### 23.13.1 What official Rwanda data do and do not establish

The NISR's Integrated Business Enterprise Survey for reference year 2024 estimated **278,060 business enterprises** and reported that **at least 87%** of enterprises operated informally. The NISR also reported that **62.6% of surveyed manufacturing enterprises did not fully use their productive capacity** and identified factors including insufficient demand and difficulties with reliable supply of inputs (NISR, 2025). These are population or survey findings, not cost-accounting adoption rates. They do not show what proportion of managers use budgets, ABC, variance analysis or digital accounting software, nor do they establish an

econometric relationship between management accounting and productivity. Their significance for Chapter 23 lies in the operating conditions to which costing systems must adapt.

Extensive informality makes it inappropriate to presume universal access to audited statements, specialized costing staff, machine-time logs or consistent separation between personal and enterprise transactions. At the same time, informality is heterogeneous: some unregistered businesses keep disciplined stock and cash records; some registered firms maintain incomplete internal controls. Capacity underutilization means that average absorbed fixed costs may be highly sensitive to output. It also presents a distinctive strategic question: unused capacity can reflect weak demand, input uncertainty, seasonality, unavoidable maintenance or deliberate resilience buffers, each calling for a different response. The relevant policy and enterprise question is not whether more production always lowers cost, but whether a profitable, safe and cash-collectible market exists for that production.

### 23.13.2 Integrated diagnosis of the hypothetical manufacturer

Imena Foods Ltd is a constructed teaching enterprise situated in Kigali solely for contextual plausibility; there are no actual company interviews, filed accounts, consumer surveys or management decisions underlying the figures. The proposed monthly sequence begins with a credible standard bill of materials, 0.80 kg per pack at RWF 900/kg, and 0.30 paid labour hour at RWF 1,200/hour. It assigns RWF 140 variable factory overhead and RWF 100 variable selling expense per unit, together with separately authorized fixed monthly costs. The initial budget uses 10,000 sales and production units; the illustrative realized period involves 12,000. These assumptions must be checked by operational managers before such a model could inform a real commitment.

The first decision concerns commercial viability. At the standard price of RWF 2,000 and contribution of RWF 680, the plant breaks even at 7,500 packs, subject to the model's relevant range. The second concerns the accuracy of costs and incentives. At 12,000 realized packs, actual profit of RWF 1,734,800 marginally exceeds the RWF 1,700,000 static target, but underperforms the activity-adjusted benchmark by RWF 1,325,200. The management team should not celebrate the former comparison without investigating the latter, nor assume all adverse variances are caused by shop-floor inefficiency. Material price and usage both worsened; labour rate and paid hours exceeded standards; actual price was below the plan. Finance should reconcile supplier invoices and worker payroll; production and quality should check material loss, machine reliability and batch changes; marketing should explain actual price concessions; and HR should ensure workers' records and rights are accurately represented.

The third decision concerns liquidity. Even where revenue exceeds RWF 23 million, realistic collection patterns and equipment payments can create a financing gap, as the worked cash bridge shows. Procurement should coordinate supplier credit, operations should avoid speculative overproduction, and finance should distinguish recognized profit from available funds. The fourth decision concerns enterprise boundaries: the packaging make-or-buy problem is almost evenly balanced when only direct cost is considered; it changes materially when a documented alternative use of capacity is added. This result can support a conditional outsourcing recommendation, not an irrevocable decision. Supplier due diligence, product safety and genuine customer demand remain necessary conditions. These four decisions together illustrate the chapter's central point: no single accounting number is sufficient to govern an interdependent enterprise.

### 23.13.3 International comparison and limits of transfer

The historical costing critique and modern ABC literature developed substantially in industrial settings with diverse products, sizable indirect costs and comparatively structured records. Cooper and Kaplan (1988) identify distortions under volume-based product allocation; Banker et al. (1995) show, in 32 selected manufacturing plants, that transactions related to production complexity have explanatory power beyond production volume. These documented international studies are valuable for identifying causal hypotheses

and cost-model designs; they cannot be transferred as ready-made parameters to a Kigali food processor or used to infer that all Rwandan manufacturers should deploy complex ABC software.

**Table 23.8. International concepts and context-sensitive transfer to Rwanda**

| Established practice or evidence | Explanatory contribution | Contextual condition in Rwandan enterprise | Proportionate adaptation |
|---|---|---|---|
| Traditional standard costing | Organizes recipes, hours and routine spending controls | Weak primary records or variable input quality can defeat precision | Verify batch sheets and physical counts before tight targets |
| ABC evidence from diversified factories | Product complexity may drive overhead beyond volume | Some SMEs have few products and minimal support pools | Add activity pools only where allocative distortion is consequential |
| TDABC | Makes service-time heterogeneity and unused capacity visible | Reliable time estimates and practical capacity may be difficult to observe | Pilot a few transaction types and reconcile to actual payroll |
| Annual and participative budgets | Coordinate departments and resource commitments | Owner-manager centralization and volatile cash may complicate participation | Use rolling cash reviews and visible assumptions with named owners |
| Balanced performance systems | Connect financial and nonfinancial objectives | Data quality and reporting capacity vary significantly | Start with a small auditable set of service, yield, cash and safety indicators |
| Material-flow cost accounting | Exposes financial costs of physical material losses | Measurement instruments and environmental data may be limited | Begin with mass balance for major inputs and document uncertainty |

*Note.* This is a transferability assessment, not an empirical comparison of measured adoption or effects in the listed populations. *Sources:* Cooper and Kaplan (1988); Banker et al. (1995); Kaplan and Anderson (2004); Chenhall (2003); ISO (2011); NISR (2025).

The normative boundary of transfer is equally important. A large multinational may use algorithmic scoring of productivity and highly granular surveillance, but the technical availability of such controls does not establish their proportionality, legality or justice in a smaller workplace. Similarly, the fact that a sophisticated management accounting system is used internationally does not prove its cost-effectiveness in a Rwandan enterprise whose most immediate problem is missing stock counts or inaccurate customer debt records. Appropriate modernization should proceed from a documented decision problem to a proportionate information system, rather than from an imported system to a retrospectively invented justification.

## 23.14 INTEGRATIVE THEORETICAL DISCUSSION AND RESEARCH AGENDA

### 23.14.1 A conditional model of accounting usefulness

The preceding evidence supports a conceptual distinction between **numerical correctness**, **decision relevance**, **institutional credibility** and **normative legitimacy**. Numerical correctness means that arithmetic, units and reconciliations are accurate. Decision relevance means that the model includes costs and benefits actually sensitive to the available alternatives and excludes misleading allocations. Institutional credibility requires verifiable records, challengeable assumptions, appropriate authority and reliable feedback. Normative legitimacy requires decisions to respect enforceable rights, non-negotiable safety protections, justified claims and honest disclosure. A system can be numerically correct but decision-irrelevant, as when a full absorbed unit cost is applied without adjustment to an incremental order. It can be relevant but institutionally incredible, as when a supplier quotation has not been verified. It can be credible yet illegitimate, as when apparent cost savings depend on coercion or preventable harm. The four dimensions must therefore be analyzed separately and brought together through explicit managerial judgment.




**Figure 23.3. Conditional management accounting decision model.** Verified resource and operational evidence → decision-specific economic model (incremental and lifecycle consequences) → organizational challenge (strategy, operations, marketing, people and finance) → constraint check (law, safety, integrity, stakeholder rights) → authorized choice and implementation → observed outcomes, variance interpretation and model revision. *Source: Original conceptual synthesis drawing on Chenhall (2003), Otley (1999), Malmi and Brown (2008) and IMA (2022); unvalidated as a general causal model.*

This model does not deny the technical value of sophisticated costing. Rather, it locates technical sophistication within a wider problem of warranted organizational inference. Activity drivers should be supported by credible resource consumption evidence; budgets should distinguish expectations from authorization and evaluation; dashboards should preserve their source definitions; and all analyses should acknowledge counterfactual uncertainty. Accordingly, Chapter 23 advances the enterprise systems argument of Chapter 1 and the evidential discipline of Chapter 4 while operationalizing the accounting concepts established in Chapter 22.

### 23.14.2 Competing interpretations and unresolved debates

Several scholarly controversies remain unresolved. First, the benefit of more precise activity costing is decision- and context-dependent: improved resource attribution can support better pricing and operational redesign, while costly measurement, false precision and nonavoidable pool allocations can reduce usefulness. Second, budgeting is neither inherently dysfunctional nor automatically coordinating; outcomes depend on how targets, expectations, resource constraints and rewards are separated. Third, performance measures are not causally self-interpreting: associations among quality, employee outcomes and profit may reflect omitted variables, delayed effects or reverse causality. Fourth, digital accounting may reduce reporting delays without improving organizational judgment when data governance and challenge capacity are weak. Fifth, narrow enterprise financial analysis may overlook environmental and human costs that are economically real but unpriced or borne by others.

The research implication is methodological. A comparison of firms using ABC with firms not using ABC may suffer from selection bias because adopters differ in size, complexity and managerial quality. A before-after productivity improvement may coincide with new equipment, staff changes or rising demand. Budgeting research based on self-reports may confound the existence of formal rules with enacted practice. Strong studies would specify the decision outcome, treatment, context, plausible counterfactual and mechanisms of adoption. Multi-method designs could combine administrative accounting records, observed workflow changes and interviews conducted with appropriate ethical approval; secondary-data comparative studies

could test publicly available correlations while acknowledging identification limits. These research designs are proposed opportunities, not procedures conducted for this chapter.

### 23.14.3 Testable propositions and an implementable agenda

Four propositions follow as hypotheses rather than demonstrated universal laws. **P1:** Greater cost-model differentiation will be associated with improved decision outcomes principally where products or customers consume heterogeneous support activities and driver data are credible. **P2:** The relationship between budgeting intensity and performance will be moderated by target use, managerial participation, environmental uncertainty and the availability of legitimate challenge. **P3:** The performance benefit of digital management accounting will depend on data quality, decision rights and the integrity of human oversight, rather than digital adoption alone. **P4:** Integrating physical resource-loss measures with monetary costing will improve the detection of selected production inefficiencies, but its effects on wider environmental outcomes will depend on boundary selection and implementation. Empirical tests require explicit variable definitions, sampling, appropriate comparison strategies and independent attention to unintended effects.

For Rwanda and comparable African economies, research priorities include the incidence and quality of costing routines in formal and informal enterprises; whether simple reconciled cash-and-stock systems outperform more complex but poorly maintained software; the economics of cost information under volatile import prices; the measurement of unused capacity; the role of owner-manager authority in budget integrity; and the effects of transparent employee-informed standards on quality, remuneration and productivity. Public datasets such as the NISR survey establish context, but organization-level cost records and justified research permissions would be necessary to test most causal mechanisms. A useful scholarly contribution would specify where standard prescriptions fail and which elements of disciplined accounting remain robust across contexts.

A defensible secondary-data research design could begin by assembling the dated NISR enterprise-survey tables, identifying whether any public-use information reports recordkeeping, industry, establishment size, ownership and capacity utilization, and documenting each variable's definition and denominator. Published information could support stratified descriptive comparisons, but management-accounting adoption and outcome effects should not be inferred unless those variables are actually observed. A later organization-level study could preregister a specific intervention, such as reconciled daily stock counts plus monthly flexible-budget review, and assess data-error rates, stock discrepancies and cash reconciliation before and after implementation against suitable comparators. Important threats would include self-selection, concurrent process changes, seasonal demand, reporting incentives and enterprise survival. Such a design would test a restricted mechanism rather than presume that adopting accounting software creates profitability.

## 23.15 CHAPTER SYNTHESIS AND CONCLUSION

Cost information becomes reliable decision support only when an enterprise distinguishes the economic question from the bookkeeping convention. Direct and indirect costs depend on the selected object; fixed and variable categories depend on activity and horizon; sunk, opportunity and avoidable costs depend on feasible alternatives. Product-costing systems must reconcile reported inventory and internal contribution without pretending that an overhead allocation is a cash consequence. ABC and time-driven costing can reveal complexity and unused capacity, but are valuable only when their drivers, decision purpose and information costs are defensible.

Contribution and CVP analysis clarify the structural relationship among price, volume, variable resources, capacity and fixed commitments. Yet break-even arithmetic remains conditional and cannot replace demand evidence, liquidity analysis, safety obligations or scenario tests. Budgets translate enterprise plans into coordinated commitments, while flexible budgets and variance analysis distinguish activity effects from pricing and resource deviations. The Imena Foods scenario demonstrates how a seemingly favorable static-

budget result can conceal severe deterioration against an activity-adjusted benchmark, and how a nearly balanced direct make-or-buy calculation can reverse after a genuine alternative use of capacity is recognized. These findings arise from disclosed teaching assumptions, not observed corporate performance.

More advanced controls cannot compensate for weak governance. Responsibility centres, balanced measures, digital dashboards and AI assistance should make uncertainty and trade-offs more visible, not hide them behind confident scores. Environmental and human impacts require physical, institutional and moral interpretation as well as monetary accounting. In an African enterprise environment characterized by heterogeneous scale, informality and capacity constraints, a lean, auditable cost-and-cash model may be more valuable than a complex system without dependable source records. The underlying scholarly conclusion is that useful management accounting is a governed relationship among evidence, economic relevance, feasible coordination, accountable learning and legitimate consequences. Chapter 24 develops the longer-horizon financing and investment decisions for which this internally coherent information provides an essential foundation.

## 23.16 KEY TERMINOLOGY AND EDUCATIONAL ASSESSMENT

### 23.16.1 Cumulative glossary

The following terms are defined with the cost object, decision horizon or accountability boundary in view. They should be read as analytical conventions rather than interchangeable labels.

**Table 23.9. Key management-accounting terminology and decision significance**

| Term | Precise meaning and interpretation |
|---|---|
| Absorption costing | Product-costing method assigning eligible variable and fixed manufacturing expenditure to units, with reporting governed by applicable inventory standards. |
| Activity-based costing (ABC) | Attribution of resource costs through specified activities and drivers; allocations do not automatically equal avoidable costs. |
| Avoidable cost | Future expenditure that can genuinely be eliminated by selecting a feasible alternative over a defined period. |
| Break-even volume | Sales volume at which modeled contribution exactly covers the specified fixed commitments. |
| Budget slack | Deliberately understated attainable results or overstated resource needs during budget negotiation. |
| Capacity cost rate | Supplied resource cost divided by its practical available capacity in consistent units. |
| Contribution margin | Defined revenue less activity-related variable costs before specified fixed commitments. |
| Cost driver | Measurable activity or resource-consumption factor used to explain, estimate or allocate cost. |
| Cost object | Product, service, order, customer, unit, project or decision to which costs are attributed. |
| Flexible budget | Performance benchmark recomputed for realized activity using agreed ex ante standards and rates. |
| Margin of safety | Excess of actual or forecast sales above modeled break-even sales, given specified conditions. |
| Opportunity cost | Economic value of the best feasible option sacrificed when another alternative is chosen. |
| Relevant range | Activity interval over which a particular cost function is treated as sufficiently stable. |
| Responsibility centre | Organizational unit with declared resource authority and corresponding reporting accountability. |
| Standard cost | Predetermined expected price or quantity of an input under defined process and operating assumptions. |
| Sunk cost | Irrecoverable prior outlay that a present choice ordinarily cannot alter. |
| Time-driven ABC | Capacity-rate approach attributing resource cost using estimated practical time demands. |
| Variance | Difference between actual and benchmark under a disclosed sign, measurement and responsibility convention. |
| Working-capital exposure | Cash tied up in receivables and inventories, net of relevant operating finance; financial management is treated in Chapter 24. |

### 23.16.2 Foundational comprehension and analytical interpretation

**Question F1 (LO1–LO2).** Explain why an externally reported inventory cost and an incremental special-order cost can legitimately differ. Identify at least two circumstances in which a commonly described 'fixed cost' becomes relevant to a decision, and distinguish an opportunity cost from a sunk cost.

**Question F2 (LO3).** Describe the conditions in which job costing, process costing and activity-based costing are each useful. Critically explain why activity drivers improve some allocation decisions but do not automatically determine avoidable expenditure or optimal product discontinuation.

**Question F3 (LO5–LO6).** Explain the difference among a static budget, a flexible budget, a rolling forecast and a performance target. Assess why an adverse labour variance does not by itself prove poor employee performance.

### 23.16.3 Worked and applied quantitative exercises

**Exercise A1: CVP stress test (LO2, LO4).** Using Imena Foods' baseline, calculate the break-even quantity, target quantity for RWF 2,040,000 operating profit, margin of safety at 12,000 sales and revised operating profit if the selling price declines to RWF 1,900 while material cost increases by 10%. Interpret whether the original 12,000-unit sales forecast is sufficient evidence of financial viability and identify two additional tests.

**Exercise A2: Costing redesign (LO3, LO6).** Recalculate the two-product ABC allocations in Table 23.2. Suppose quality tests for customized packs increase from 60 to 75 without changing available testing capacity or the RWF 900,000 support cost. Distinguish the implications of recalculating a cost allocation rate from the actual short-run cash consequences. Discuss how observed test frequency could reflect product design, customer specifications or process failure.

**Exercise A3: Budget and variances (LO5).** Reconstruct the 10,000-unit static and 12,000-unit flexible budgets and calculate the four direct-material and labour components from the stated standard and actual quantities and rates. Reconcile profit from the static plan through the volume effect and flexible-budget deviations to actual operating profit. Identify which findings require independent operational evidence before an intervention is justified.

**Exercise A4: Make-or-buy and cash risk (LO4, LO8).** Reproduce Table 23.4, then analyze three scenarios: no available alternative order; verified alternative contribution of RWF 440,000; and a supplier quote rising by RWF 120 per sleeve. Discuss the quality, workforce and continuity conditions under which buying remains preferable. Separately reproduce the cash bridge and calculate the minimum funding requirement against the stated policy balance.

### 23.16.4 Advanced integrative assignment

**Assignment C1: Management accounting redesign for a Rwandan enterprise (LO1–LO8).** Select a real enterprise category in Rwanda, such as a food processor, independent distributor, cooperative or service organization, without claiming access to confidential company data. On the basis of published evidence and transparently declared constructed assumptions, design a 12-month management accounting architecture. The submission should include an evidence register, cost-object map, fixed/variable and relevant-cost classifications, an activity-driver justification, a sales-production-cash budget linkage, a flexible-budget/variance protocol, a balanced five-to-seven-indicator dashboard, an ethical-risk review and a decision memorandum. It must specify which claims are externally evidenced, which figures are pedagogical assumptions, how the analysis could be tested, and which cross-functional actors must approve implementation. Comparisons with at least one published international costing or management-control study should explain contextual limits rather than assert automatic transferability.

### 23.16.5 Educator answer notes and evaluative rubric

The numerical answers to Exercise A1 should be demonstrated rather than merely reported. Unit contribution is RWF 680 (2,000 − 1,320), producing break-even of 5,100,000/680 = 7,500 packs. Target profit of RWF 2,040,000 requires (5,100,000 + 2,040,000)/680 = 10,500 packs; the margin of safety at 12,000 packs is 4,500 packs, or 37.5%. Under the combined price and material shock, unit contribution falls to RWF 508, leaving 12,000 × 508 − 5,100,000 = RWF 996,000 operating profit. A strong student answer should add demand sensitivity and available liquidity rather than declaring the decision safe because profit remains above zero.

For Exercise A2, setup, testing and machine-support costs are allocated using the exact activity volumes in Table 23.2, not by an assumed per-product share. When the customized product requires 75 rather than 60 tests while the RWF 900,000 test pool remains a supplied fixed cost, increasing activity changes the observed usage and, if the model divides the fixed pool by 105 tests, reduces the ex post test rate to approximately RWF 8,571.43. This recomputation does **not** imply a cash saving from performing additional tests. If genuinely incremental consumables or outsourced testing expenditure accompanies each test, students must identify and cost that separate resource change. Credit should depend on clearly distinguishing the descriptive allocation, practical-capacity cost and avoidable payment.

For Exercise A3, the allowable material quantity for 12,000 good packs is 9,600 kg, and standard labour is 3,600 hours. The material price and usage variances are respectively RWF 198,000 adverse and RWF 270,000 adverse; labour rate and efficiency variances are RWF 223,200 adverse and RWF 144,000 adverse. The RWF 1,360,000 favorable static-to-flexible activity effect is offset by RWF 1,325,200 adverse deviations against the flexible comparator, yielding a RWF 34,800 favorable static-to-actual difference. Learners should demonstrate how these results reconcile to actual operating profit of RWF 1,734,800 and identify what procurement, production and payroll records would be needed before attributing responsibility.

For Exercise A4, making the sleeves is less expensive by RWF 5,000 without an additional market for released capacity; buying becomes preferable by RWF 435,000 only when RWF 440,000 of alternative contribution is reliably available. A RWF 120 rise in the supplier's unit price adds RWF 480,000 to buying cost and reverses that advantage by RWF 45,000, before qualitative risk. The cash-budget requirement follows from RWF 22,632,000 receipts, RWF 21,725,200 operating cash payments, RWF 1,400,000 planned equipment outflow and RWF 1,000,000 opening cash, leaving RWF 506,800 against a RWF 1,000,000 policy floor and therefore a RWF 493,200 funding or rescheduling need. Answers should not collapse a forecasted cash gap into accounting loss.

The capstone assignment is best judged through a transparent analytic rubric rather than the number of charts submitted. Allocate 20% to conceptual and theoretical validity, 25% to the reproducibility and accuracy of computations, 20% to evidence credibility and boundary disclosure, 15% to Rwandan feasibility and cross-functional integration, 10% to legitimate stakeholder and governance safeguards, and 10% to scholarly presentation and accurate referencing. A defensible recommendation must explain the rejected alternative, identify who can authorize implementation, anticipate potential gaming or harmful cost shifting, and specify observable criteria for revising the decision.

### 23.16.6 Selected further reading

Readers seeking deeper cost-system architecture may begin with Johnson and Kaplan (1987), Cooper and Kaplan (1988), Kaplan and Cooper (1998), and Kaplan and Anderson (2004). For empirical cost behaviour, Anderson et al. (2003) and Banker et al. (1995) provide contrasting tests of assumptions. For management control, Chenhall (2003), Otley (1999), Hansen et al. (2003), Libby and Lindsay (2010), and Malmi and Brown (2008) develop important debates. Bhimani (2020), ISO (2011) and the IMA (2022) extend the discussion to digital research, physical resource losses and professional integrity. These works should be read critically rather than treated as interchangeable recipes.

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