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Structural and behavioural coupling in Business Value-Creating Organizations

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Abstract

The objective of this paper is twofold: on the one hand, to present a coherent framework regarding the formal logic of value production in, or through, organizations (Mella); on the other, to show how the new logic of *Economic Value Added* and *Activity Based Costing* must be united in order to strengthen the cognitive activity of organizations in order to make the production of value maximally efficient (Moisello).

The subject matter is developed along the following guidelines:

1 – the processes for the production of value are carried out by *permanent production organizations*, in particular *Business Value-Creating Organizations* (BVCO) or "production organizations"), as well as by for-profit business organizations (or "capitalistic firm");

2 – the production of value takes place through a network of efficient production, economic and financial transformation processes guided by laws that determine the stable equilibriums;

3 – from an internal point of view, BVOCs are operationally-closed systems that are at the same time structurally and behaviourally coupled to the environment; through (and to the extent of) their own cognitive and computational resources they perceive disturbances such as external stimuli, process these, and act (react or pro-act) to balance the network of vital processes;

4 – in BVOCs the internal cognition - data gathering processes, strategies, decisions, planning and controls – are carried out by the *management*, which produces the *thought* of the organization (rational calculations for decision-making, strategies, programmes and controls) from which the organization's

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actions derive; the production, economic and financial processes, which are instrumental for the production of value, are carried out by the *effector* organs that produce the action of the system;

5 - in this sense BVCOs can be conceived as *"conscious cognitive systems"* that link themselves to the environment through a system of processed, up-dated, and evaluated information which we can define as the *representation of the external world*;

6 – from an external point of view BVCOs are teleonomic systems that can continue to exist only as long as their performance as systems for the production of value is appreciated by the environment, according to a coherent system of performance indicators for the production of value (productivity, quality, economic efficiency, returns, Economic Value Added and Economic Value of the Firm); BVCOs allow managers to continually modify the network of autopoietic processes on the basis of the disturbances from environmental changes.

7 - the culture of value is diffused, and BVCOs not only have the maximization of value as their objective but must translate this into an operative approach to management problems. This approach emphasizes the capacity of BVCOs to generate an adequate cash flow for new investment and to insure a remuneration at rates that exceed the cost of capital, in order to have available resources for organizational expansion as well. Management must transform itself into a *Value-Based Management* (VBM) that must not only manage its normal activities but also the value of the organization as a whole;

8 –The appearance of new Web-Based Information Technologies that favor and strengthen the globalization process, as well as the growing role of financial markets, bring out more clearly the problem regarding the application of traditional decision-making, planning and performance-measuring models. This implies a reorientation of cognitive activity toward managerial models that favor the understanding of the driver of value and permit objectives to be set and performance to be measured in a manner which is coherent with the expectations of stakeholders.

1 - Organizations as autopoietic systems[3]

An *organization* is a social system that forms when several individuals choose, for their own particular reasons, to be (or be part of) typical organs in terms of functionality, function, behaviour and topology, which are linked by organizational relationships and structural ties that force them to carry out specialized, coordinated and cooperative behaviour – thus accepting certain objectives, programmes, rules and responsibilities – in order to undertake long-lasting processes aimed at a common end.

A *permanent organization* is an organization having a *non-predefined* (unlimited) *life:* the common end is joined to the individual goals; the lengthy life also assumes the satisfaction of social interests or ends, as well as a system of operative objectives.

Permanent organizations are *autopoietic systems* (Bednarz, 1988; Luhmann, 1995) because, through their metabolic processes, they *produce themselves* by searching for the metabolic and energy inputs in the environment which are useful for *autopoiesis* and flee from those which are damaging (Zeleny and Hufford, 1992; Mingers, 1994).

A class of permanent organizations may be conceived of as an institution.

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3 For more details on paragraphs 1-5, see Mella (2003)

If we define *teleonomy* as the ability of an autopoietic system to maintain its existence by regenerating its autopoietic processes, then a permanent organization is a teleonomic system, in that it maintains its own autopoiesis by carrying out cognitive processes to search for the conditions that allow individuals to benefit, directly or indirectly, from the achievement of a common end that defines its teleology.

Thus we can distinguish between (Monod, 1970: 124; contra, Maturana-Varela 1980; 1988; Brooks and Wiley, 1986 Mayr, 1989; Paetau, 1997)[4]:

a) *endogenous* teleonomy, which depends on the ability to pursue internal goals, that is to develop a teleology[5] (Dennet, 1988, Van de Ven and Pool, 1995); in other words, to achieve a common aim and satisfy the individual internal motivations;

b) *exogenous* teleonomy, which depends on the organization being appreciated by individuals not belonging to it but who gain external advantages, individual or social, from its existence.

While *endogenous* teleonomy characterizes the internal structural dynamics, *exogenous* teleonomy characterizes the environmental dynamics of the organization; the organization has a high endogenous teleonomy if it continues to exist despite the unfavourable structural disturbances from the environment, by developing processes of *adaptation*; it is characterized by a high exogenous teleonomy if the environment itself sets the conditions that favour its autopoiesis, and thus a lasting existence, as a unit as well as an organizational type (Toffler, 1985).

2 - Value Creating business and non-business, profit and non-profit organizations.

A permanent organization whose common goal is the production of goods and services through instrumental transformation processes of factors into products is a *production-oriented organization*

To carry out the productive transformation and obtain the quantity of goods QP_θ, at a given level of quality θ, Material and Services (M) and Labour (L) (these are the operative factors) together with Machines and other structural factors (S) (that is, production capacity factors) must be obtained from the environment at a cost equal to $CF_{M, L, S}$, whose sum is the full production cost for QP_θ[6]: CP_θ, = CP = $\Sigma_{M, L, S}$ $CF_{M, L, S}$ (Mella, 2002)

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[4] We can show the relationships between teleonomy and autopoiesis. In this sense teleonomy -- understood as a species' self-preservation -- can be considered the phenomenology, with respect to the species, that corresponds to autopoiesis -- understood as self-production -- which refers to each individual (Mella, 1997); "In effect, teleonomy is teleology made respectable by Darwin" (Dawkins, 1982).

[5] Teleology is considered in the traditional Hegelian meaning of purposeful activity directed towards an "End".

[6] From now on we will use the notation $F_{M, L, S}$ to indicate F = M, L, S. In general, we will use capital letters (Q, T, P, etc.) to symbolize overall volumes or periods, and lower case letters (q, t, c, etc.) to indicate unitary or instant quantities. Capital letters are also used to designate the names of the variables (M, L, S).

Autopoiesis derives from the capacity to produce useful goods and services and to continually renew their demand by users, so that it is possible to hold back labour (metabolism) and reacquire the other factors. Since the production is consumed by the individuals that make up the organization, the latter enjoys a prevalently endogenous teleonomy. If the production is destined for the environment, then the exogenous teleonomy depends on the capacity to produce customer satisfaction so as to cover production costs and reacquire from the environment the resources necessary for autopoiesis by renewing the productive processes. This implies the capacity to offer users products and services considered useful by feeding their desire to maintain the production organization alive, thereby reintegrating the production costs with contributions of various kinds (taxes, associative shares, sunk capital contributions, etc.).

A production-oriented organization that is preordained to sell its production in markets at prices at least equal to the unit cost of production is a *business organization*. If preordained to give up its production without a price, or recover only a share of the production cost, it is a *non-business organization*.

If we let cP_θ, = CP/QP_θ be the average unit production cost, then the business organization reintegrates the cost $CP = cP\ QP_\theta$ by selling its production at price $pP \geq cP$, thereby gaining revenues of $RP = pP\ QP_\theta$.

The business organization's *autopoiesis* is based on economic *efficiency*, that is on the possibility of covering costs through revenues or containing costs within the limits of its revenue, so that in any event: $CP \leq RP$.

In business organizations, *exogenous teleonomy* is connected to the capacity to create value for the environment; on the one hand, by limiting or reducing the costs of production, and on the other by obtaining production with a value at least equal to the value of the factors used to produce it, so that customers are willing to pay a price at least equal to the unit production costs. This is equivalent to stating that these organizations are preordained to achieve a non-negative operational income, that is: $OI = RP - CP = QP_\theta\ (pP - cP) \geq 0$.

The business organization whose operative programme leads it to pursue the maximum economic efficiency by seeking the maximum gap between average unit production costs (to be minimized) and average selling prices (to maximize) is a *for-profit organization* whose operating logic is to achieve $\{(\max)\ (pP - cP) > 0\}$; otherwise it is a *not-for- (non-) profit organization* and the operating logic of its processes is to achieve $\{(\min)\ (pP - cP) > 0\}$.

If we assume we want to establish a fair pP* and a fair cP* - that is, production and sales values compatible with normal supply and sales conditions – then we can determine the fair Operating Income (OI*) produced by the organization: $OI^* = QP\ (pP^* - cP^*)$, which physiologically is zero in non-profit organizations and positive in profit ones.

The difference: $TEVA = (OI - OI^*)$ represents the *Total Economic Value Added* by the organization compared to the fair return that the environment could have (fairly) expect from the organization.

If the business organization has a productive efficiency higher than the fair one – so that cP < cP* – then OI > OI* and the difference (OI – OI*) represents the *Total Economic Value Added of Production; TEVAP* = QP (pP* - cP), with product qualities being equal.

If cP = cP* but market efficiency is higher than the fair one, so that pP > pP*, then the *TEVAM* = QP (pP – pP*) represents the *Total Economic Value Added by the Market,* which is obtained from the price side, with sales volumes being equal.

If cP < cP* and pP > pP*, then RO > FR and RO – FR = *TEVAP* + *TEVAM* = *TEVA*.

In the *non-profit organization*, OI must tend toward zero by definition; thus, the TEVAM must tend toward zero (no increase in prices), with the *TEVAP* obtained from the production side and tending toward zero by a reduction in pP*; the entire *TEVAP* benefits the user of the products and services; thus in the non-profit organization the exogenous teleonomy depends on the capacity to produce values from the increase in the productive efficiency, since with each reduction in cP with respect to cP* there is a corresponding reduction in pP with respect to pP*. Since it cannot produce value by increasing pP but only by trying to reduce cP, we can see immediately that the operating logic of the non-profit organization must be based on the standardization of production over time and the constancy in its quality and process.

In the profit organization the TEVA is obtained by increasing both the productive as well as the business efficiency. Its exogenous teleonomy is linked to the capacity to produce the maximum TEVA, whose use for the *capitalist firm* will be examined in detail in the subsequent definition.

3 – Value-creating capitalistic firm

We can define as a capitalist firm a profit organization that finances its economic processes with external capital in the form of *Equity* (E) and *Debt* (D).

The capitalist firm must produce an OI at least equal to the *fair return* which capital suppliers require (*fair cost of capital for the organization*) if they are to keep their capital invested; that is: *fair return* (R*) to remunerate E and *fair interest payment* (I*) to remunerate D.

The capitalist firm bases its autopoiesis on its capacity to regenerate its financial and economic circuits, or loops.

The *financial circuit* is renewed if the capitalist firm succeeds in acquiring and preserving its invested capital (IC) – necessary for structural investments – by means of an adequate financial leverage (Debt/Equity ratio, or *der*); but this requires that the suppliers of both *Debt* and *Equity* financial capital – D and E – receive a *fair remuneration*, defined as a remuneration at least equal to their *opportunity cost.*

If we let R* and I* represent the remuneration judged to be fair by capital providers, then the financial circuit is renewed if the following economic condition holds: OI ≥ R* + I*. In particular, the difference (OI – (R* + I*)) = EVA represents the Economic Value Added, that is the surplus value produced in terms of the *full cost plus financial charges*, which is composed of

the operating costs CP (necessary to produce) as well as the financial costs (necessary to obtain and hold the capital E and D).

Since the profit organization is preordained so that {(max) (pP – cP) > 0}, then it follows that EVA = (max) as well.

We can easily prove that if EVA > 0, then the firm's economic value EVF is greater than E, with the difference representing the value of knowledge (human capital) as well as the value of *goodwill* (Mella, 2002).

The *Economic Value of the Firm* (EVF) is the *value of the firm* considered as an asset for the *shareholders* (for the *equity holders* as a more general case), and in its simplest form corresponds to the *financial value* of the capital (or economic capital) that derives from the capitalization of the future expected standard earnings, R°(T), obtained at a *roe*° on E(t_0) and discounted at a rate equal to the opportunity cost (or expected fair return) for the shareholders (*roe*)*:

$$EVF = \frac{R°(T)}{roe*} = E(T_0)\ \frac{roe°}{roe*}$$

From the definition of *financial integrity* in the previous section, we immediately see that if *roe** < (= >) *roe*° , then EVF > (= <) E(t_0), respectively.

The Economic Value Added or the *residual income*, can be viewed as the *economic value added* by the firm to the original amount of IC(t_0): that is, the residual economic result from IC when its return, *roi*, is greater than the cost of the invested capital, *coi* (*cost of invested capital*, *capital cost rate*, *ccr* = *coi*), or *weighted average capital cost* (*wacc*):

EVA = IC (*roi- coi),*

In fact, if we write the operating result as OR = (IC *roi*), then in order to have an EVA the following must hold:

EVA = OR – (I + R*)

If we substitue OR = *roi* IC, I = *rod* D, and R* = (*roe** E) into the previous equation, we obtain:

EVA = *roi* IC – (*rod* D + *roe** E)

which gives[7]:

$$coi = \frac{rod\ D + roe*\ E}{IC} = rod\ \frac{D}{IC} = roe*\frac{E}{IC} = wacc = ccr.$$

In economic terms this means that the return on total invested capital, *roi,* must be sufficient to pay the interest on the debt, at a fair financial cost, and to guarantee a proper *roe** to the *equity holders*.

[7] An equivalent definition is: EVA = OPBT – Tax – (IC *coc*) = NOPAT – (IC *coc*), where OPBT is the operating profit before tax and NOPAT is the net operating profit after tax (Steward, 1999).

The spread (*roi* – *coi*) thus takes on the meaning of *overall financial performance* (which is independent of the scale of the investment), whose absolute value is instead represented by the EVA, taking into account the amount of IC.

We can also define *coi* = wacc as the roi* - that is, the minimum return for IC that guarantees a fair interest and dividend return for the holders of equity capital.

EVA thus represents a performance indicator both of efficiency and outcome for the *entrepreneurial transformation*, since it expresses the efficiency of the latter in achieving a *roi* that is greater than *roi** = *coi* = *wacc*, where the latter is the minimum *roi* that would allow the firm to pay back its debts at a cost equal to the *rod*, as well as to guarantee a satisfactory return for the *equity holders* in the amount of *roe**.

It then follows that a *second condition* for the existence of the *capitalistic firm*, as defined above, is that it succeeds in producing a *roi* such that *roi* > *coi*, which, as we can also see from the equation of *coi*, also implies that *roe* > *roe** (Porter/McGahan,1997; 1999).

If this *second condition* is met, then EVF>E, thereby achieving the financial integrity of the equity capital invested by the shareholders.

If *roi* > *coi*, then it follows that *roe* > *roe** , and therefore also that R(T) = R*(T) + EVA; the EVF can also be written as follows:

$$EVF = \frac{R^*(T) + EVA}{roe^*} = E(t_0) + G$$

where

G = EVA/*roe**

is the theoretical measure of the *goodwill* of the capitalist firm.

Referring as usual to the entire period T, the EVA corresponds to the *extra income* that, discounted, represents the equivalent of the *goodwill* determined by a more concise procedure (Mella, 1992).

Only a *roe*>*roe** guarantees the production of value, and since the *roe* depends on the *roi*, together with the *der*, these become the maximum mangerial *objectives*, on which the other operating objectives depend: *volume* of production and sales, *cost*, *quality*, and *price*.

Having demonstrated that OI = OI* + TEVAP + TEVAM = OI* + TEVA, it follows that:

EVA = (OI* + TEVA – (R* + I*)).

The capitalist firm produces an EVA only if it succeeds in producing a TEVA which is sufficient to provide a fair return for the capital necessary for the productive processes.

Thus, the first condition for autopoiesis is that the capitalist firm produce values in terms of TEVA – and thus in terms of EVA and EVF – since only by producing in an efficient manner can it maintain its Equity and Debt while at the same time remunerating its shareholders and financers.

In fact, if the TEVA were insufficient to remunerate (I* + R*) then the capital would go toward other investments and the organization would break up.

If EVF ≥ E(t_0), and R*(T) is the net income that assures the minimum (or fair) return, *roe**, then the difference *sfin* = R(T) – R*(T) can be invested in the growth of the firm.

4 - Conditions for autopoiesis and teleology in BVCOs

Hence, autopoiesis depends on the organization's capacity to develop economic processes capable of achieving an OI above the fair cost of capital (I* + R*); but this implies that economic efficiency must be sufficient to permit an *roi* greater than the fair *rod**, so that, by taking advantage of the financial leverage, *roe* > fair *roe**.

Thus, the capitalist firm:

- sets the objective *roe** in order that EVF ≥ E(t_0), but tries to achieve max *roe*≥ *roe** by also exploiting its financial leverage, thereby controlling the *spread* and the *der*;
- manages the *business portfolio* in order to produce an OI(T) sufficient enough to guarantee a min *roi** that in turn is sufficient to achieve *roe**;
- manages its *financial portfolio,* with an overall financial cost I(T), so that, if possible, max*rod* ≤ min*roi**.

More specifically, the capitalist firm:

1) chooses those investments having a *roi* ≥ min*roi** for the entire firm; if there is more than one, it chooses the one having the max *roi;*

2) chooses the investments that in any event have *roi* > 0, as long as at least *roi* > *rod*, where *rod* is the cost of the correlated financing and, in any case, is sufficient to guarantee min*roe*;

3) chooses financing with min*rod* (with length of investment and other conditions held constant);

4) if *rod*<*roi*, increases D and reduces E; turn to rule (1);

5) substitutes, when possible, investment I with J if *roi*(J) > *roi*(I); in this way the average *roi* for the entire firm will increase;

6) substitutes, when possible, financing F with G if *rod*(G) < *rod*(F), in order to reduce the average *rod* for the entire firm;

Since OI = QP (pP – cP), autopoiesis is achieved if the *economic circuit* is continually renewed: that is, if there are sufficient sales volumes and at adequate prices to cover the factor costs under fair conditions, so as to continually reintegrate the factors necessary for a new production cycle.

We thus observe that, in order for *teleonomy* to exist, the search for TEVA and EVA by the organization must be perceived as positive by the environment. In particular, the TEVAP must be obtained under fair conditions of use of the factors of production and by maintaining the volumes

of supply and the fair remuneration for the suppliers and workers; otherwise the contraction in the costs of production would be considered unfavourable for the organization's teleonomy.

Similarly the TEVAM must be viewed as the consequence of an increase in the quality of the product, and not only as the consequence of price control policies (monopolies, trusts, etc.). In the opposite case the consumers would perceive the price surcharge as unjustified with regard to the fair measure, and this would lead to a reduction in the market shares.

The capitalist firm maintains the conditions for *exogenous teleonomy* only if it tries to maintain prices as close as possible to the fair price, or even by lowering the latter through price reductions justified by cost reductions. On the other hand, it must try to reduce the cost of production below the fair cost, so as to reduce the latter as well.

Maintaining the conditions for *teleonomy* thus implies:

- searching for the maximum exploitation of the present market and enlargement toward new markets;
- the continual improvement in the quality of production θ in order to increase QP_{θ} and pP;
- the continual enlargement of the variety of products in order to reach new consumers;
- an increase in the *productivity* of the processes in order to reduce the unitary factor requirements qF, on which depend the purchased volumes: $QF_{M, L, S} = qF_{M, L, S}\, QP$;
- in particular, an increase in the productivity of labour πL through an increase in the quality of the human factor of the organization (skill, motivation, incentives) and its work efficacy (fertility, equipment, software);
- the search for supply markets where the factors have a higher quality θF, but above all lower purchase prices, since the level of factor costs depends on prices and, as a result, the cost of production, with: $CP = QF_{M, L, S}\, pF_{M, L, S}$.

Autopoiesis thus implies both attaining a high degree of *endogenous teleonomy* – with the search for internal conditions for survival through an optimal mix of creativity, productivity and incentive system – and a high degree of *exogenous teleonomy*, which guarantees the external conditions for survival, with an increase in customer satisfaction – obtained from the optimal mix of quantity, quality, variety and price of production – as well as social satisfaction, deriving from a valued social impact of the organization (spread of employment, rise in average income, payment of taxes, environmental care, etc.).

5 - Managerial qualities and entrepreunership in business organizations

A *permanent organization*, profit or non-profit, may be viewed - to an outside observer - as a "*conscious cognitive system*", since it must develop processes capable of both perceiving stimuli and giving them a significance as "external" or "internal", "favourable" or "unfavourable", and of transforming these into dynamic representations of the internal or external environment (Terreberry, 1968) on the basis of which decisions are made and programs built, in order to develop behaviour which is reactive (based on causes) and pro-active (based on objectives) with

regard to environmental changes for the purpose of maintaining its autopoiesis even while it modifies its own structure (Von Krogh and Roos, 1995; Lewin et al., 1999)[8].

The intelligence of the organization is the capacity of the cognitive system to acquire and utilize *knowledge* in order to make rational decisions, develop programmes that are compatible with the structure and adequate in terms of the available resources, act in a manner coherent with the programmes, and carry out effective performance controls, all the while tending to achieve the maximum existential success without reducing the options for survival (Drucker 1989; Gephart at al., 1996). On the other hand, the intelligence of the organization is the capability of its components to build on a common experience (Kock, McQueen and Baker, 1996; 1997).

In order to maintain its autopoiesis and renew the financial and economic cycles it is vital for the intelligent autopoietic organization to produce a continual *learning process*; that is, one with formation, accumulation, structuring and self-confirmation of *knowledge* in order to broaden its *experience* (formation) and use this (utilization) to modify the evaluation criteria for the purpose of improving the decision-making and planning process and the control procedures (Boland and Tenkasi, 1995; 33. Argyris, 1977; 1992; Walsh, 1995).

In business organizations the construction of representations of the internal and external world, as well as the other cognition processes, are carried out by the *management*, which produces the thought of the organization (rational calculations for decision-making, programmes and controls) from which the organization's actions derive; the production and financial processes, which are instrumental for achieving a common end, are carried out by the effector organs that produce the action of the system.

Management must formalize its mental representations by constructing formal, verifiable, transmittable and utilizable models:

a) *market and sector models,* to know the competitive structure of the external environment the organization operates in (present sector, present and potential competition, markets, profile of potential consumers, profile of customers, etc.);

b) *organization models,* through which the internal organic structure is known (formal and informal structure, information flows, internal competition, incentive system, etc.);

c) *balance sheet models*, which represent a summary of the past trends in the economic and financial processes, and of the organization's impact on its environment; these models determine the economic output, the capital, and the overall surplus;

d) *programme models*, which represent the future trends that result from the forecasts and decisions;

e) *control models*, such as analytical accounting and the tableau de bord, which monitors the performance variables judged to be significant indicators of the organization's vital parameters (efficiency, efficacy, quality and, in particular, economic efficiency,

[8] Maturana and Varela distinguish between two forms of System Coupling: one with the Environment and one with another system (Maturana, 1975; Varela, 1979).

profitability, length of processes, potency of the organs, etc.), since the organization can maintain its identity only if it remains vital:

f) that is, manages to maintain the vital parameters at levels that impede its break-up.

6 – The limits of traditional costing methods for the creation of value

Measuring the EVA permits a valuation of the impact of the resource allocation choices, since it provides a progressive estimate of the value created by management for the *shareholders*. However, it can become an effective instrument of support for managerial decisions only if it is systematically applied to the operational levels of the organization as well.

As we have underlined above, an organization produces a positive EVA, and thus an EVF>E, only if the following relation is satisfied:

$OI > I + T + R^*$

Since $OI = QP(pP - cP)$, it follows that:

$QP(pP - cP) = I + T + R^*$

from which we obtain:

$$pP > cP + \frac{R^*}{QP} + \frac{I}{QP} + \frac{T}{QP}$$

The control of OI thus implies that the average unit price can cover the average unit cost of production, the remuneration expected by those who have supplied the capital needed to acquire the productive factors in the form of risk and debt capital, and taxes. In other words, management needs a model of the price-cost correlation which allows it to systematically control the effective payment of all the factors of production, including capital, taking account of both the cost of debt capital and the opportunity cost of its own capital, so as to guarantee the creation of value through a suitable and fair return for the financial investment (Mella, 1997).

Such cognitive requirements imply the adoption of an adequate plan for the attribution of costs that is capable of highlighting the absorption of resources through processes through which value is created (or destroyed). The costing methodology which best meets this need is *activity based costing*, which, by abandoning the traditional vertical approach linked to the functional hierarchical structure in favor of a horizontal view of business, focuses attention on the activity by which organizational processes are carried out.

ABC, by identifying the activities carried out for the product and the relative determinant of cost (*cost driver*) leads to a determination of the *full cost* of the product, without the distortions caused by the traditional system where the apportionment of indirect costs are too closely tied to the measures of output and not to the processes from which the output derives (Cooper and Kaplan, 88; Johnson and Kaplan, 91). The *cost drivers* represent a new basis for explaining and controlling the variability of costs linked to production based on the activities involved in the latter.

In fact, the growing weight of indirect costs in the overall cost structure (Santesso, 91) makes it ill-advised to adopt the *direct-costing* approach and more preferable to adopt the *full-costing* methodology. The approach based on the marginalist principles is based on the hypothesis, often implicit, of full production capacity for one or more factors, and tries to find rational solutions while taking account of capacity constraints.

The *direct costing method* thus appears oriented toward the optimal management of direct variable costs, while not taking into account the possibilities of overcoming the capacity constraints through strategic decisions to expand the productive structure.

On the one hand, this viewpoint leads to the management of variable costs being given priority over the management of investments, and on the other it focuses attention exclusively over a short-term horizon, favoring the adoption of decisions at the operational level without giving due weight to the strategic dimension.

Even the decision to create a product or to change the productive mix, thereby creating a long-term commitment in terms of indirect activities, more and more acquires the characteristics of a long-term or strategic decision, which thus cannot be adopted on the basis of information only on variable cost dynamics, but instead must be based on the knowledge of the full cost (Collini, 93; Pastore, 95).

The basis for the imputation of indirect costs generally used in the application of *full costing* – operational, instrumental and functional bases (Moisello, 2000) – which are indispensable for the common structure costs, are instead often inadequate for allocating the costs relating to production support activities.

On the other hand, the traditional *full-costing* method does not explicitly bring out the imputation of several cost elements whose allocation is instead fundamental for the correct attribution of the indirect costs of the product: that is, the *costs of complexity* (relative to setup, planning changes, the management of supplies). The adoption of a vertical approach linked to the formal organizational structure, as opposed to a transversal approach connected to the real organizational processes, does not allow businesses to identify the levers they can use to enjoy competitive cost advantages (Brusa, 79).

7 – Activity Based Costing in the context of value creation

ABC abandons the traditional division of costs into fixed and variable on the basis of the volume of production; instead it identifies a new category of costs, the so-called *costs of complexity* linked to the growing differentiation of production. These costs are defined as "variable in the long-term" since, despite the fact they are fixed with respect to the volume of production, they show a notable amount of variability if compared to the level of differentiation among products: if, that is, they are seen as a function of the degree of complexity of the production and sales processes (Tardivo, 95).

The strategic importance of costs determined by means of ABC is based on the idea of long-term variability, on the *horizontal* view of business activities, and on the explanation of the mechanisms that govern the consumption of resources over the long-term through appropriate

cost drivers (Cooper, 89; Roth and Faye, 91; Novin, 92; Babad and Bala, 93; Sharman, 94; Dopuch 93).

In fact, ABC allows for an analysis of the "horizontal" processes through the determination of the cost of the various *activities* involved in carrying out a given process, by allowing for an evaluation of the contribution of those *activities* to the creation of value (Turney, 91). It thus allows economic information about costs to re-design the internal processes based on criteria of long-term efficiency.

The determination of a specific *cost driver* for every activity allows us to overcome the distortions created by the application of traditional bases – direct labor, production volume, etc. – in the attribution of costs relative to production support activities (which do not depend as much on the volume of production as they do on the degree of product differentiation) such as, for example, *engineering*, *quality control*, the *supply* of materials, and the *management of stocks* (Cooper, 89; Santesso, 91).

The indirect link between cost and product is represented by two relations, COSTS↔ACTIVITIES and ACTIVITIES ↔PRODUCTS, which represents the logical approach ABC uses to allocate costs.

The relation ACTIVITIES↔PRODUCTS highlights the absorption of the utility yielded by the activities. The consumption of the latter can be transnational in nature, or it can be proportionate to the volume of output. The cost of the activities common to the various types of production are allocated to these on the basis of the *cost drivers* held to be most suitable for expressing a causal-functional link.

ABC displays its maximum potential in the strategic product decisions (decisions regarding price, mix, marketing, abandoning mature products, etc.) that refer to a medium-to-long-term period, for which they have been studied (Cooper and Kaplan, 88; Koehler, 91; Wizdo, 93). In fact, we must emphasize that the validity of the obtained information is limited to the specific decision-making context described above, since only in the medium-to-long-term can the costs which the ABC method considers variable actually be considered as such.

Thus, as mentioned above, the full cost of product ABC is not effective as a support to the evaluations of short-term economic convenience (Brusa, 97).

The proponents themselves of ABC have subsequently widened the initial restricted decision-making context: now we have moved on to *Activity-Based Profitability Analysis,* a system that basically aims at an analysis of the profitability of clients, markets, distribution channels, etc. (Cooper and Kaplan, 91).

In relation to the use of a long-term methodology in the evaluation of economic convenience, it is appropriate to point out a methodological feature that allows us to make critical observations. In its field of reference ABC does not consider the diverse distribution over time of the economic performance's indicators to be relevant for decisions, and does not evaluate the "risk" factor. As these deals with decisions regarding "investment choices" they would strictly speaking require the use of methods of evaluation based on the discounted cash flows, a procedure not presently foreseen by ABC or other cost accounting methods.

Finally, and this represents an aspect that will be developed in the following sections, in the calculation of the full cost of product the ABC methodology does not call for the calculation of the effective or implicit costs and charges connected with capital.

Thus the choices regarding convenience and mix, which are based only on the technical cost of production and not on the cost combined with the financial components, do not allow us to rationally make pricing decisions which guarantee a just and appropriate return on the *equity*.

This limit has led to the creation of models for the calculation of the product cost that combine the determination of the ABC cost with the direct and indirect charges regarding the invested capital, which are calculated in a way consistent with the EVA model through the determination of the average weighted cost of capital.

8– The integration of Activity Based Costing and Economic Value Added

As we have observed, as originally presented ABC limits itself to allocating to the cost of production the *operating* and *general* expenses and the amortization shares of fixed capital (Roztocki, Needy and LaScola, 99), and does not consider the *capital charges* that express the financial cost of the capital obtained for investment in the business operating structure.

Ignoring the cost of capital can lead to the underestimation of the product cost as well as to erroneous decisions. For example, businesses can be wrongly led to penalize the production of a product with a lower profit margin in favor of one that, even though having a high profit margin, has a negative EVA, since it requires a large amount of capital given the high capital cost.

The cost of capital – which by nature represents an *opportunity cost* – includes both the cost of *debt* as well as that of *equity* which, even though it does not represent a monetary cost of production, must nevertheless be covered by revenue if the firm wants to create *dividends* and *economic value* for the shareholders (Kee, 99).

The cost of capital must necessarily be included in the calculation of the cost of the control object (whether this be a product, client, distribution channel, etc.). This obliges the firm to also include in the costing procedure the identification of the capital employed for each activity and thus the calculation of the cost associated with this capital (Cooper and Slagmulder, 99).

Completing what we have considered above and introducing the fiscal benefits, we can observe that the cost of capital can be calculated as the average of the cost of debt and the opportunity cost of equity, weighted on the basis of the proportion of each source of capital in the financial structure:

$$wacc = \frac{D}{IC} \times i_d \times (1-t) + \frac{E}{IC} \times r_e$$

$$IC = D + E$$

where D represents the debt capital and E the firm's own resources

i_d x (1- t) is the cost of debt net of the fiscal benefit they generate, while $r_e = r_f + (r_m - r_f)$ x β represents the cost of the firm's own financial resources.

As an *opportunity cost* the above represents the yield from the use of capital with the same degree of risk[9], and it is estimated using the Capital Asset Pricing Model (CAPM) (Sharpe, 64; Lintner, 65; Mossin, 66), according to which the cost of equity, r_e, is the algebraic sum of the yield from risk-free activities[10], r_f, and the expected premium for the risk. In fact, the yield from any risky activity is given by the pure interest rate (return from risk-free financial activities, for instance treasury bills) plus the difference between the expected return from the market portfolio, r_m and the pure interest rate, r_f, multiplied by the coefficient β. β represents a measure of the degree of non-diversifiable risk of the activity[11].

In general the implementation phases of an ABC-EVA system follow those of a traditional ABC system: identification of the activity, the allocation of operating expenses and capital charges to the activities, the allocation of the activity costs to the products on the basis of the *activity driver* (for the operating costs), and the *capital driver* (for the capital costs).

On the assumption that there is an explicit configuration (suppliers, etc.) of the capital net of: no interest bearing debt, provision for depreciation, reserves for bad debts and provision for warehouse depreciation, etc., then the first step is to calculate the *capital charges* associated with the capital invested in the firm. To this end we consider the assets, current and fixed (cash, commercial credit, stocks, buildings and equipment, etc.) and the current liabilities (commercial debt, accrued costs and deferred revenue, etc.).

We then multiply the value of each of these asset entries by *wacc*, thereby obtaining the *opportunity cost* of the capital invested in each asset. This cost will then be allocated to the activity or activities directly connected with the accounting item in question (for example, with reference to commercial credit, the cost of capital will be assigned to the activity "invoicing and collection"; regarding the final goods, the cost of capital will be assigned to the activity "warehousing"; with reference to the commercial debts, the cost of the capital (Hubbel, 96) will be allocated to the activity "purchase of material and supplies"; etc.). The *capital charges* relative to no interest bearing debts are negative, since they have the effect of reducing the cost of capital.

We thus come to the construction of the capital charges/activities matrix. At this point we allocate to the products all the costs of the activities (operating expenses and those relating to the capital). In particular, as mentioned above, the operating costs are allocated on the basis of the *activity driver*, while the capital charges on the basis of the *capital driver* (it often occurs that the *activity driver* and the *capital driver* coincide) (Cooper and Slagmulder, 99).

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9 The cost of equity expresses the average rate of return required by shareholders in order to invest in a given firm.

10 The *risk free rate* is a rate that expresses the guaranteed returns from a risk-free investment in treasury bills that have a zero correlation with the risky activities of the market.

11 The non-diversifiable systematic market risk, which is exogenous to the firm, is expressed by the coefficient $\beta=\sigma_{im}/\sigma^2_m$. A firm defined as a market performer has a $\beta=1$: that is, it has an expected return equal to the variations in the overall returns guaranteed by the market for investments of equal risk. A firm with $\beta>1$ has more volatile returns compared to those of the market and is judged by investors to have a greater implicit risk, as opposed to firms with $\beta<1$, whose risk is less than the market.

The allocation of the cost of the activities to the product occurs through the calculation of the *activity costing rate*, which is given by the ratio between the total cost of the activity and the total quantity of the chosen driver. The unit consumption factor of the resources thus obtained is then multiplied by the driver units, which express the overall consumption of that activity by the product. In an integrated ABC-EVA system it is necessary to calculate two different *driver rates*, the *consumable driver rate* and the *capital driver rate.*

We can then construct the ACTIVITIES↔PRODUCT MATRIX. The product cost comes from the sum of the operating costs, allocated by activity, and the costs of the capital invested for its production, both direct and implicit.

If the cost includes the *operating expenses* as well as the *capital charges*, then we can immediately see which *products*, *distribution channels* and *clients* contribute to increasing the EVA, and thus creating value.

In this way, with regard to the decision-making processes we can abandon the not-so-meaningful reference, in terms of value creation, to the operating results.

9 – The ABC-EVA system. Some considerations

Now that we have presented the integrated ABC-EVA model, some considerations are in order. With reference to the *destination* of the capital, we can distinguish between "*dedicated capital*" and "*non-dedicated capital*", according to whether or not we can identify a causal relation between the capital and the product which is the object of the cost (Cooper and Slagmulder, 99). The "*dedicated capital*" can, in turn, be classified as direct and indirect. The former can be allocated without any ambiguity to the cost object (for example, consider the commercial credits regarding a particular client), while the latter does not directly refer to the cost object. An example is the capital used in such support activities as setup activities. We can proceed by allocating the cost of the indirect capital to the activities this capital serves, and only at a later stage to the products. As regards the *"non-dedicated capital"*, this concerns the capital invested in the general support activities for the building structures. It cannot be allocated along the lines of causal criteria, since it is not directly linked to the production of products or to the assistance to clients or distribution channels. The capital charges associated with this type of capital will thus not be allocated to the cost objects, since the decisions that concern these generally do not modify the amount of such investment.

From the point of view of the appropriateness of implementing an integrated ABC-EVA system, we can say that it would be advantageous in the case of high capital costs. In order to aid the value-creating organizations in evaluating the appropriateness of adopting such a system, with the aim of making available more accurate accounting information, the literature on the topic, inspired by the empirical experience in the sector of small- and medium-sized firms, proposes determining the weight of the *capital charges* with respect to the *operating expenses* by means of the *capital-to-operating ratio:*

$$CO = \frac{CC}{OE}$$

suggesting we proceed to an integrated system when the indicator has a value greater than 0.1 (Roztocki, Needy and LaScola, 99).

For decision-making purposes (decisions on mix, the discontinuation or acquisition of activities and resources, etc.) the calculation of the EVA of the product may be useful based on two considerations:

1) the EVA is coherent with the principles commonly adopted in investment decisions and with the techniques inherent in the discounting of the expected cash flows; the integrated ABC-EVA model thus permits the limits of ABC to be overcome when it is used for investment decision choices;

2) the methodology provides useful information to managers regarding the cost of the funds invested in the various operations, thereby allowing them to evaluate more efficiently and effectively the use of the capital invested in the firm – while also taking account of the tax beneit from the debt charges – and to develop appropriate improvement programmes.

The calculation of the product EVA can be formalized as follows:

$$EVA = (pP - cP) \; x \; (1 - t) - F$$

where t represents the tax rate and F the cost of capital per unit of product.

This relation suggests that a product responds to the criterion of economic efficiency – understood as the ability to appropriately remunerate all the productive factors – if its price can guarantee a positive EVA.

In order for a product to be able to guarantee an appropriate and just return to all the productive factors its price must be such that:

$$pP = cP + \frac{F}{1 - t}$$

When the EVA is negative the price increase necessary to reach equality in the above equation is thus difficult to determine.

If the selling price cannot be increased, then another action which can increase the EVA is the reduction of the operating expenses, or alternatively the invested capital. The relation above shows how this second strategy is preferable to the first, since the cost savings that would accrue through a reduction in the resources connected to the operational management are subject to tax.

In short, in developing strategies to increase the EVA of a product the manager must be able to distinguish between the different effects, in terms of the creation of value, from an increase in prices as opposed to a reduction in the operating expenses or the cost of the capital.

Moreover, an essential role in the improvement process can be played by the optimal use of the production capacity. For example, in order to create value, it can be useful to sell off the excess *assets* or try alternative uses for the unused resources.

In conclusion, the integrated ABC-EVA system is much more than an accurate system of costing. In fact, in addition to guaranteeing reliable and thorough cost information capable of also including the cost of capital, and thus coherent with the objective of the creation of value for the shareholder, the system also provides a useful estimate of the performance of specific cost objects (products, processes and activities, clients, distribution channels, etc.). In fact, this indicates to what extent the cost objects are able to recover not only the operating expenses but also to satisfy the expectations of those who have invested their own capital, thereby guaranteeing a satisfactory rate of return on the capital invested in the firm by the shareholders. It is important to identify "where" the EVA has been created and determine the appropriate strategies to increase its value. To this end it is useful to link the business plans and the budgeting decisions with the strategies to increase the EVA. But this is still not enough: it is necessary to systematically apply the EVA all the way down to the lowest levels of the organization: that is, to the operating levels, since the true "agents" of the creation of value are the employees, clients, suppliers, processes and operations, etc. (Hubbel, 96). It is only by concentrating their attention on the true determinants of value that management can best manage the improvement processes and the allocation decisions for the scarse capital.

Thus an ABC-type accounting system represents a solid base for the application of a management model. ABC serves to supply information on the efficiency of one's business, in terms of cost (including the cost of capital); the EVA system allows for the planning of value (thus bringing into line managerial objectives with the expectations of the shareholders), the summarizing of the periodic performance in a single indicator that is clear and unanimously shared within the organization, and the motivation of each member of the firm to attain the common objective through a stimulating system of incentives that includes bonuses linked to the creation of long-term value.

The valuation of the product through the integrated ABC-EVA system also has the advantage of considering the risk through the determination of the average cost of capital, since the latter depends not so much on the financial structure of the firm as it does on the *business risk*.

To conclude, the analysis of the profitability of products for a business profit organization carried out using the EVA as an indicator can help to identify which products create and which destroy economic value. The products with a negative EVA must be reconsidered in order to determine how much their prices should increase by, and how much costs should be reduced along with the quantity of the operating resources and investment consumed. Including the cost of capital in the cost of the product helps to better understand the economic consequences of the allocating choices regarding the available resources and to come up with better plans for the business processes for the purpose of maximizing the economic result of the value-creating organization and assure its survival and development over the long term. Clearly this instrument of analysis permits choices which are in line with the aim of maintaining the *financial integrity* of capital. In the presence of inflation the methodology by itself is not sufficient to guarantee that the value-creating organization will be able to indefinitely renew the productive investment, since

the ABC system is based in any event on final accounting data typical of traditional systems. In difficult economies the choices must be supported by cost information based on replacement values and not on historical values, since only the former can guarantee that investments can be renewed under the current market conditions.

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