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Performance Indicators in Business Value-Creating Organizations

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Summary

In this paper I propose a general model to understand (not merely describe) the operating logic of *Business Value-Creating Organizations* and, in particular of the *capitalistic firm* - that is, the *business for-profit organization*.

When viewed as autopoietic and teleologic organizations, firms can be interpreted as operating systems for efficient transformation that carry out five parallel transformations,

a. a *productive transformation* of factors into production; this is a transformation of utility, governed by productivity and by quality;

b. an *economic transformation* of costs and revenues into operating income; this is a transformation of value, governed by prices and therefore by the market;

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c. a *financial transformation* of risks, which transforms capital into returns and guarantees the maintenance of its financial integrity;

d. an *entrepreneurial transformation* of information into strategies, which leads to a continual re-adjustment of the firm's strategic position;

e. a *managerial* (organizational) *transformation* of strategies into actions of management control.

The model allows us to propose a system of performance indices and measures and to highlight the mutual relationships among these indices and measures.

1 – Organizations as autopoietic and teleonomic systems of transformation. Measures of performance

The processes for the production of value in the advanced economies (where production is distinct from consumption) are carried out by permanent productive organizations[1], in particular *Business Value-Creating Organizations (BVCO),* which are also known as *production market-oriented organizations,* and by business for-profit BVCOs, called *capitalistic firms*.

The production of value occurs through a *network of efficient processes* - carried out by a structure of processors, or organs, or by networks of specialized organizations (Thorelli, 1986; Alter and Hage, 1993) - that produce *cognition, metabolism and transformation* supported by specific rules that define their stable equilibriums.

From a *cognitive* point of view the BVCOs are conscious cognitive systems[2] that present two characteristics:

- they are *operationally closed* – in that the cognitive (and computational) processes derive from the cognitive interconnections among all the individuals that make up the organization (Maturana and Varela, 1980);
- they are *structurally coupled* to the environment; through (and to the extent of) their own cognitive and computational resources they perceive disturbances as external stimuli, process these to form *representations of the external world*, and act (react or pro-act) to re-equilibrate the network of vital processes (Von Krogh and Roos, 1995).

As regards the continuance of the *metabolic processes,* the BVCO can be considered an *autopoietic system* (Varela, 1979; 1981: 38; Uribe, 1981: p. 61; Vicari, 1991) that, through cogni-

[1] "Definition 1 - *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 functioning, role, functionality 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.*" (Mella, 2002). An organization not having a predefined term of existence is called a permanent or institutionalised organization.

[2] A conscious cognitive system is – to an outside observer – a system with internal organs of memory, computation, and evaluation (preferences), able to compare objects, calculate information, and construct representations in order to couple itself successfully to the environment and survive, even by modifying its own structure in line with the variations permitted by the genetic and operative programme (Von Krogh and Roos, 1995); *"A cognitive system is a system whose organization defines a domain of interactions in which it can act with relevance to the maintenance of itself, and the process of cognition is the actual (inductive) acting or behaving in this domain."'* (Maturana and Varela, 1980: 13).

tive processes, continually develops *metabolic processes* by which it reproduces itself, regenerating the network of processes and processors to extend the life of the organization even beyond that of the component individuals (Maturana-Varela, 1980: 82; Zeleny, 1981: 2)[3].

From an external point of view we immediately see that permanent organizations must also develop *instrumental processes* of some kind or another, since only by interacting with the environment can they pursue the institutional aims they have been created and are maintained to satisfy; in this sense they can be considered *open instrumental systems of transformation*, since they transform inputs from the environment into certain kinds of outputs that are demanded and appreciated by the environment. In particular, the BVCOs produce value through a network of instrumental processes of transformation, utility (productive), value (market), and risk (financial); in this sense they are *teleonomic systems*[4] that continue to exist only as long as their performance, as producers of value, is appreciated by the environment for which the value is produced[5].

In simple terms, I define the process/system of *transformation* as a process/system that carries out a transformation of some kind (qualitative or quantitative) of input variables [x(t)] into output ones [y(t)] by means of the state [s(t)], according to an appropriate network of *operative processes* regulated by specific *transformation functions* managed by the system's operative *programme* (Mella, 1997a).

A *transformation system* is *instrumental* if its functioning is pre-arranged to satisfy the needs of users who are outside the system.

Every *instrumental* transformation system is characterized by a *performance* made up of a variable (or vector of variables) that expresses its *performances* in terms of *functioning* and *result*, and in particular the differing capacities to produce a given *gap* (qualitative or quantitative) between the *correlated* outputs and inputs.[6]

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[3] As an autopoietic system the organization produces itself (Bednarz, 1988; Luhmann, 1995) by developing cognition in order to search for energetic and metabolic inputs in the environment which are held to be useful, and fleeing from stimuli deemed damaging (Zeleny and Hufford, 1992; Mingers, 1994).

[4] If we define *teleonomy* as the attitude of the organization to maintain its existence by regenerating its autopoietic processes, then we can distinguish between (Monod, 1970: 124; compare with Maturana-Varela, 1980; 1988; Brooks and Wiley, 1986, Mayr, 1989):

a) *endogenous* teleonomy, which depends on the ability to pursue internal goals, that is to develop a teleology (understood in the traditional Hegelian meaning of voluntary activity directed at an "end"; Dennet, 1988, Van de Ven and Pool, 1995); that is, to achieve a common aim and satisfy the individual motivations of the components;
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.

[5] We can show the relationships between teleonomy and autopoiesis. In this sense teleonomy – understood as the attitude of a species, as a collectivity, to preserve itself – can be considered the phenomenology that corresponds to autopoiesis – understood as self-production with respect to the individuals (Mella, 1997b); "In effect, teleonomy is teleology made respectable by Darwin" (Dawkins, 1982).

[6] We can attribute to the term *performance* of a process/system of transformation the meaning of the *modality* by which the process is carried out and the *result* from that process, or the *modality* or *result* of the functioning of the *system* that carries out that process.
A *performance indicator* for the process/system S is a variable (a vector of variables), P(S, t), that expresses these means or results over time.

In general the *performance measures* of instrumental systems of transformation can be specified as follows (Mella 1992)

Efficiency, or *functioning* measures; these refer to the relationship between the *output-performance* (quantity and time) of the system and the *resources-inputs* needed and employed [*matching input and output*]; if we assume a system S that transforms the quantity of inputs x(T) into the outputs y(T) at the end of cycle T, then we can consider an indicator formed, for example, by the vector:

$P^F(S, t)$ = [*efficiency* = e(T) = y(T)/x(T); *unitary input requirements* = f(T) = x(T)/y(T); *period result* = R(T) = y(T) – x(T); *return on input* = roi(T) = R(T)/x(T) = e(T) –1];

a) *output* or *performance* measures; these refer to the ratio between the system's *performance/results* and the *results expected* by management [*matching planning and output*]; they express the ratio [programmed result, Y°(T°) ↔ result obtained, Y(T)]; for example:

$P^P(S, t)$ = [*efficacy* = p(T) = Y(T)/Y°(T°); *variance* (deviation) = ε(T) = Y(T) – Y°(T°); *timeliness* = T actual length of time, T° programmed length of time; *project quality*= qlY°, specifics of the planned output / qlY specifics of actual output][7];

b) *outcome* or *benefit* measures; these refer to the ratio between the performance/results of the system and the satisfaction of the *users/consumers* [*matching satisfaction and output*]; these express the ratio [satisfactory results, R*(T*) ↔ actual results, R(T)]; for example:

$P^B(S, t)$ = [*satisfaction* = s(T) = R(T)/R*(T); *benefit* = b(t) = R(T)-R*(T); *advantage* = roi – roi*]; *punctuality* = (t+T) actual time /(t+T∗) planned time; *functional quality* = qlY* use function of expected output / qlY use function of actual output].

We define the *performance measures* function for the system S in period T as the vector:

$PM(S, t) = [P^F(S, t), P^P(S, t), P^B(S, t)]$

which expresses the dynamics over time of the performance indicators selected to test the observed system of transformation.

According to the variables considered, the indicators can be (a) *qualitative,* if they express the process or system modality; *quantitative*, or performance *measures*, if they refer to *size*; (b) *absolute,* if they refer to the system; *temprally variant*, if they refer to the dynamics of the system over time; *positional*, if they express the comparison between the system/process and other systems/processes; (c) *analytical*, if manifold due to differing characteristics or different objectives; *synthetic,* if they derive from a synthesis of analytical indicators and refer to the entire system process.
Once we have defined a performance indicator we can also set forth a *performance objective*, P*(S, t*), and a *performance standard,* P*(S, T).
An appropriate system of *performance indicators* allows us to verify over time the achievement of objectives or the maintenance of the functioning standards of a system of transformation.

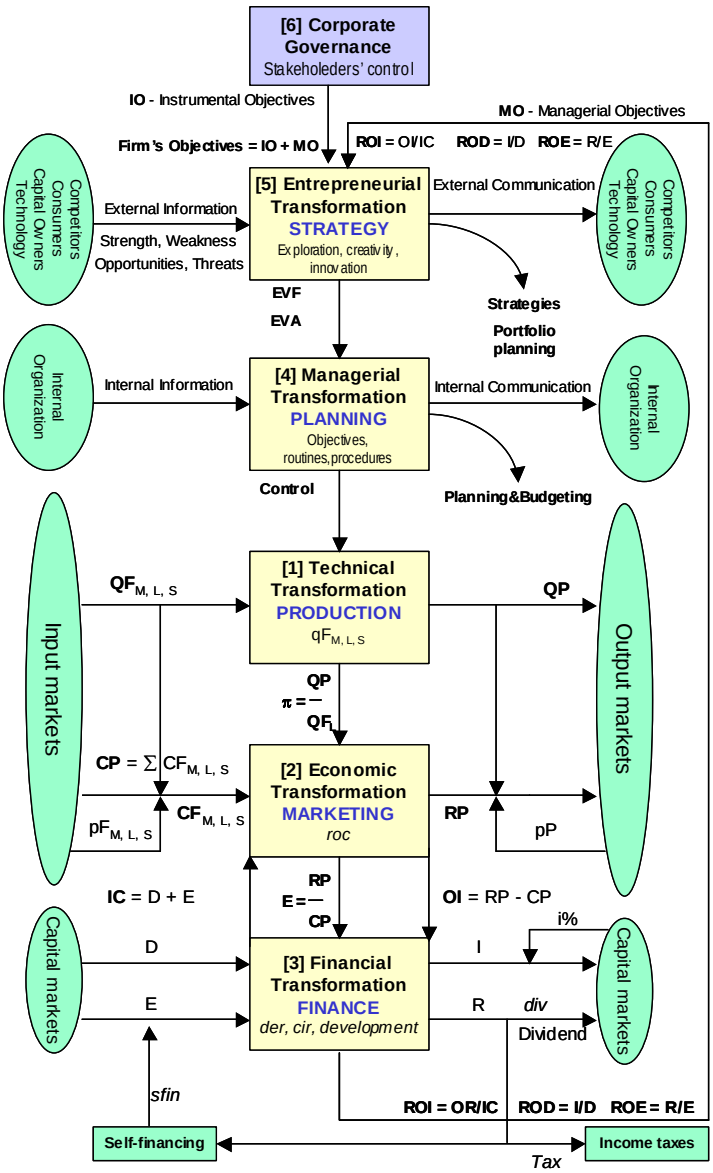
[7] By "quality" we refer to at least two correlated aspects:
1) the set of characteristics that made a given system/process/object suitable to be used for a particular purpose; this form represents the *extrinsic, use,* or *functional quality*; the set of purposes for which the system/process/object can be useful for a particular subject is defined as the *use function*;
2) the set of characteristics that make a system/process/object conform to a reference sample – either observed or expected – that defines its functioning; this form of quality is defined as the *intrinsic, project,* or *instrumental quality.*

However, from these basic notions we can see the difficulty of defining the meaning of *quality*; this term is *fleeting*, and an understanding of it is normally left to intuition (Mella, 1992, ch. 17).

2 – Capitalist firms as efficient systems of transformation

The *capitalist firm* (as defined in the sections below) is typically a permanent *business* and *profit–oriented* organization; that is, a social system that produces five types of transformation, as shown in the model in figure 1.

Figure 1 – Model of a firm as an efficient system of transformation



[1] *TECHNICAL* OR *PRODUCTIVE* TRANSFORMATION (PRODUCTION).

All permanent productive organizations transform flows of productive *factors* into flows of finite *products*; the productive transformation is typically a transformation of *utility*: factors of

production, having a given utility, are transformed into *products* capable of producing a greater utility.[8]

We indicate by F = [M, L and S] the vector of typical factors: the materials, components and other *operating* factors (material or immaterial), the direct labor, and the *structural* factors of production, material or immaterial (buildings, machines, facilities, patents, indirect labor, etc.): that is, the factors of *capacity*.

We can represent by qF(T) = [qM, qL, qS] the vector of *average unit requirements* of factors in a given period T = (t_{n-1}, t_n).[9]

If $QP_\theta(T)$ indicates the volume of production in period T (if not necessary, the reference to T will be implied), then the factor volumes are determined as follows:

[1] $QF(T) = [QM, QL, QS] = [qM\ QP_\theta, qL\ QP_\theta, qS\ QP_\theta]$

The productive transformation must also consider the *quality* of the products obtained, expressed by the symbol θ, in addition to their quantity.

A permanent organization created to systematically obtain $QP_\theta(T)$, to be consumed by users who are different from the members of the organization, represents a *production organization* or a *production-oriented organization*.

[2] *ECONOMIC* OR *MARKET* TRANSFORMATION (MARKETING).

The productive transformation must be integrated by a transformation of values by which the firm tries to increase the value of the productive *factors* by employing these to obtain products that can be traded at remunerative prices.

If we consider that the value of a factor or product is determined by how much it is *appreciated* in an exchange, then we immediately see that the economic transformation depends on the *price function* and on the average prices that are compatible with the negotiated market volumes.

We indicate by pF(T) = [pM, pL, pS] the average prices in time T for each class of input factor, and by pP the vector of average prices for the output produced.

From [1] we can calculate the factor costs:

[2] $QF\ pF = [CS, CL, CS] = [QP_\theta\ cM, QP_\theta\ cL, NS\ pS] =$

$= [QP_\theta\ (qM\ pP), QP_\theta\ (qL\ pL), [(QP_\theta\ qS)/KP]\ pS],$

where $NS = [(QP_\theta\ qI)/KP]$ represents the number of structure factors to be acquired in T, given the average productive capacity of each factor, which is equal to *KP*, and where CS = NS pS

[8] In the productive transformation we also have *residues* that, if polluting, have a disutility that must be considered along with the utility of the production.

[9] We use the following conventions: In general, we use capital letters to symbolize overall volumes: QF indicates the overall quantities of F in a certain period T, QP, CF, RP and CP express the sales volumes, overall factor costs, sales revenue and total cost of production, and so on. To indicate the amounts corresponding to a given unit we will write the corresponding letter in lower case; qF indicates the unit quantity of F, cP the average unit cost, etc.

indicates the cost of structure factors acquired as factors of capacity necessary for producing QP_θ.

The *full production cost* for period T, which expresses the total value of the factors productively used in production, given the chosen technology and supply and sales decisions, cost of capital not included, can be determined as a function of the variable QP_θ, with reference to [2]:

[3] $CP(T) = [CS + CL + CS] = QP_\theta\ (cM + cL) + CS.$

The *average unit cost* of production becomes:

[4] $cP(T) = CP(T)/QP_\theta(T).$

In general, the costs for material and direct labor can be considered as variable costs that are proportionate to the volume of production; the structure costs are fixed or semi-fixed in relation to these volumes.

The sales revenue from production is simply:

[5] $RP(T) = QP_\theta(T)\ pP(T).$

The difference between the sales revenue – or market value of output – and the cost of production – or value of inputs used up in production, which is assumed to be homogeneous with that of output value – quantifies the operating result of the economic transformation[10]:

[6] $OR(T) = RP(T) - CP(T)$

The production of a given product P_θ which also involves an *economic transformation* – that is, for which it makes sense to determine an OR(T) – is a *business.*

A production organization that systematically and for a long period of time achieves a *business portfolio* and sells its products on the market in an effort to obtain $pP(T) \geq cP(T)$ in order to physiologically produce an $OR(T) \geq 0$, is not only a *production-oriented organization* but also becomes a *business organization*; therefore:

[7] $OR(T) = \sum_n OR_n(T) = RP_n(T) - CP_n(T)$

where $OR_n(T)$, n=1, 2, … are the analytical operating results of the various businesses.

[3] *FINANCIAL* TRANSFORMATION (FINANCE).

To carry out the economic transformation the organization must *invest* its financial resources, placing at risk the *capital* necessary to form the productive structure. This capital – at least during the initial phase of the organization's creation, when it cannot be obtained by *self-financing* – must be obtained from investors who, in the hope of a significant remuneration, accept the risk from the business activity and provide their capital as a relative risk (financing, loans and various forms of debt) or an absolute one (underwritings, equity, shares).

From this it follows that the firm must transform its *capital* – relative or absolute risk capital – into *remuneration* in the form of *interest* (for *loan* capital) and *profit* (for capital *contributions*). Thus, there is typically a transformation of *risk* by means of investment.[11]

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[10] We can derive the operating result from a series of margins:
Value Added: VA(T) = RP(T) – CM(T);
Contribution Margin MC(T) = VA(T) – CL(T) = RP(T) – CM(T) – CL(T);so that: OR(T) = MC(T) – CS(T).

If we indicate by $E(t_0)$ the equity conferred at t_0 and by $D(t_0)$ the financial portfolio that represents the debt to raise at t_0 the invested capital $CI(t_0)$, then we can write:

[8] $CI(t_0) = D(t_0) + E(t_0)$.

We can assume that the necessary invested capital depends on the investment in structure factors (capacity) and on the inventories of operating and production factors. For simplicity's sake we can write:

$$CI(t_0) = CS(T) + \omega(T)\,[CM + CL]$$

where $\omega(T)$ indicates the coefficient that adjusts the invested capital to the value of the operating factors. To simplify, we can write [8] as a function of the structure factors only:

[9] $CI(t_0) = \kappa(T)\,CS(T)$.

The coefficient $\kappa(T) \geq 1$ expresses the inflow of inventories from the amount of capital invested that exceeds the value of the structure factors; if the formation of inventories of operating factors is also financed by the capital, then $\kappa(T) > 1$.

The *rotation* of the invested capital (where the time references have been omitted), *rot* = CP/CI, and the *financial leverage* (Debit/Equity Ratio), *der* = $D(t_0)/E(t_0)$, define the financial *structure* of the capitalist firm.

If $D(t_0)$ is invested for period T at the rate i(T), then we obtain the interest on the debt (payable interest), $I(T) = D(t_0)\,i(T)$.

If we assume that the income tax, Tax(T), is proportionate to an average tax rate, *tax*, then the net economic result for the equity is:

[10] $R(T) = OR(T) - I(T) - Tax(T) = [OR(T) - D(t_0)\,i(T)]\,(1\text{-}tax)$.

If physiologically R(T) = 0 – that is, the business organization merely seeks to cover its cost of production by revenues, or physiologically sells at an average price equal to the average unit cost – then we have a *non-profit business organization*. If instead the organization desires $R(T) > 0 = max$, then the *business organization* is profit-oriented, and becomes a *for-profit business organization.*

In the case where the organization must physiologically accept $R(T) < 0$, then it is a *non-business*, or *not-for-profit* organization.

A production organization is defined as an *independent capitalist firm* if physiologically $E(t_0) > 0$, unless there are capital losses, and thus it is in a pathological condition.

If physiologically $E(t_0) = 0$, then we do not have a capitalist firm but only a production organization that is dependent on another one (*non-independent production organization*), or an organization based only on labor (*labor-production organization*).

An *independent business profit-oriented organization* is defined as a *capitalist firm.*

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[11] *Investment* is the activity by which an *investor risks* a share of his wealth – transforming it into *capital* – for a given period, with the *hope* of having a future benefit in terms of greater wealth. The *investment* assumes, on the one hand, that there is an *accumulation of capital*, and on the other the acceptance of a *risk* linked to a *hope* for future gain (Mella, 1991).

[4] *MANAGERIAL* TRANSFORMATION (PLANNING AND CONTROL).

This is typically a transformation of internal and external information into decisions and planning and control procedures - (Prahalad/Bettis,1986; Lax/Sebenius, 1986) concerning production, marketing and finance transformations - which are aimed at achieving the performance objectives necessary to ensure the autopoiesis of the system.

The output of the managerial transformation is represented by a system of planning, programming and budgeting that aims at maximum efficiency, as well as a system of controls for the productive, economic and financial efficiency of present and future transformations.

The core of the managerial transformation is the set of *managerial calculations* needed to rationally decide how to achieve the maximum efficiency, and the set of control procedures to determine and possibly eliminate the divergences between the objectives and standards of performance and the actual performance; we define these as *managerial calculations and control*.

[5] *BUSINESS* TRANSFORMATION (STRATEGY). This is typically a transformation of external and internal information into *strategic decisions* – that is, decisions which are creative and not only adaptative or reactive – regarding the business portfolio to manage, the technology, markets, prices, and the financial structure (section 3).

The business transformation changes the *strategic position* of the firm to permit it to survive; that is, it maintains the conditions for autopoiesis. The business transformation, especially in corporations, is subordinate to a system of *corporate governance* that chooses the decision-makers and controls their activities. The system of corporate governance is not part of the capitalist firm, since it is an expression of the stakeholders operating in the external environment.

The business transformation must not be confused with the managerial one, since their modus operandi are different.

Managerial thinking is typically *procedural* or *conservative* and the *behaviour* is directed at determining objectives, making plans to achieve these, and controlling for any problems by identifying errors or deviations to be corrected in the spirit of *carrying out only successful actions and never repeating the same error twice*.

E*ntrepreneurial* thinking is typically *creative*, explorative or innovation-generating. Entrepreneurial actions attempt to avoid known types of behaviour in order to produce new ones; in this case managerial thinking is typically *creative*, in the spirit of *never repeating successful actions* but purposely producing errors in order to break free from known schema.

In non-business and non-profit organizations a conservative managerial behaviour prevails, since the exogenous teleonomy implies that the organization must maintain the efficiency of its processes and seek to produce value from the cost side. Product innovation is not possible, or in any case is rare; the constancy of production quality that continues on unchanged through time is rewarded.

Control appears to be the crucial cognitive activity, in order to maintain quality and reduce production costs; conservativeness is the crucial cognitive resource.

In profit organizations, especially capitalist firms, the achievement of exogenous teleonomy is based on customer satisfaction, and the conditions of autopoiesis impose an innovative business behaviour that supplements the conservative behaviour (section 9).

The crucial cognitive activity appears to be innovative decision-making and the crucial resources creativity and motivation; the former is necessary to produce diversification and innovation, the latter to reduce production costs.

3 - Business organizations. Performance measures

We have defined a business organization as a particular type of production-oriented organization that develops businesses by selling its products on the market at remunerative prices $pP \geq cP$, and whose teleonomy implies that $OR \geq 0$.

In *independent business organizations* – we will take up the business transformation in subsequent sections of this paper – each of the other four transformations that make up such organizations can be characterized by a system of performance indicators of *efficiency* and *functioning*.

[1] *Performance* of the PRODUCTIVE TRANSFORMATION. The main performance measures are the ratios of productive efficiency, *average productivity*, or factor *returns*:

[11] $\pi F(T) = QP_\theta(T)/QF(T)$, where F refers to M, L and S,

and their inverse ratio, which represents the *unitary factor requirements*, $qF = 1/\pi F$, which is already indicated in [1][12].

Particular importance must be given to the average labor productivity, which is determined as follows: $\pi L = QP_\theta/QL$, or, using a more complete expression, by the vector:

[12] $\pi L = [(QP_\theta/QS), (QS/QLo), (QLo/QL)]$

where (QP_θ/QS) measures the efficiency of the factors of capacity (QS), while (QS/QLo) measures the quantities of structure factors per unit of manpower and (QLO QL) the unit labor inputs actually supplied (QLo) with regard to the total paid labor (QL).

The *quality* of production (goods or services) also represents a performance parameter of the productive transformation.

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[12] From [11] it follows that an increase in productivity means:

a) an increase in the quantity (and/or quality) of goods (numerator); b) a reduction in the quantity of labor needed to produce these goods (denominator); and c) a combination of the preceding effects.

By *factors of productivity* we mean the variables of managerial action or the non-controllable states of nature that can increase productivity; though various in nature these can be classified as follows:

1) *passive factors:* these influence the quantity of production given the quantity of labor supplied; there is only one passive factor of productivity: "natural" fertility;
2) *active factors*: these affect the quantity and quality of labor needed to produce, reduce these quantities, or improve the quality of the performance, given the level of fertility; there are three active factors of productivity: a) *skill*, b) *equipment*, and c) *organization*;
3) *endogenous* or *psychological* factors: these represent the psychological conditions that lead man to supply his labor to a given organization; we can distinguish between: a) *motivation*; man is willing to supply his labor only if adequately motivated, and he expects his needs or aspirations to be satisfied; b) *satisfaction*; motivations push man to begin to work; satisfaction must follow the initial motivation – that is, the satisfactory fulfilment of the motivations.

Maximum productivity is achieved when skilled, equipped and organized labor that is appropriately motivated and satisfied is supplied within a fertile environment: in other words, when production organizations are formed (Mella, 1992, ch. 5; Mella, 1992).

[2] *Performance* of the MARKET TRANSFORMATION. There are five basic indicators:

a) *economic efficiency*, or total productivity: *[13-a]* e(T) = RP(T)/CP(T),

b) the *operating result* (from [6]): *[13-b]* $OR(T) = QP_{\theta}\ (pP - cP)$

c) the *return on cost*: *[13-c]* *roc* = OR/CP = (pP - cP)/cP

d) the *margin of safety* *[13-d]* $ms = (QP - QP^{e})/QP$

where QP^{e} is the quantity that corresponds to the *Break Even Point*:

[13-e] $QP^{e} = CS / (pP - cM - cL)$

e) the *market share*, which can be expressed by the ratio: *[14]* mksP = QP/MKP

where mksP is the *market share* for product P and QP the sales volume, which is compared to the total market volumes expressed by MKP;

Analyzing the *economic efficiency [13-a]* we can obtain the following more general model:

[15] e(T) = [RP(T) / Φ(T)]/[CP(T) / Φ(T)], in which Φ(T) is a significant variable of the productive transformation. In particular, for example:

- if we assume Φ(T) = N(L) = [mean number of employees], then *[15]* denotes the ratio between the *average productivity* and the *average cost* per head;
- if we assume Φ(T) = QP(T) = [volume of production in period T], then *[15]* shows the ratio between the *average unit price* and the *average unit cost*;
- if we assume Φ(T) = CL(T) = [number of customers], then *[15]* denotes the ratio between the *average sales proceeds* and the *average cost* per customer.

[3] *Performance* of the FINANCIAL TRANSFORMATION. This is tested by the following three indicators:

a) the *net result:* *[16-a]* R = OR - I – *Tax*

b) the residual income (section 7) *[16-b]* EVA = OR – I – R* - *Tax*

where R* represents the expected fair result for equity holders,

c) the *return on equity*: *[16]* *roe* = R/E,

d) the *return on debt*: *[17]* *rod* = I/D,

e) the *return on invested capital*: *[18]* *roi* = OR/CI = (R+I)/(I+D).[13]

[4] *Performance* of the MANAGERIAL TRANSFORMATION. The typical performance measures are efficiency and variance of efficiency, which are typical of *planning* and *reporting*. In particular, we can test the variance of *roe* and, moving backwards, that for the fundamental variables it is defined by, which are connected by the fundamental relations we will discuss in the next section.

[13] The *return on invested capital*, or *roi*, is also known as the *accountant's rate of profit* (ARP), the *accountant's rate of return* (ARR), or the *book yield*. We can write a relation between *roi* and the internal rate of return (IRR) for the firm's overall investment (Luckett, 1984; Gordon, 1974; Fisher/McGowan, 1983).

4 – Fundamental relations among the performance indicators. The performance dynamics

The productive, economic and financial transformations are linked by several fundamental relations (Lev,1974; Lev/Sunder,1979; Bernstein, 1989).

A) The *FUNDAMENTAL ECONOMIC RELATION* between OR and the economic values as functions of the production volume; from[6] we can write:

[19] $OR(T)= [RP(T) - QP_\theta (cM + cL)] – CS = MC(T) – CS,$

where

[20] $MC(T) = [pP – (cM + cL)] QP_\theta = mcP\ QP_\theta$

is the *contribution margin* to cover the structure costs.

In the case of a business portfolio, we have:

[21] $MC(T) = [\sum_n MC_n(T) - CS_n] - CS_{COM}$

where CS_n are the specific structure factors for each production, and CS_{COM} the structure factors common to the entire business portfolio[14], taking account of the capacity constraints for all M productions: $QF = \sum_m QP_{m\theta}\ qF \leq QF^{MAX}$, where F = [M, L, S].

B) The *FUNDAMENTAL FINANCIAL RELATION* among the indicators of financial efficiency (Modigliani/Miller)[15] are:

[22-a] $roe = roi + spread(D)\ der$

or

[22-b] $spread(E)\ E(t_0) = spread(D)\ D(t_0)$

where

spread(D) = roi – rod, to indicate the differential between the return on invested capital and the cost of finance capital raised through debt;

spread(E) = roe – roi, to indicate the differential between the return on equity capital and that on invested capital;

der = $D(t_0)/E(t_0)$ (debit-equity ratio) to indicate the financial leverage, as a multiplier of the spread.

[14] In general the non-negativity condition $QP \geq 0$ holds; but we could also introduce minimum volume constraints: $QP \geq QP^{min}$ (Mella, 1997a).

[15] In order to take account of taxes, the second term in [22-a] must be multiplied by (1-*t*), where t<1 is the average tax rate on income.

C) The *GENERAL FINANCIAL RELATION* among the variables of the entire economic transformation indicated in *figure* 1 is:

$$[23] \qquad roe = \frac{CI}{E} \frac{CP}{CI} \frac{RP}{CP} \frac{OR}{RP} \frac{R}{OR} = ier \bullet rot \bullet e \bullet ros \bullet nor$$

where:

ier = CI/E = 1+*der* represents the *investment/equity ratio* (*ier*) as the multiplier of the equity that gives us the amount of the invested capital obtained from that equity, and thus the *financial performance* linked to the financial structure;

rot = CP/CI indicates the *investment performance*, in that it expresses the *turnover of invested capital* in relation to the overall investment in costs of production; the higher *rot* is, the lower are the investment needs, and consequently the financing needs;

e = RP/CP, as seen in [13], shows the overall *economic efficiency*; this can also be written as follows:

$$[24] \qquad e = (CM + CL + CS + OR) / CP = cM + cL + cS + roc$$

where the *overall economic performance* is analytically expressed as the productive performance, which in turn is expressed by the average unit cost per unit of factor and the return on cost, which offers indications about the production and business performance – that is, on the capacity of the economic transformation to contain costs (production performance) and expand returns (business performance);

ros = OR/RP represents the *return on sales* and expresses the overall *market performance*, since it indicates the average return by unit of value of sold production; it gives us more concise information about performance than that offered by the *roc* expressed in *[15]*;

nor = R/OR represents the *net/operating ratio* and indirectly expresses the financial and tax performance, as we can immediately see in [10] and by rewriting *nor* as follows:

$$[25] \qquad nor = (OR - IP - Tax) / OR = 1 - IP/OR - Tax/OR$$

D) The general *balance sheet relation*:

$$[26] \qquad E = KL + CI - D$$

or, in accounting form: KL + CI = D + E

$$[27] \qquad R = RP - CF - D\ i - Tax = div + sfin$$

or, in accounting form: (CL + CM + CS) + (R + I + *Tax*) = RP o anche: CP + OR = RP,

where KL indicates *liquidity*[16] and *div* and s*fin* refer to, *dividends and self-financing* (Mella, 1992).

The previous measures of performance refer to a general unit period T. We can nevertheless consider a certain number of periods T_m, $1 \leq m \leq M$ and determine measures of performance

[16] Liquidity is commonly understood as the sum of the available liquid resources, typically active current accounts and investments in cash reserve securities, and short-term monetary credits, minus short-term monetary debts (coming due during the period of observation T).

for each T_m. In this case the time series of each measure of performance denotes the dynamics over time of the performance of the transformation system which it refers to.

5 – Performance in profit and non-profit organizations.

In section **2**, point **[3]**; we saw that a *business organization* must be considered as a *for-profit organization* if the *managerial transformation* assigns to the productive transformation the task of pursuing the *maximum productive* performance, and the maximum return and quality, while assigning to the *economic transformation* the pursuit of the maximum gap between costs and prices (average, in period T): $cP \leftarrow max \rightarrow pP$; we must in any case assume that $(pP-cP)\,QP > I + R^*$, having named R^* as the fair result for Equity.

If instead the objective is to obtain $cP \rightarrow min \leftarrow pP$, then we have a *non-profit* or *not-for-profit* business organization; in any case we must assume that at least $(pP-cP)\,QP = I$.

A *supply organization* is a *production-oriented organization* whose production is distributed to some class of user or consumer at a price tP that partially meets the cost of production: $tP \leq cP$.

In the *business for-profit organizations* the performance must be evaluated by output indicators that show whether the *managerial transformation* expectations are achieved; in fact, the objective of the economic transformation is thus to achieve the max *e*(T) (see *[13-a])*, or, in equivalent terms, the max OR(T) (defined in *[13-b]).*

Substituting *[12]* into *[13-a]* we get:

[28] $$e(T) = \frac{QP_\theta}{QF}\,\frac{pP}{pF} = \pi F\,\frac{pP}{pF}$$, where F = M, L and S.

We immediately see that a necessary and sufficient condition to achieve max *e*(T) is that the *managerial transformation*:

1) maximizes the *productive efficiency* (or the technical, combination, or internal efficiency), expressed by the *productivity indicators* πF, or inversely by the *unit factor requirements* qF (where F = M, L and S) and the *quality indicators* of production, θP;
2) maximizes the *market efficiency* (or economic, negotiating, or external efficiency), expressed by the *price spread* that, in fact, represents the market efficiency (last factor in *[28]*.

The *profit organizations* whose economic performance is mainly based on productive efficiency are defined as *production efficient.* Those whose economic performance is based mainly on business efficiency are instead defined as *marketing efficient*.

We can observe that, instead of the form in [28], the economic performance can be written in the following way by referring to [13-b]:

[29] $OR(T) = QP_\theta\,(pP_\theta - cP_\theta)$

which better shows how the *economic performance* can be expressed in terms of multiple managerial objectives:

1) to maximize the *sales volume*, and thus the *market share*, for a selected level of quality, θ;

2) to maximize the *average market price* as a function of θ;

3) to minimize the *average unit cost* of production at the selected level θ.

If we assume we want to establish a *fair* pP* and a *fair* cP* - that is, production and sales values compatible with supply and sales conditions considered *fair* by the stakeholders – then we can determine the Fair Operating Income (OI*) produced by the organization, taking into account the *fair* levels of *quality*:

[30] $OI^* = QP_\theta (pP_\theta^* - cP_\theta^*)$

that 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 expected from the organization.

If the business organization has a productive efficiency higher than the fair one, so that cP < cP*, then it must follow that OI > OI*, and the difference represents the *Total Economic Value Added by the Production:*

[31] *TEVAP* = QP [cP* - cP], with product *quality* held constant.

If cP = cP* but the business efficiency is higher than the fair one, so that pP> pP*, then

[32] *TEVAM* = QP [pP – pP*] represents the *Total Economic Value Added by the Market,* which is obtained from the price side, with sales volumes held constant.

If cP < cP* and pP > pP*, then OI > OI* and

[33] *TEVA* = OI – OI* = *TEVAP* + *TEVAM*

In the *non-profit organization* OI must tend toward zero by definition; thus OI* must also be zero.

This means that, on the one hand, the *TEVAM* must tend toward zero (no increase in prices above the average unit cost of production), and on the other that the *TEVAP* obtained from the greater production efficiency must also tend to zero by a reduction in pP*; the entire *TEVAP* goes to benefit the user of the products and services.

Thus in the *non-profit organization* the exogenous teleonomy depends on the capacity to produce values from an 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 immediately see that the operating logic of the *non-profit organization* must be based on the standardization of production over time and constancy in its quality and process.

In the profit organization the *TEVA* is obtained by increasing both the production as well as the business efficiency, through a reduction in cP and an increase in pP, respectively. 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 next section.

6 – Capitalist firms and the entrepreneurial transformation

We define a *capitalist firm* as an autonomous *business-for-profit organization* that develops a *business portfolio* and activates a *financing portfolio*, accepting the system of production, economic and financial risks[17] (Ruefli and al., 1999), and which is constituted to maintain $E(t_0)$ financially integral and thus pursue the max *roe*.

A capital $K(t_0)$ that yields a return $R(T)$[18], with a $roi = R(T)/K(t_0)$, is kept financially integral at the end of period $T = [t_0, t_1]$ if $roi \geq roi^*$, where roi^* is the opportunity cost of the invested capital $K(t_0)$, defined as the highest roi^* of all the alternative available investments[19].

In fact the financial value K^F from a capital $K(t_0)$ that yields an income $R(T) = [K(t_0)\ roi]$ can, for simplicity's sake, be set equal to the present value of R(T) at the rate *i*. If we consider $i = roi^*$, then we can write: $K^F = [(K(t_0)\ (roi/roi^*)]$.

By definition $K(t_0)$ is financially integral at the end of T if $K^F \geq K(t_0)$. We can immediately observe that:

a) if $roi = roi^*$, then $K^F = K(t_0)$;

b) if $roi < roi^*$, then $K^F < K(t_0)$;

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[17] *Business profit organizations* bear three types of ccorrelated risks, one for each of the three basic transformations:

a) *technical* or *production* risk, which entails not being able to attain production goals;
b) *economic* or *market risk*, which entails not being able to sell the production at profitable prices and at adequate volumes; there are two kinds of risk in this case:
   1) *demand risk*, which derives from *consumer freedom*;
   2) *competitive risk*, which derives from the *freedom to take business initiatives*
c) *financial risks*, connected to the impossibility of maintaining IC and E *financially integral*.

[18] We must remember that invested capital can produce two forms of remuneration:

1) a periodic remuneration, called *income* (or *interest*), which takes the form of interest for finance capital (relative risk) and of profit for absolute-risk capital investments;
2) a *capital gain* received when the invested capital is disinvested and the disinvestment is of an amount greater than that of the original investment.

The overall "gain" from the investment of capital is thus composed of the sum of the *interest* and the *capital gain*. In the text R(T) includes both components, which are made homogeneous by means of a predefined capitalization rule.

[19] We define the *opportunity cost* of capital intended for a given investment – also the *implicit cost of the capital* to invest – as the return from the best alternative investment.
If a person must decide whether or not to invest his capital in investment A, he will have to evaluate the expected *roi* from that investment, which we indicate by *roi*(A). He will then consider the possible alternative investments and for each of these determine the obtainable returns; let us assume investments X, Y and Z are realizable and that there returns are *roi*(X)=12%, *roi*(Y)=14% e *roi*(Z)=18%; the opportunity cost of the capital for that person will then be 18% (the highest financial return). The person will invest in A only if *roi*(A)>18%; if the return from A is 16% the person should refuse the investment, since he would have a *relative loss* with respect to investment Z , as we see from the following *Economic Statement of the differential return* of the investment:

ECONOMIC STATEMENT of the differential return of investment A

opportunity cost (implicit) of A 18% net loss from A 2%	return (explicit) from A 16%

c) if *roi* > *roi**, then $K^F > K(t_0)$.

We obtain the following conclusion: in order to maintain a capital $K(t_0)$ financially integral, the *roi* obtained in period T must be greater than the opportunity cost, *roi**.

It follows that an *initial necessary condition* for a capitalist firm to be created and continue to exist for period T is that $E^F \geq E(t_0)$, where $E^F = R(T)/roe^*$ and *roe** is the minimum acceptable return – fair return, or opportunity cost – that would allow the *equity holders* to maintain their risk capital invested in the firm *financially integral*.

If $E^F \geq E(t_0)$, 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.

Thus, the capitalist firm:

- sets the objective *roe** in order that $E^F \geq E(t_0)$, but tries to achieve max *roe*≥ *roe** by also exploiting its financial leverage *[22-a]*, 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**.

To represent the *capitalist firm*, the model in figure 1 also presents a FIFTH transformation mentioned in part [5], that is an:

[5] *ENTREPRENEURIAL TRANSFORMATION* (STRATEGY) that allows the system to be managed mainly on the basis of external information that form representations (or mental models) of the external environment (Macintosh/Maclean 1999); this produces an *innovative,* and thus *creative* thinking (Christensen, 1997; Deephouse, 1999) by trying to change the strategic position of the firm in the environment (Nonaka/Takeuchi, 1995; Mintzberg and al., 1998) in order to achieve the max*roe* ≥ *roe** necessary to maintain the invested capital financially integral.

Refering to the relation in *[22-a]*, we see that the *entrepreneurial transformation* transforms the external representations (sector, market, technology, etc.) into a strategy for creating the optimal *mix* of the *business* (structure) and *financial* (structure) portfolios (Jensen, 2000; Bednarzik, 2000) according to the following rules (Sea/Harbir,1999):

(1) choose those investments having a *roi* ≥ min*roi** for the entire firm; if there is more than one, choose that having the max *roi;*
(2) choose 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) choose financing with min*rod* (with length of investment and other conditions held constant);
(4) if *rod*<*roi*, increase D and reduce E; turn to rule (1);
(5) substitute, when possible, investment I with J if *roi*(J) > *roi*(I); in this way the average *roi* for the entire firm will increase;
(6) substitute, when possible, financing F with G if *rod*(G) < *rod*(F); in order to reduce the average *rod* for the entire firm;

7 – Measures of performance of the entrepreneurial transformation

The *performance* of the *entrepreneurial transformation* can thus be evaluated on the basis of *outcome indicators* that reveal the aim of the capitalist firm to achieve an actual *roe** equal to or greater than the fair *roe** that satisfies the *equity holders*; there are two indicators held to be more significant and efficient: the *Economic Value of the Firm* (EVF), or economic capital, and the *Economic Value Added* (EVA), or actual economic result.

$$[34] \qquad EVF = \frac{R°(T)}{roe^*} = E(T_0)\ \frac{roe°}{roe^*}$$

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*)*.

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

Thus EVF is a *dynamic performance indicator*, since it takes account of the variations over time in the *opportunity cost* of the capital for the shareholders (*roe*)* and of the capability of the strategy to produce a *roe°* sufficient to guarantee this.

[35-a] EVA = IC (*roi- coi),*

which expresses 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*).

In fact, if OR = IC *roi* is the operating result, then in order to have an EVA the following must hold:

[35-b] EVA = OR – (I + R*)

which becomes *[22-a]* when we substitute OR = *roi* IC, I = *rod* D, and R* = *roe** E into the equation, thereby obtaining:

[36-a] EVA = *roi* IC – (*rod* D + *roe** E)

which gives:

$$[36\text{-}b] \qquad coi = \frac{rod\ D + roe^*\ E}{IC} = rod\ \frac{D}{IC} = roe^*\ \frac{E}{IC} = wacc = ccr.$$

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*[20].

[20] 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*) in [35-a] 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.[21]

EVA thus represents a performance indicator of both 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 *[36-b]*, 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, as can be seen in *[34]*.

Since from *[22-a]* it follows that if *roi* > *coi*, then *roe* > *roe** , and therefore from *[35-b]* that R(T) = R*(T) + EVA, then *[34]* can also be written as follows:

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

where

[37] $G = EVA/roe^*$

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 managerial *objectives*, on which the other operating objectives depend: *volume* of production and sales, *cost*, *quality*, and *price*.

8 – Growth and self-financing objectives

The *entrepreneurial transformation* does not only set objectives of profitability but also for the firm's *growth*.

By *growth*, or *organizational expansion*, we mean the growth of sales revenue and invested capital; and thus an economic process, even if a process of organizational growth must accompany the economic growth.

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[21] In fact, from [22-a] we can determine a roi that guarantees a roe*. After a few simple steps we can derive [32] in another way.

The growth of the firm must follow the rules (1) to (5) of section 5 and requires that

a) it is possible to increase sales with a consequent absorption by the markets;

b) along with the growth in sales there is an adequate growth in the productive processes, and thus the capital invested in the firm;

c) the increase in the size of the productive processes is adequately financed;

d) the growth in sales and invested capital leads to a proportionate growth in operating income as well.

Condition d) is very important: the growth in RP(T+1) and in IC must occur under conditions where *rod* and *roi* are held constant; so that *roe* does not decrease, the growth must not lead to an increase in average interest rates, *rod*, for financing.

Thus the *entrepreneurial transformation* can set *growth objectives* that translate into objectives involving increases in sales and revenue (*market share* objective) and in objectives regarding the acquiring of resources needed for an increase in the amount of invested capital.

Organizational growth requires the availability of financial resources, which can be obtained from *outside sources* – loans or increases in capital stock – or internal ones, typically the *operating cash flow* (or gross self-financing) and self-financing (net).

The *operating cash flow* is represented by the financial resources from revenue, after all the monetary costs for period T are covered; it is measured by the sum of profits and amortization (in Italy the sum also includes the share for the termination indemnities). It can be utilized to pay back the financing, acquire other fixed assets to expand the size of the organization, pay back the net capital from shareholders, or undertake other investments.

One of the most useful financing sources for growth is *net self-financing*, that is the retained profits and their setting aside in a reserve fund.

The generation of *net self-financing flows* over time is possible only if the firm's revenue is sufficiently high to allow for a fair amount of dividend distributions, R*, while at the same time keeping part of the profits as a reserve, and thus as self-financing.

Once again the performance of the managerial transformation can be further refined; it is not enough for *roe* > *roe**, but it is necessary for (*roe* – *roe**) $E(t_0) \geq$ sfin*, where sfin° is the net self-financing needed to achieve the desired levels of growth.

If

$s° = [E(t_1) - E(t_0)] / E(t_0)$ indicates the *growth rate* of equity capity from t_0 to t_1,

and

$a° =$ sfin° $/ E(t_0)$ indicates the rate of self-financing,

we immediately see that

$s° = a° = (roe - roe*)$.

Recalling *[22-a]*, and setting $d* = (roe*/roe)$ to indicate the the *dividend share*, then we can write (Mella, 1992, cap. 14):

$s° = a° = [\ roi + spread\ der\ ] (1-d*) (1-t)$.

Again we see how important it is that, in order for *teleonomy* to indicate *growth*, it is necessary to achieve a *roi* sufficient to produce *roe* > *roe**, taking account of the financial balance account represented by *der*.

9 – Conditions for autopoiesis and teleology in BVCOs

From section 4), where we demonstrated that OI = OI* + TEVAP + TEVAM, it follows that:

[38] EVA = [RO* + TEVA – (R* + I*)].

If OI* = (R* + I*), then all the EVA derives from the TEVA.Only if OI*> (R* + I*), then EVA> TEVA and 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, D and E, necessary for the productive processes. 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.

Since from *[30]* and *[33]* it follows that OI = [QP (pP* – cP*) + TEVA], *autopoiesis* is achieved if the economic circuit is continually renewed: sufficient sales volumes and at *fair* prices to cover, under *fair* conditions, the cost of factors used up in the production processes, so as to continually reintegrate the factors necessary for a new production cycle, since only by producing efficiently can it preserve and maintain the equity and debt and remunerate the *shareholders* and financers.

In fact, the condition expressed in *[38]* implies that *economic efficiency* must be sufficient to achieve a *roi* greater than the fair *rod**, so that by exploiting the financial leverage we can obtain a *roe* > *roe**.

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; in the opposite case the contraction in the costs of production would be considered as unfavourable for the organization's *teleonomy*. Similarly the TEVAM must be viewed as the consequence of an increase in the quality of the products 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. We can also argue that maintaining the conditions for teleonomy thus implies:

- searching for the maximum *exploitation* of the present market and enlargement toward new markets, in order to increase QP;
- the continual improvement in the *quality* of production, θP, in order to increase QP 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 = qF QP;-
- in particular, the increase in the productivity of labor, πL, through an increase in the quality of the human factor of the organization (skill, motivation, incentives) and its work efficacy (fertility, equipment, software) and the re-engineering of the production process;

- 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. 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 social impact of the organization (spread of employment, rise in average income, payment of taxes, environmental care, etc.) judged as positive by the stakeholders of the firm.

It follows that the fundamental problem the *entrepreneurial transformation* must face today in *capitalist firms* operating in wealthy economies is to guarantee investors a financial return (interest or dividends) at least equal to the opportunity cost of the best alternative investment, while maintaining an acceptable degree of risk (actuarial integrity) and, in any event, preserving the purchasing power of their capital (monetary integrity) (Boulton, 2000).

When the monetary wealth from the accumulation of savings is relatively scarce, firms must search for the capital necessary to start up or maintain the production processes; the efficiency of the managerial transformation (section [4] of figure 1) is usually sufficient to assure the teleonomy of the *production-oriented organization*.

When capital is abundant, those businesses possessing economic self-sufficiency are necessary to maintain the integrity (monetary, financial and actuarial) of the invested capital; in order to maintain the conditions for teleonomy it is thus necessary to have an efficient entrepreneurial transformation that continually modifies the business portfolios producing *roi* and the financial portfolios producing *rod*, in order to guarantee that it is always the case that *roe* > *roe* and a sufficient EVF as defined by [34].

This clearly reveals the significance of *human capital* and *intangible assets* as dominant elements in the production of capitalist firms (Griliches, 1996) and the need for:

a) *creativity*, by which products and processes are continually innovated, favouring applied scientific research and technological innovation,

b) *knowledge* in order to make more powerful models for understanding internal and external environment of the organization[5];

[5] On the basis of the information it gathers, 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, profitability, length of processes, potency of the organs, etc.), since the organization can maintain its identity only if it remains vital: that is, manages to maintain the vital parameters at levels that impede its break-up.

c) *intelligence* in understanding, on the basis of continually reformulated and innovative models, internal and external processes, in order to rationalize the technical processes of production and management (Business Intelligence with all its instruments: Data Warehouse systems, online analytical processing, or OLAP, query/reporting, and data mining);

d) *organizational learning* and the formation of *learning organizations*[22] that move and guide individuals in the organization to take on greater responsibilities and to learn and act together to deal with the new competitive challenges through new work rules[23] (Computer Supported Cooperative Work (CSCW) (Greenberg, 1991); Work Group Computing Systems and, in general, *Groupware* (Whitaker, 1995); Performance Management, in order to assign all the members of the organization objectives that are coherent with the entrepreneurial transformation)

e) *management control*, to make the control process efficient (from the Decision Support System to Just-In-Time production, from Business Intelligence to *Web-Based Information Technology*, from Performance Management to Competence Management, in order to set the competences at the levels needed for the development of adequate organizational actions) (Schmitz Jr., 2001, Wilcox et al.; Mella, 2002)*;*

f) *strategic renewal,* to increase the efficiency and efficacy of the formulation of models and representations of the environment, which are necessary to redesign the strategic actions and direct these toward ever new *strategic positions* (balanced scorecard, *Tableau de bord* or organizational cockpit).

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[22] We adopt the traditional idea of a Learning Organization as an organization in which people at all levels, individually and collectively, are continually increasing their capacity to produce better results (Garvin, 2000; Greenberg, 1991; Rheem, 1995), and we define E-learning as any form of learning that utilizes a network to communicate, interact and facilitate interpersonal relationships. We can thus easily imagine how WBITs can represent the indispensable means for creating a system of E-learning (Wiske, 1998; Blythe, 1997) to allow all the members of the organization to invest in their own cognitive growth and to refine their learning capacity (Education with New Technologies, or ENT) (Leperhoff, 2002).

[23] Senge identifies three conditions that are necessary for dialogue to occur: All participants must "suspend their assumptions;" all participants must "regard one another as colleagues;" and there must be a facilitator (at least until teams develop these skills) "who holds the context of the dialogue." Bohm asserts that "hierarchy is antithetical to dialogue, and it is difficult to escape hierarchy in organizations." (Senge, 1990, p. 245). Suspending all assumptions is also difficult, but it is necessary to reshape thinking about reality.
Before a team can learn, it must become a team.
Tuckman (1965) identified four stages that teams had to go through to be successful (Tuckman and Jenson, 1977):

1. *Forming*: When a group is just learning to deal with one another; a time when minimal work gets accomplished.
2. *Storming*: A time of stressful negotiation of the terms under which the team will work together; a trial by fire.
3. *Norming*: A time in which roles are accepted, team feeling develops, and information is freely shared.
4. *Performing*: When optimal levels are finally realized—in productivity, quality, decision making, allocation of resources, and interpersonal interdependence.

Tuckman asserts that no team goes straight from *forming* to *performing* (Robbins and Finley, 1995).

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