

# KNOWLEDGE AS CAPITAL: INTEGRATED QUALITY MANAGEMENT

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*Quality of any product or service depends on the quality of the underlying process of its design, production and delivery. Quality, as customer-defined fitness for use, is to be pulled in by an integrated (and empowered) customer, rather than pushed out by a survey data-saturated (informed) producer. There are two essential ways of approaching such an objective of continuous quality improvement. The second tries to exploit the customer separation from the production process (customer is the object of production), while the other is based on direct customer integration into the production process (customer becomes also the subject of production — the prosumer) and relies more on monitoring the customer's actual behaviour. This paper describes and demonstrates the latter approach, integrated process management (IPM), as a more reliable, more flexible and globally more desirable system of customer-pulled quality delivery. Transnational business ecosystems require new ways of management, more attuned to the upcoming era of knowledge, integration and company-environment ecological interpenetration. These new ways of management are naturally related to the older management wisdom and experience of both Western Europe and United States before World War II, later abandoned by the West, but perpetuated and enhanced by Japan of today. As P.F. Drucker argues, the next step in the use of knowledge, in full swing since 1970, applies analysis and system to the productive process itself.*

Keywords: Knowledge, capital, quality, management, systems.

We shall build good ships here; at a profit if we can, at a loss if we must,  
but always good ships

Newport News Shipbuilding

## QUALITY

Quality is probably the only concern shared equally by producers and customers. It is also one of the oldest concerns of man, and thus an excellent foundation for theory and practice of management. Quality is, *ceteris paribus*, preferred and desired by all. But where is quality produced and by whom? Are all the *ceteris* actually *paribus*? Can a plant manager, operator or inspector be responsible for quality if either the product or the process, or both, have been misdesigned, pulling against quality or its improvement? And quality cannot be 'computerised in' although automated, hi-tech production of low quality products or services is common enough. There is no need to belabour this point.

Top management does not produce quality and the corporate board cannot even discuss quality. Quality cannot be dictated from the top and miraculously propagated all the way down. Such a 'perestroika fallacy,' although becoming more common, can stifle any human enterprise. Quality should be viewed as a function of the entire organisation, of its design and function as a system, and of the knowledge production, and reproduction, capabilities of its human participants. No single person or a group of persons can produce effective quality.

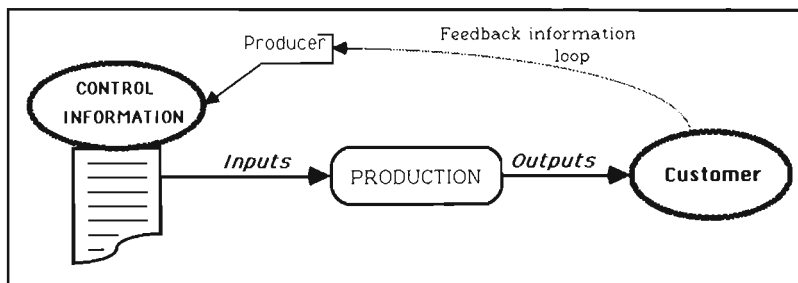
Although improving quality is necessary for improving both productivity and production cost, and never *vice versa*, it is adversely related to quality improvement cost: 'perfect quality' is not free under the *ceteris paribus* conditions. Only continued creative, breakthrough restructurings of the production system can overcome the quality improvement cost trade-off.

The key words for assuring quality improvements are: system, process, knowledge, and customer. These concepts have to be integrated into a coherent management system and an accompanying theory of management. The times of management techniques, methods, approaches and other separate and often context-free splinters of knowledge are over.

## INFORMATION

A traditional management system, as presented in Figure 1, is based on strict separation of the customer 'out there,' in the environment. In this model, the customer is the object, but not subject of production. The only way to learn about the customer and to predict his future action is through establishing information feedback loops (e.g., consumer research, marketing), based on information gathering via questionnaires and other cognitive tools.

**FIGURE 1**  
**TRADITIONAL MANAGEMENT SYSTEM: 'LINEAR' TRANSFORMATION OF**  
**INPUTS INTO OUTPUTS, CUSTOMER AND PRODUCER SEPARATED, BUT**  
**RECONNECTED BY INFORMATION FEEDBACK LOOP.**

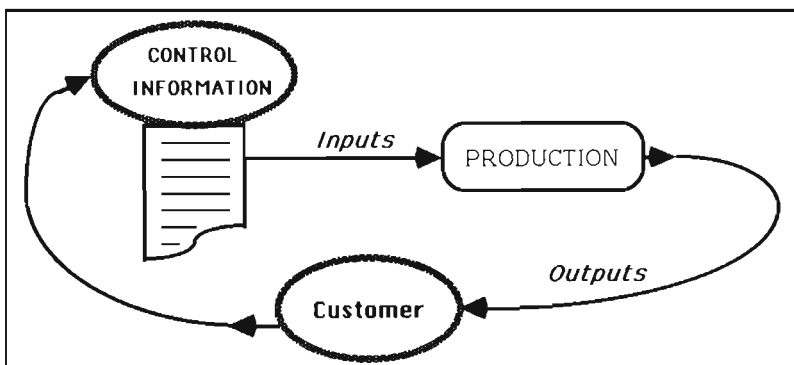


This approach is becoming increasingly inadequate because of the growing discrepancy between what people do and what they say they do. There is a fundamental difference between action and its description. “Managements want to hear what’s happening, not what consumers say is happening. The data on actual behaviour are beginning to push out a lot of survey data on attitudes,” stated a recent article<sup>1</sup> on differences between the old-fashioned cognitive marketing and modern behavioural marketing. Information-gathering questionnaires and surveys provide only context-free, symbolic descriptions of intended or abstract action, not the action itself. No questionnaire can recreate the specific context of a particular action. The value of questionnaires and surveys is after the fact, providing an explanation of an action taken.

## IN-FORMATION

In order to measure action itself, we have to shift from gathering information to monitoring in-formation. This latter and original meaning of information refers to sending messages through physical effect, i.e., an indentation or deformation of the physical space. When I say I like to eat fish — that is information; when I actually order a fish at a local restaurant — the only thing of importance in business — that is in-formation. In Figure 2 we have replaced the information-gathering feedback by the in-formation loop, integrating the customer and his action in the production process itself.<sup>2</sup>

**FIGURE 2**  
**IPM SYSTEM: SELF-RENEWING LOOP, CUSTOMER INTEGRATED INTO AND PART OF THE PRODUCTION PROCESS, DISTINCTION BETWEEN PRODUCER AND CUSTOMER REDUCED OR REMOVED.**



In this new model, the product in the hands of the customer remains part of the production process. This extended notion of the production process is the embodiment of the old “Our customer — our master” slogan of Tomás Bat’a. Details of the Bat’a-system are presented in Zeleny.<sup>3</sup>

Full customer integration into the production process is mandatory for a competitive survival in the emerging transnational business ecosystem.<sup>4</sup> The customer is not just the consumer, or end-user, but also the supplier, the employee and the stakeholder. All these participants serve as customers to each other and all are indispensable for the 'right' product/service quality to be properly 'pulled out' of the system.

## INTEGRATED QUALITY MANAGEMENT

As discussed, quality must be viewed as a hierarchical (differentially weighted) complex of multiple attributes (or criteria). As such, it cannot be 'controlled in' by maintaining any single one of its statistical dimensions. Simple-minded statistical analysis constitutes neither quality control nor quality improvement. Statistics is not about numbers, but about process relations and their future states.

Any statistics monitoring and measuring a single dimension (e.g., machine tolerance) are so simple, routine, and unimaginative that they are best gathered, analysed and acted upon by the machine itself, e.g., automation, informing machines, etc.

This multicriteria quality complex cannot be delivered by a single machine nor by a series of independently monitored machines, but by a system of interrelated processes or subsystems: product planning, product design, process design, manufacturing, sales, services. All these subsystems must be co-ordinated along all dimensions in order to produce a high-quality product. This is Integrated Quality Management (IQM). Testing of individual components or stages does not provide assurance that they will work together as a system.

Searching for system stability or static equilibrium leads to stagnation and death. To maintain responsive flexibility to regime changes and restructurings, any viable system must oscillate and weave, dance rather than march. A dynamic or continually displaced equilibrium can only be maintained where the circle between operation, measurement and comparison is closed and performance continually measured. Deviation from the norm is necessary to preserve such dynamic equilibrium and the norm must be followed if it is to be possible to reach the objective.

Unexpected deviations (outliers) are the most important system regime-shifting tool and a methodology for their systematic exploration has to be deployed. The more outliers in the desirable direction, the better — a constant stream of outliers in a given direction is ideal. Bringing the system to so called statistical stability is a non-system concept of doubtful intellectual value. To measure the number of errors on a form (because it 'is' measurable), rather than redesigning the form so that one does not have to measure 'it,' is a strong manifestation of this managerial failure.

A 100 per cent inspection at the source, combined with immediate action, using what the Japanese call *poka-yoke* (error-proofing) is the system-design and re-design programme aiming at eliminating all quality

control inspections, statistical sampling and the old-fashioned charting. Intelligence of workers should be respected and utilised, not squandered on the mindless charting of repetitive tasks or actions that depend on vigilance or memory: machines can do that best. Employees' time and mind should be freed to pursue the crucial creative and value-adding activities of system restructuring and design. A good compendium of 240 *poka-yoke* improvement examples can be found in *poka-yoke dai ziskan*.<sup>5</sup>

## CAPITAL

The classical division of factors of production into land, capital and labour is quite unimportant today. It is also incomplete because major factors of production, like technology and knowledge, are not explicitly treated. Capital itself is defined vaguely as either reproducible resources or product used as input, including money, machinery and capital goods. The distinction between non-human and human capital is equally vague and only adds to the confusion.

In fact, according to Friedman, all sources of productive services can be regarded as capital.<sup>6</sup> Also, capital can hardly be a thing, type or product *per se*. Rather, it is a particular function or process attributed to things by a decision-maker. For the purpose of this paper we shall use the following definition: capital is that part of the results and proceeds of production that was chosen to be maintained, reproduced or produced in order to realise the next production cycle.

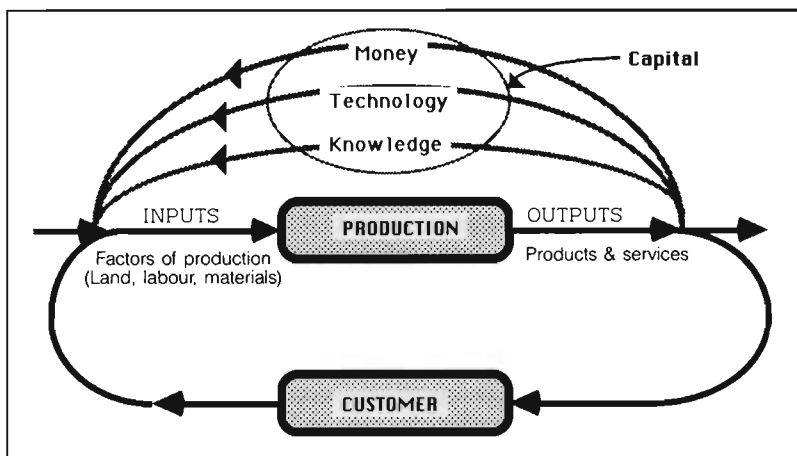
Capital is therefore that part of the harvest that is set aside for the next season planting. Productive power of the soil, maintained, produced or recovered by tillage, drainage or fertilisation, is capital. The revenue ploughed back into the production process, expanded or maintained is capital. The machine park, maintained, replaced or added, is capital. Labour, reproduced, expanded or maintained is capital. The knowledge necessary for realising the production process, properly maintained, expanded or produced, is capital. All these capitals are both produced and consumed by the production process. Capital is the catalyst of production.

So, capital is reproducible and, through the process of capital formation, can be accumulated for the purposes of expanded production. It can also be transferred, i.e., invested rather than reinvested: capital thus changes its function and becomes an investment or investment capital. Productive resources are not independent of each other and cannot stand alone: they must form an interactive portfolio of capitals. A portfolio of capitals is all that which makes the next production round possible.

So what is not capital? Final products and services, used-up, non-reproducible materials, money paid out and spent: everything that leaves or enters the process externally. Investment or venture capital is therefore a resource external (or initiatory) to the process. It is not capital in the

sense of our definition. The functions of productive sources, as capital (reinvestment) or investment, are determined by the decision-making process of the owners. The capitalist, the owner of capital, can choose to function as an investor and vice versa. These and the related ideas are deeply rooted in the thought and experience of famous capitalist of the West.<sup>7</sup>

**FIGURE 3**  
**MAJOR FORMS OF CAPITAL NECESSARY FOR THE CONTINUED REPRODUCTION OF THE PROCESS**



The capitalist is the owner of the whole or part of the portfolio of capitals (knowledge, money, labour, technology) necessary for the next round of production. In this sense, the history of production systems coincides with the history of capitalism. Only the capitalistic, self-renewing systems can survive and evolve.

Only the degrees of separateness and separability of the capitals portfolio components, and the resulting possibility of their differentiated ownership, define the stages of the natural evolution of capitalism. The division of labour and function made the corresponding division of ownership possible.

Because of the fundamentally systematic nature of the portfolio of capitals, i.e., the interdependency of land, labour, money, technology and knowledge, there are both pros and cons of separating capital components. The advantages of division and specialisation can be outweighed by the cost of co-ordination, increased complexity and conflicting purposes, increasing the need for re-integration of capitals.

One component of a capital portfolio is primary and dominant as no other components can function without it: knowledge. Land cannot be cultivated, labour applied, technology used and money spent without

knowledge. However, other forms of capital can be derived from it. Knowledge, and knowledge alone, is capable of creating wealth. It produces and then uses all other forms of capital as the means of its own self-enhancement. That the most important wealth-producing asset and form of capital was not even considered by Marx and remains absent from modern economics is not too short of being remarkable and even amazing.

## **KNOWLEDGE**

Drucker<sup>8</sup> recently observed that "knowledge now has become the real capital of a developed economy," and that "knowledge is becoming the true capital and the premier wealth-producing resource." He states that "specialisation is becoming an obstacle to the acquisition of knowledge."

Knowledge is not printed (or recited) information or data. Documents are not knowledge. Knowledge is inseparable from the process of knowing: knowledge is a process. What is meant by saying that somebody knows? That we expect that person to be capable of co-ordinated action, towards some objectives. Co-ordinated action is the proof of the possession of knowledge. Knowledge without action reduces it to information or data. It is not what you say you do that matters, but what you do. Maturana and Varela put it succinctly: All doing is knowing, and all knowing is doing.<sup>9</sup>

The vast repositories of data and information (data banks, encyclopaedias, 'wise men of the mountain') are just passive recordings, the raw material of knowledge. Only co-ordinated human action, i.e., the process of relating such components into coherent patterns, which turn out to be successful in achieving goals and purposes, should qualify as knowledge: bringing forth a world of co-ordinated action is human knowledge. The details of the underlying theory of knowledge are presented by Zeleny.<sup>10</sup> Drucker also regards knowledge as information that changes something or somebody — either by becoming grounds for action, or by making an individual, or an institution capable of different and more effective action.

Separation of knowing from doing (knowledge from action) in the sense of "some know and others act," like separation of managers (co-ordinators) from the doers (workers), is a self-inflicted wound of modern management.

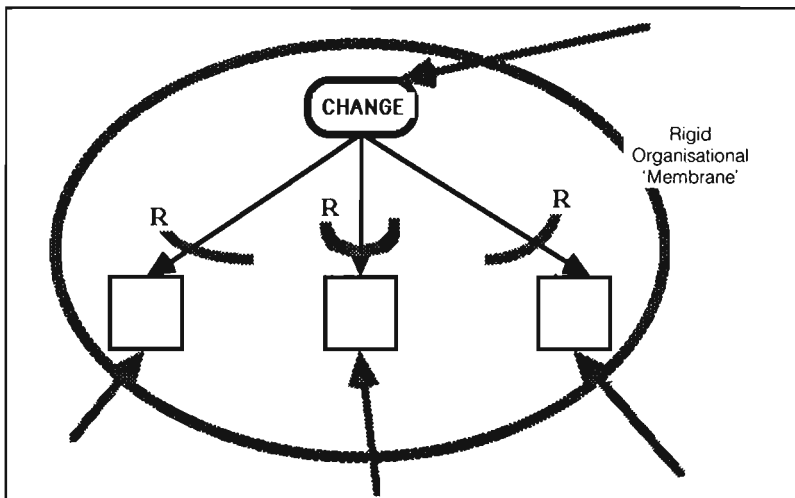
## **RESISTANCE TO CHANGE**

Implementing new quality management systems of IPM-type represents change and change is often resisted. This applies to systems restructurings, management reorganisations and 'perestroikas.' Most organisations indirectly (some even directly) reward and encourage resistance to change. In order to succeed with IPM and the implied stream of continuous change, one has to design an organisation of least resistance to change. A new theory of change is needed.

In Figures 4 and 5 the two paradigmal organisations are contrasted: (a) a traditional 'push-out' organisation, where change, quality, products, decisions, etc., are all designed at the top and 'pushed-out' by being propagated down through resisting layers of the hierarchy (or bureaucracy). Resistances *R* are naturally numerous, strong and persistent; (b) a modern, IPM-based 'pull-in' organisation, where change, quality, products, decisions, etc., are all generated at their proper localities of contact (e.g., customer integration) and 'pulled-in' by being propagated upwards, encountering a single, weak and unsustainable resistance *R* at the top.

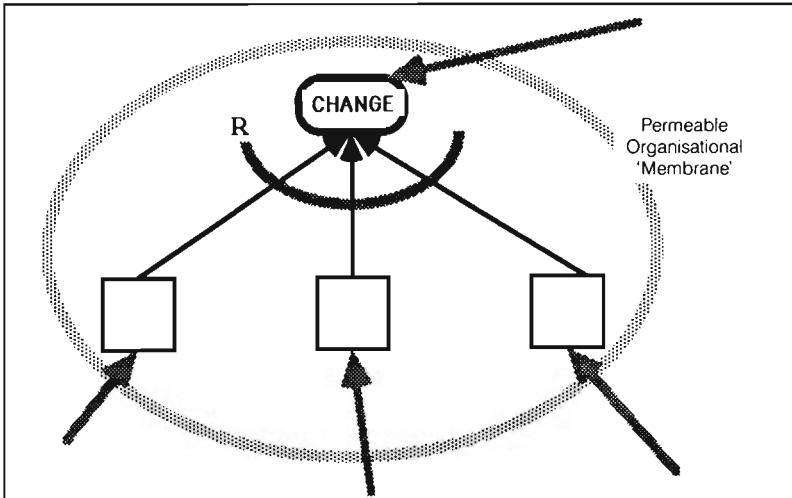
The selectively permeable or non-permeable membrane, designed to shield and screen the employees from external fluctuations, capable of responding only through designated and specialised expert departments, has to be transformed into semi-permeable or fully permeable membrane. Only when most or all employees are exposed to external fluctuations, only then can they develop the local knowledge needed for distributed, responsible, broad-front flexible response by all employees — a trademark of the 21st-century enterprise.

**FIGURE 4**  
**RESISTANCE TO CHANGE IN THE TRADITIONAL 'PUSH-OUT' ORGANISATION.**





**FIGURE 5**  
**RESISTANCE TO CHANGE IN THE IPM-BASED 'PULL-IN' ORGANISATION.**



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