

Editorial

Towards Trade-Offs-Free Management

A new, somewhat discomfoting, possibly radical and undoubtedly challenging idea has started making its rounds even in the traditionally conservative business media: *'Are trade-offs really necessary?'* ask Robert H. Hayes and Gary P. Pisano in Harvard Business Review [1].

The answer must be: *no, trade-offs are not (really) necessary*. Pursuing and achieving lower cost, higher quality (and improved flexibility), all at the same time, is not only possible but clearly desirable and – within the newly emerging management paradigm – quite necessary.

Trade-offs have been often postulated among different, conflicting objectives or criteria. Conventional wisdom recommends dealing with such conflicts via 'tough choices and a careful analysis' of the trade-offs. Such a way of 'tough' thinking is precisely what is wrong with the U.S. management. According to Hayes and Pisano, many Japanese factories have achieved lower cost, higher quality, faster product introductions, and greater flexibility, all at the same time: *'Lean manufacturing has apparently eliminated the trade-offs among productivity, investment, and variety'*, they conclude.

Similarly, B. Joseph Pine II, Bart Victor, and Andrew C. Boynton, in their article *'Making Mass Customization Work'* [2], recall that (in the old paradigm): 'Quality and low cost and customization and low cost were assumed to be trade-offs'. Their analysis also concludes that: *'... companies can overcome the traditional trade-offs'*. In other words, companies can have it all if they embrace trade-offs-free thinking and trade-offs-free methodology of optimal systems design.

How can traditional trade-offs be 'eliminated' or 'overcome'? None of the HBR articles even hints at any practical or at least pragmatic approach. Are not trade-offs generic to multiple-criteria conflicts? Can we have it both ways? Can one decrease

cost and increase quality at the same time – and continue doing so? The answer is: Yes, trade-offs are properties of badly designed systems and thus can be eliminated by designing better, preferably optimal systems.

The key to Trade-Offs-Free (TOF) management (or production) does not lie necessarily in a strategic focus or strategic flexibility of executives and managers, but in an *optimal portfolio of corporate resources*.

In other words, it *does* matter how the levels of individual resources are determined in relation to each other, as a totality of a system. As long as resources are treated separately, one-by-one, in a *ceteris paribus* fashion, the resulting system must remain suboptimal, i.e., characterized by trade-offs. Such suboptimal systems are the remains of the old paradigm and are becoming non-competitive worldwide.

Multiple Objectives and Trade-Offs

'There are no conflicting objectives per se'. No human objectives are in conflict by definition, that is, inherently conflicting. Everything depends on the given situation, the historical state of affairs, the reigning paradigm, or the lack of imagination.

We often hear that one cannot minimize unemployment and inflation at the same time. We are used to the notion that maximizing quality precludes minimizing costs, that safety conflicts with profits, Arabs with Jews, and industry with the environment. Although these generalizations may be true, they are only conditionally true. Usually inadequate means or technology, insufficient exploration of new alternatives, lack of innovation – not the objectives or criteria themselves – are the causes of apparent conflict¹.

Trade-offs among multiple objectives (there can

¹The above two paragraphs are reprinted from the conclusion of the author's text on *Multiple Criteria Decision Making*, McGraw-Hill, New York, 1982, p. 402 [3].

be no trade-offs when only a single objective is considered) are *not* properties of the objectives themselves, but of the set of alternatives or options they are engaged to measure. This simple truth is often lost in the self-assured whirlwind of conventional economics.

For example, trade-offs between cost and quality have little if anything to do with criteria of cost and quality themselves: rather, they are implied by the limits and constraints on the characteristics of available automobiles they measure. Measuring sticks are neutral and any apparent relations (like trade-offs) are only induced by the measured.

Realizing and acknowledging this fundamental truth provides sufficient proof that a shift from the trade-offs-based to trade-offs-free thinking does not constitute an improvement or a refinement and must be of paradigmatic nature.

Graphical Example

Suppose that objectives $f_1 = \text{Profit}$ and $f_2 = \text{Quality}$. Both of these objectives are to be maximized with respect to given resource constraints (feasible options).

In Fig. 1, the polyhedron of system-feasible options is well-defined System I. Maximizing functions f_1 and f_2 separately, leads to two different optimal solutions and levels of criteria performance (designated as *max*). If System I remains fixed, observe that the maximal, separately attainable levels of both objectives lead to an *infeasible* 'ideal' option. The trade-offs between quality and profits are explicit and must be dealt with (selecting from the heavy boundary, i.e., non-dominated solutions, of System I).

In Fig. 1, observe that System I is poorly designed because there exists a set of good, currently unavailable options which would make the 'ideal' point feasible and thus allow the maxima of f_1 and f_2 (Profits and Quality) to be attained both at the same time.

Any manager's lifetime of work in System I shall unfailingly lead to the following wisdom: there is always a trade-off between profits (or costs) and quality, one cannot have both ways, one has to pay for quality. As more and more managers derive (from their own experience) the same wisdom, textbook writers and instructors accept the wisdom as conventional, embed in their own edu-

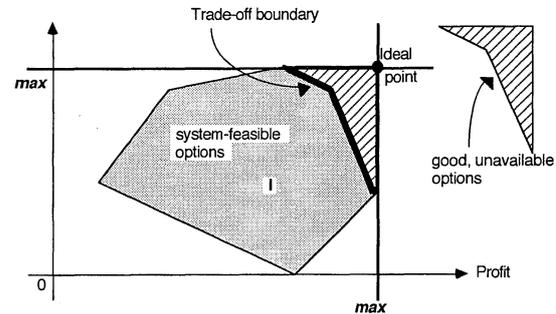


Fig. 1. System I: given design with natural quality-profit trade-offs.

cational efforts and teach it to multitudes who had no such prior experience. Trade-off-based systems and culture are thus perpetuated.

In other words, reshaping the feasible set (reconfiguring resource constraints) in order to include the 'missing' alternatives, if realizable at the same or comparable costs, would lead to a superior system design with higher levels of criteria performance.

Such desirable 'reshaping' of the feasible set is represented in Fig. 2, where System II of system-feasible options is sketched. Given System II, both objectives are maximized at the same point (or option): System II is superior in design to System I.

From all such possible 'reshapings' of system configurations, given some cost or effort constraint, the best possible *optimal design* or configuration of resources can be chosen. Computational methodology for linear-programming type problems is represented by De Novo programming [4]. Optimal systems (like System II) will be superior with respect to both profit and quality and no trade-offs between them are possible. Trade-offs have been eliminated through optimal system design.

In Fig. 2, a system with no quality-profit trade-offs is presented. Observe that the maximal separately attainable levels of both criteria now form feasible ideal options. Consequently, the trade-offs between quality and profit cease to exist (heavy trade-off boundary of System I has disappeared in System II).

Any manager's lifetime of work in System II shall unfailingly lead to the following wisdom: there is never a trade-off between profits (or costs) and quality, one cannot have one without the other, quality pays for itself. As more and more managers derive (from their own experience) the same wisdom, textbook writers and instructors accept the

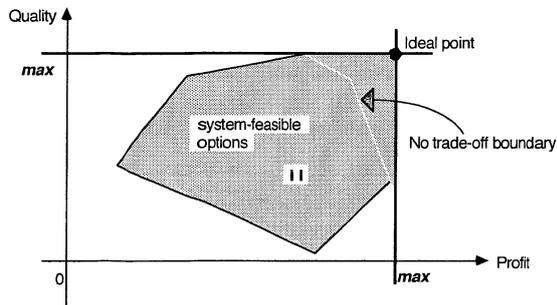


Fig. 2. System II: optimal design with no apparent quality-profit trade-offs.

wisdom as conventional, embed it in their own educational efforts and teach it to multitudes who had no such prior experience. Trade-off-free systems and culture are thus perpetuated.

Profit Maximization

Free market systems are rooted in the assumption of profit maximization by individuals and their corporations.

This time-honored premise is usually not further specified or elaborated, as if there was only a single form of profit maximization.

Yet, rational economic agents can maximize profits in *at least two* fundamentally different – often mutually exclusive – ways:

1. Manage (operate) a *given* system so that a profit function is maximized.
2. *Design* a system so that its management (operation) would result in maximal profits.

These two forms of profit maximization are not the same. In the first case, one is doing his managing best and squeezing maximum profits from a *given* system. This is known as profit maximization. In the second case, one designs (re-engineers) a profit-maximizing system: doing one's managing best leads to maximum profits. This is, undoubtedly, also profit maximization.

The two modes are mutually exclusive because one cannot follow the second without first dismantling the first. It is not sufficient to (continually) improve the given system: because there is *only one* optimally designed system, all *other* systems must be suboptimal by definition.

One mode of profit maximization leads to con-

sistently lower profits than the other, other things being equal. This could not have been intended by Adam Smith.

Because the second case is, *ceteris paribus*, always superior to the first case, we face two strategically different concepts of profit maximization. It *does* matter – in business, economics and management – which particular mode of profit maximization the individuals, corporations or cultures mostly adhere to: free markets are committed to reward those who consistently adhere to the *second* mode of operation.

References

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- [4] Zeleny, M. (1986): Optimal System Design with Multiple Criteria: De Novo Programming Approach, *Engineering Costs and Production Economics* 10: 89–94.

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