

## In this Issue

---

### Bühner's 'Production technology and organization'

Flexible manufacturing has arrived. Toffler's 'prosumer' will follow within few years. Modern managers are already shifting their thinking away from 'economies of scale' to 'economies of scope': flexibility, quality and integration. In order to do this effectively, they have to comprehend systems relationship between strategy, organization and manufacturing. Dr. Bühner from Passau University has studied this new *technology of flexibility* in all of its current facets of importance.

He discusses the need for strategic decision with respect to *which flexibility* should be adopted primarily: Flexibility of design, parts, volume, re-routing or materials? Ideally, of course, all of them. Their interrelatedness is self-evident and the decision is more managerial than technological. Tomáš Baťa implemented *all* of these flexibilities in the thirties and there were no computers or robots then.

New flexible technologies are *high* technologies: that is, they affect the organization, structure and human component of their requisite support net. In other words, using flexible technologies in inflexible and rigid organizations could serve as a definition of failure. Managing flexible technologies is fundamentally different from managing rigid technologies. Organizational theories of the 'rigid' era are not transferrable to the flexible era. Departmentalization and specialization of the past is rapidly disappearing in the age of systems.

Production of marketable products through FMS requires organizational solutions that overcome traditional limits between functional departments. New form of spontaneous and organizationally amplified cooperation are needed. Top management itself has to be first reorganized: because of the changed departmental linkages and interfaces, the responsibilities must be redefined and reassigned. The coordination points and hierarchies in the form of matrix structures are fast becoming unnecessary.

Because of the cost and long-term implications of FMS, the short-term financial appraisal techniques are not appropriate for the high-technology era. Flexibility, quality and strategic advantage can hardly be measures by 'payback period' or 'net present value'. Using such 'measures' could actually restrain the introduction of FMS and CIS and cause the loss of competitive standing. In fact, at last, these financial artifacts of the past have already started their long overdue exit. Multiple Criteria Decision Making (MCDM) techniques offer the required sophistication and flexibility.

*Flexibility and integration*: quick changeovers in just-in-time response to consumer demand, combined with multifunctionality of workers *and* managers, supported by a flexible organization dedicated to quality – all this spells nothing more than competitive advantage in a high-technology environment.

After the decades of decline, management is becoming a profession: Knowledge-based, integrative, systems-oriented, dedicated to quality rather than to the fast financial buck of the Wall Street manipulators and their apologists. We are returning to managing people and their organizations, away from managing (bad) numbers.

Rolf Bühner's paper provides an excellent introduction into the special *HSM* issue on 'Human resources in the computerized factory'.

### Graham and Rosenthal's 'Flexible manufacturing – flexible people'

Professors Graham and Rosenthal from Boston University have affirmed that FMS (Flexible Manufacturing Systems) mandates and relies upon heightened *human flexibility*. One cannot combine flexible machines with rigid managers. Re-integration of human skills, knowledge, labor and experience has arrived: multifunctionality goes hand in hand with flexibility.

It is also high time to stop talking about anything 'of the future': factory of the future, office of the future, manager of the future, and so on.

There is only one fair statement to sum it all up: *the future is past.*

Flexibility is the new paradigm of management: flexibility in technology, organization, production and management. Building flexibility into the system is the true and potent *strategic thinking*. Forget the goals and objectives which end up translated into rigid structures; more perhaps: oppose the rigid strategic planning of the past.

Concentrate on FLEXIBLE PEOPLE.

We need production managers who can market and sell; workers who can operate and maintain their technology, executives who can speak three languages, know something about history and evolution of human systems, and who can lead by example. We need non-specialized, non-crippled, broad-minded people who are *capable* of responding to change.

Graham and Rosenthal have conducted a field project to learn about the organizational costs involved in pursuing manufacturing flexibility. They found right away that the conventional manufacturing approaches seriously inhibit flexible practice and behavior. FMS is not an extension or improvement, it does not build on the past: it represents a clear break from the past and the existing managerial 'skills' are not only inadequate, but pose active barrier and grave threat to company's competitive position. What are some of these hindrances of conventional management?

- inability to comprehend the need for cross-functional participation in design and procurement of FMS;
- skills outdated, tied to the traditional hardware-oriented fixation;
- inability to involve operating personnel *before* vendor selection;
- very little in-house expertise on software, leading to intense vendor-dependency;
- vendor incorporation is inappropriate, hindering the system integration;
- very little in-house training, still left, often entirely, up to the external vendors;
- inability to comprehend that 'skilled' - 'unskilled' classification is useless at best;
- no job rotation;
- belief that training is an operating expense!

It is quite a miracle that the above 'skills', beliefs, and expertises allow even a rudimentary

functioning of human systems.

Instead of building in-house capabilities, some managers 'subcontract'; instead of assuring computer-fluency, some managers, in their ghetto-language, talk about computer-literacy; instead of training supervisors, some managers train hourly workforce (when education, not training, should preoccupy them).

One cannot be less prepared, one cannot achieve worse results. Yet, in the end, it does not matter: some companies and some managers will get it right and *they* will prevail.

### Kelley's 'Automation: the skill question'

Maryellen R. Kelley, Professor at the University of Massachusetts and Harvard, has presented a cross-national study on management's job design practices related to programmable automation technologies. No evidence or pattern of 'deskilling' has been found.

Again, it is the management, rather than conventional (hardware/software) technology, which appears to be the dominant factor in competitive positioning. According to Kelley, management of human resources did pass from so-called scientific management, through technocratic participative system, to worker-centered participative system. No matter that some companies are only now starting on the 'scientific' management stage: most of those which matter, and competition is about 'mattering', are well started into the latter management system. The entrepreneur extraordinary, Tomáš Baťa, developed *that* system fully and successfully already during the twenties, proving that not technology, but technology plus organization plus management plus people - is *all* that matters.

Kelley shows that the 'deskilling' thesis of programmable automation ('a powerful new weapon of management designed to further its control over production at the expense of worker's skills and autonomy') is a modern luddism at best and popular religion at worst. Accepting such thesis, either for a company or for a nation, guarantees nothing but failure.

Much too much seems to be assumed about the scheming, deviousness and smartness of management: trying to defuse skilled workers' autonomy by introducing programmable automation. In fact,

it is the conventional management which is *bound to lose control* because of the integrative aspects of high technology: there is not much 'management' in self-managed or self-coordinated systems, is there? Management is not devious – it could be even less informed about high technology implications than workers themselves. Management introduces programmable automation in order to stay in business, remain competitive, attain flexibility, and thus justify itself. Management has no choice. Doing that (introducing programmable automation), management sows the seeds of its own demise (i.e., management as we know it).

Kelley has not found any evidence of actual skill *upgrading* either, but that's a more complex issue: the requisite skills are different qualitatively, many of them never before required, many of them 'invisible' to the traditional observer. Simple, linear, measurable 'upgrading' may be hard to find.

Programmable automation *is integrative* technology: workers should not only operate it but program it as well. Current U.S. tendencies to take this marvellous technology and use it to enhance the narrow specialization and division of labor even further is obviously a temporary phenomenon (and aberration) and a sad comment on U.S. management foresight and competency. *Narrowly specialized division of labor is increasingly outdated and uneconomical technique for organizing production or services; it cannot meet either contemporary or future production / consumptions requirements.* If the integrative aspects (integration of labor and knowledge) of high technologies stays unrecognized by some, it is only their competitive position which is to be lost.

Professor Maryellen Kelley has prepared an important document which should translate into direct encouragement to forward-looking companies searching for excellence in unexcellent world.

#### **Parkinson and Avlonitis's 'Adoption of flexible manufacturing systems'**

The decision to adopt or not to adopt flexibility in manufacturing organization and management is a human, personal, organizational and competency issue; in terms of economic, technical, competitive and other criteria, the decision whether to adapt FMS should not even arise.

Of course, it is better to be flexible than not; of course, it is better to stay in business than not; of course, it is better to make profits than not. But some managers still have to go through a slow and agonizing process of deciding: to be or not be. Why?

*Flexibility* is the best answer to dealing with uncertain and turbulent market environment – *not* the conventional strategic planning. Strategic planning, by starting from the goals and objectives, actually institutionalizes rigidity of means. Its has occurred only to a few 'strategists' that flexibility of means itself *is* the best strategy. Undisputedly so. In this sense the conventional strategic planning is an artifact of the past, a rigidity-fixing toolage which aspires to know the future.

Parkinson and Avlonitis have conducted interviews with 31 British and German companies and they do confirm the above stated concerns about the true barriers to innovation and flexibility adoption. FMS reduces work in progress, allows faster production times, faster response to consumer demand, consistent quality, reduced stock levels and lower unit cost of production. It achieves this impressive characteristics through its capability for random processing of parts for small-batch production. Parts can be run in almost any sequence, at any time, without the need for costly set up charges. What is the managerial decision *against* FMS going to involve?

Incompatibility of FMS technology with the existing technology support net: human and technical infrastructure and psychological resistance to FMS technology, change and innovation rank among the first and foremost barriers. The authors report three companies (all of them British) which failed to move towards evaluating and implementing FMS because of such reasons. Psychological factors? Resistance to change? Perceived risk too high? Professional management? Somehow these utterances do not 'fit' and their incompatibility is glaringly self-evident.

From the research sample of companies, 5 out of 19 British and 7 out of 12 German had committed themselves to the FMS technology. None of these 'ratios' compares favorably with Japan and that's where the difference lies and will lie in the future of respective countries. Tomáš Baťa used to say: 'And how do they do things in England? Just the other way around'. He was the

first large-scale practitioner of employee autonomy, self-management, profit and ownership sharing, quality and total and complete system flexibility.

The failure to adopt modern management and organizational practices is *the failure of management and only of management*. No other significant factor has been identified by research so far. Managerial failure of many is brought into its sharp focus by managerial success of some. Yet, nobody has proven that the capacity to learn has totally and forever disappeared from U.S. managerial culture. It has only become muted, unchallenged and quite invisible during the past decade or two. It is emerging again at the 'grass-roots' levels – down below, in the lowest of echelons, far removed from the top, managers are learning to learn *again*.

#### Wildemann's 'Strategic planning'

High technologies improve integration, automation and flexibility of production: they are instruments of *competitive strategy of the enterprise*. How does one evaluate high technologies? How does one evaluate their opportunities and risks? Certainly *not* by using payback period, net present value, ROI, or any other similar artifacts of the low-tech era.

Professor Wildemann of the University of Passau has undertaken the task of developing investment strategies for high technology. He explains why consideration of any *single* project is unwise and unscientific: it is the concept of *technology portfolio*, and its components-interactions, which becomes important in the high-technology era. Only an overall consideration of production technologies within the scope of the *product-market-technology* combination, sufficiently guarantees that risks are controlled, managed and perhaps even diminished.

Wildemann starts with the model of three basic competitive strategies: (1) Cost Leadership; (2) Differentiation; (3) Market-segment concentration. The enterprise can thus attain its competitive advantage either through lower costs, sufficiently differentiated product, narrower market focus, all or three in combinations. High technology, how-

ever, brings the most potent competitive potential and new strategic principle: FLEXIBILITY.

The possible combinations of external opportunities, risks and internal resources can be explicated through a *technology-portfolio* matrix. From this technology-portfolio *normative* strategies for the distribution of resources can be derived. However, if the introduction of high technologies is understood as an active variable within the strategy of an enterprise, the coordination of *market and technology strategy* is required. Production technologies used for manufacturing products with high market priority would consequently obtain high '*production-market priority*'. Because the high technologies (CAD/CAM, CIM, FMS) are increasingly product-flexible, the role of market portfolio, although it may deliver valuable hints, is on the decrease. The whole culture of strategic management is therefore shifting: away from goal and purposes determining the requisite means, and toward the flexible means allowing attainment of broad variety of goals and purposes. *There is no better competitive strategy than to be completely flexible.*

There are also risks, especially today in the transition period towards high technology. The newer a technology, the more imprecise are the estimates of its costs, effects and further development. Such risks are not only limited to technology, but failures may cause the loss of market shares or even market segments. That is, failures to use appropriate competitive, mostly integrative, technologies. One has to evaluate the costs, risks and losses stemming from doing nothing, i.e., *not* introducing high technology.

Wildemann's own empirical survey concluded that 85% of the enterprises observed a strong connection between the application of FMS and the future competitive position of their enterprise. Early introducers of FMS also observed that: (1) training of the personnel started earlier; (2) area of application was determined by management decision; (3) contacts with suppliers were more intensive. It is the observations and insights like these from which normative strategies for introducing high technologies can be developed.

Human Systems Management is positioned to take the lead in evolving the new family of multi-dimensional measures and criteria: Going beyond the net present value ... at last.