

industrial statistician. He quite rightly identifies the need to build a very deep understanding of the industry which employs them. This remark stimulated me to go back and read again Hahn and Boardman's (1985) excellent *Amstat News* article on the statistician's role in quality improvement. There is little point in quoting selectively from it. I think it is worth reading from time to time no matter how clever and experienced a statistician we think we are because it focuses on the personal traits we require to be effective as industrial statisticians.

David Banks presents confusing messages about TQM, perhaps in an attempt to be provocative. He may be right to claim "that there are dozens of definitions of TQM, but none with any mathematical precision," but it is clear to me that Dr. Deming's philosophy provides a well-defined and consistent approach which can be applied successfully in any industry (not without sustained effort over many years). I am certain that the long-term gains from TQM will not, as seems to be claimed, be realised by "any new theory of management."

Being provocative may stimulate thought but I think a potential industrial statistician reading "TQM correctly shifts corporate attention to the customer, at every level of the business. From the TQM perspective, each employee is a two-legged profit machine" will develop quite the wrong attitude toward management and the role of statisticians in improving their employer's business. This is because TQM is about the man-

agement of people. It may be easier to see this in service industries (which now account for well over half of GDP in developed countries) but it applies equally to manufacturing. Reading *Out of the Crisis* helped me develop as a manager and I am sure corporate executives will benefit from it too. If nothing else, it should teach them not to look at employees as two-legged profit machines. Dr. Deming's advice on driving out fear, instituting training and removing barriers is all about improving people and their working environment. It may be true that any good manager can apply the nonstatistical aspects of a TQM philosophy. Statisticians should realise that they can do that and more, because we should have good analytical intelligence and the knowledge to select and use appropriate techniques. This is why we can make a unique contribution, if our attitude is right.

Although I have concentrated my remarks on TQM, I know that industrial statistics is not just about TQM and that it is important to have some statisticians who can apply advanced techniques (incidentally, I agree entirely with what David Banks has to say on the topics needed to be covered in industrial statisticians' training) but I am sure we can contribute more if we can dispel fear and can institute training in the simple techniques which are central to most process and product improvement schemes. By doing so we will ensure that industrial statistics continues as a growth industry—whose products are appreciated by contented customers.

Comment

G. K. Robinson

It is good to see such a candid article on industrial statistics. I agree with David Banks that the way forward is to discuss our problems and uncertainties frankly and honestly.

I have little direct knowledge about industrial statistics in the United States. However, it seems reasonable to assume that Australian experience is relevant, since many senior managers in the two countries have been influenced by the same consultant gurus.

The first of my comments is to suggest that Banks has ignored the fundamental question of whether stat-

isticians should take a role in changing the managerial climate, the second looks at the overall thrust of Banks' article from a different viewpoint and the third refers to Taguchi's work.

1. THE ROLE OF STATISTICIANS IN CHANGING THE MANAGERIAL CLIMATE

Deming (1982), Joiner (1985), Hahn and Boardman (1985) and others have argued that statisticians have an important role to play in changing the managerial climate of enterprises in ways which are often referred to as "Deming's 14 points for management" or as Total Quality Management (TQM). Most statisticians have not thought about this view or consider it to be an overstatement. However, the statisticians that agree

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