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Advancing Six Sigma: Predicting the unforeseeable

“Timely update of information about customer needs may serve as a useful indicator to monitor the progress of a company in satisfying customers over time, and also allow formulating the next strategy for product or service design and upgrading.” -- Prof Goh Thong Ngee, Director, Quality and Innovation Research Centre, NUS, on the challenge of uncertainty and variability.

Expecting the unexpected is what Prof Goh Thong Ngee and his team at the Quality and Innovation Research Centre (QIRC) have been doing in the name of quality.

Competing in a global market means products in the hands of the customer have to be in peak condition under all circumstances -- including the unforeseeable, said Prof Goh, Engineering Faculty member with the Department of Industrial and Systems Engineering. Director of QIRC, Prof Goh is also at the helm of the Centre for Design Technology of the Faculty.



CAPTURING THE UNFORESEEABLE: Prof Goh Thong Ngee (3rd from left) with researchers. The Quality and Innovation Research Centre has some 30 PhD students working on cutting-edge topics in Quality Engineering and Management.

Gone are the days when quality is assured once a product is certified to have met all requirements on a factory's checklist. As a reflection of how quality has changed, Prof Goh gave the example of the mini computer 20 years ago which would only function as promised if it was operated under specified conditions -- with the right environmental temperature and humidity for example. Nowadays, one expects performance from a compute even at the beach or desert -- anywhere and anytime.

Making sure that the product is robust from the very start is crucial. In an increasingly fast-paced world, we see new models with new features every day. Production cycles need to be as short as possible for new products to gain foothold in the market. The ultimate goal would be to have quality built into every stage of product realisation and hence do away with routine Quality Control (QC) inspection downstream which would only add costs and

lengthen the time-to-market cycle, said Prof Goh who is the inaugural recipient of the International Academy for Quality (IAQ) Masing Book Prize for authoring a "distinguished book that significantly enhances the body of quality knowledge".

The book, *Six Sigma: Advanced Tools for Black Belts and Master Black Belts* (by Tang, Goh, Yam and Yeap; Wiley: ISBN 978-0-470-02583-3) is a collaboration with senior industry partners, offering novel techniques for solving non-standard problems in the real world.

Organisations have been adopting *Six Sigma*, a Quality Management framework for achieving competitive advantage, for the last two decades. Traditional initiatives such as statistical quality control, zero defects and total quality management have been known for many years; today researchers feel that there is a need to take stock of the knowledge accumulated in this important field of study -- and look for integrated approaches in applying *Six Sigma*.

One of QIRC's current research projects is to explore ways in which *Six Sigma* can be applied to a wide range of service organisations. Besides developing a framework specific to services, the Centre will also investigate its applicability through case studies involving different types of service industries.

Another aspect commonly known as "Voice of the Customer" (VOC) should also be taken into account as a prominent tool in the "Design for Six Sigma" methodology, said Prof Goh. "In today's rapidly changing market context, it is likely that the VOC may already be different when the product or service finally hits the market. To solve this problem posed by time lag, we are researching strategies to incorporate an appropriate "future" VOC that would anticipate possible market dynamics," said Prof Goh.

And as with all predicted data, there is always the element of uncertainty and variability. "So far there has been little study to deal with such uncertainty. Our Centre is concurrently investigating into ways to handle this. Timely update of information about customer needs may serve as a useful indicator to monitor the progress of a company in satisfying customers over time, and also allow formulating the next strategy for product or service design and upgrading," said Prof Goh.

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