Luleå University of Technology
Department of Mathematics
Kerstin Vännman 2010-08-29

Curriculum Vitae for Kerstin Vännman

Personal information

Born: 10 April 1946 in Umeå.
Gender: Female
Position held: Full Professor in Mathematical Statistics with special emphasis on Industrial Statistics as well as head of the unit of Industrial Statistics (professor tillika ämnesföreträdare) at Department of Mathematics, Luleå University of Technology, since March 2004. 70% on leave (tjänstledig) 2010-04-01–2011-03-31.
Professor (gästprofessor) in Statistics, 60%, Umeå University, 2010-04-01–2011-03-31.
Professor (gästprofessor) in Statistics, 10%, University West (Högskolan Väst), 2010-02-01–2012-01-31.

Education and exams

Fil kand-exam, Umeå University, 1969.
Fil lic-examen (old system) in Mathematical Statistics, Umeå University, 1975.
PhD-exam (doktorsexamen) in Mathematical Statistics, Umeå university, 1975.
Docent in Mathematical Statistics at Luleå University of Technology, 1996.

Former positions

Teaching at Umeå University (assistant teacher, assistant professor/lecturer, research fellow), 1967–1974.
Researcher at Umeå University (assistant researcher, research fellow), 1969–1975.
Associate professor/Senior lecturer (tenure) in Mathematical Statistics at Luleå University, July 1975–January 1998 .
Professor (biträdande professor) in Mathematical Statistics at Luleå University of Technology, February 1998–March 2004.

Present research direction

Industrial statistics, for the moment focusing on capability analysis, statistical process control, and design of experiments in continuous processes. Furthermore, an interest in multivariate data analysis.

Teaching

Responsible for all courses in Mathematical statistics within the Faculty of Engineering. At present teaching courses in basic Mathematical statistics, Multivariate data analysis, Experimental design, Regression analysis.

Scientific activities

Funded research projects

- *Mastering variation by using process capability studies and other related quality improvement methods*. From Volvo Research Foundation. Totally 1 338 000 SEK during 1 July1997-31 December 1999.
- *Quality improvement strategies based on process capability studies*. From the Swedish Research Council. Totally 2 027 000 SEK during 1 January 2003-31 December 2005.

Ph.D. Thesis

Contributions to the theory of statistical inference based on simple functions of order statistics. Inst of Mathematics and Statistics, Univ of Umeå, 1975. Ph.D Thesis consisting of a summary and the following five articles.

- Estimation of the location and scale parameters of a Pareto distribution by linear functions of order statistics. *Journal of the American Statistical Association*, Vol 68 (1973), 218-227. With Gunnar Kulldorff.
- *Estimators based on order statistics from a Pareto distribution*. Inst of Mathematics and Statistics, Univ of Umeå, No 4 (1974), 1-21.
- *Simple estimators of the scale parameters of a Pareto distribution.* Inst of Mathematics and Statistics, Univ of Umeå, No 8 (1974), 1-18.
- *Constant-risk estimators with applications to linear functions of order statistics*. Inst of Mathematics and Statistics, Univ of Umeå, April 1975, revised version No 6 (1973), 1-39.
- *Definitions and some simple tests for heavy-tailed distributions*. Inst of Mathematics and Statistics, Univ of Umeå, No 8 (1975), 1-29.

Publications in refereed international scientific journals

- Kulldorff, G. & Vännman, K. (1973). Estimation of the location and scale parameters of a Pareto distribution by linear functions of order statistics. *Journal of the American Statistical Association*, Vol 68, 218-227.
- Vännman, K. (1976). Estimators based on order statistics from a Pareto distribution. *Journal of the American Statistical Association*, Vol 71, 704-707.
- Vännman, K. (1995). On the distribution of the estimated mean from nonstandard mixtures of distributions. *Communications in Statistics—Theory and Methods*, Vol 24, 1569-1584.
- Vännman, K. (1995). A unified approach to capability indices. *Statistica Sinica*, Vol 5, 805-820.
- Vännman, K. and Kotz, S. (1995). A superstructure of capability indices—distributional properties and implications. *Scandinavian Journal of Statistics*, Vol 22, 477-491.
- Vännman, K. & Kotz, S. (1995). A superstructure of capability indices—asymptotics and its implications. *International Journal of Reliability, Quality, and Safety Engineering*, 2, 343–360.
- Vännman, K. (1997). Distribution and moments in simplified form for a general class of capability indices. *Communications in Statistics—Theory and Methods*, 26, 159–179.
- Vännman, K. (1997). A general class of capability indices in the case of asymmetric tolerances. *Communications in Statistics—Theory and Methods*, 26, 2049–2072.
- Vännman, K. (1998). Families of capability indices for one-sided specification limits. *Statistics*, Vol 31, 43-66.
- Deleryd, M. & Vännman K. (1998). Process capability studies for short production runs. *International Journal of Reliability, Quality and Safety Engineering*, 5, 383–401.

- Deleryd, M. & Vännman, K. (1999). Process capability plots—a quality improvement tool. *Quality and Reliability Engineering International*, 15, 213-227.
- Vännman, K. (2002). Discussion in Process capability indices—a review, 1992–2000. *Journal of Quality Technology*, 34, 40–42.
- Vännman, K. & Hubele, N. F. (2003). Distributional properties of estimated capability indices based on subsamples. *Quality and Reliability Engineering International*, 19, 111–128.
- Hubele, N. F & Vännman, K. (2004). The effect of pooled and un-pooled variance estimators on C_{pm} when using subsamples, *Journal of Quality Technology*, 36, 207-222.
- Vännman, K (2005). The circular safety region: a useful graphical tool in capability analysis, *Quality and Reliability Engineering International*, 21, 529-538.
- Vännman, K. (2006). Safety regions in process capability plots. *Quality Technology and Quantitative Management*, 3, 227-246.
- Vännman, K. & Albing M. (2007). Process capability plots for one-sided specification limits. *Quality Technology and Quantitative Management*, 4, 569-590.
- Vännman, K. & Albing M. (2007). Process capability indices for one-sided specifications and skewed distributions. *Quality and Reliability Engineering International*, 23, 755-765.
- Castagliola, P. & Vännman, K. (2007). Monitoring capability indices using EWMA. *Quality and Reliability Engineering International*, 23, 769-790.
- Vännman, K. & Kulahci, M. (2008). A model-free approach to eliminate autocorrelation when testing for process capability. *Quality and Reliability Engineering International*, 24, 213-228.
- Vanhatalo, E. & Vännman, K. (2008). Using Factorial Design and Multivariate Analysis when Experimenting in a Continuous Process. *Quality and Reliability Engineering International*, 24, 983-995.
- Castagliola, P. & Vännman, K. (2008). Average run length when monitoring capability indices using EWMA. *Quality and Reliability Engineering International*, 24, 941-955.
- Albing M. & Vännman, K. (2009). Skewed zero-bound distributions and process capability indices for upper specifications. *Journal of Applied Statistics*, 36, 205-221.
- Castagliola, P., Maravelakis, P., Psarakis, S., Vännman, K. (2009). Monitoring Capability Indices using Run Rules. *Journal of Quality in Maintenance Engineering*, 15, 358-370.
- Vanhatalo, E., Kvarnström, B., Bergquist, B., Vännman, K. (2010) A Method to Determine Transition Time for Experiments in Dynamic Processes, To appear in *Quality Engineering.*
- Albing, M. & Vännman, K. (2010). Elliptical safety region plots for C_{pk}. To appear in *Journal of Applied Statistics*.

Manuscripts submitted for publication in refereed international scientific journals

- Vanhatalo, E., Bergquist, B., & Vännman, K. (2009). Analyzing two-level factorial experiments with time series responses.

Publications in books

- Capability indices when tolerances are asymmetric. In *Quality Improvement Through Statistical Methods*, Editor: Bovas Abraham. Birkhauser, Boston, 1998, 79–97.
- A graphical method to control process capability. *Frontiers in Statistical Quality Control*, No 6, Editors: H-J Lenz & P-TH Wilrich. Physica-Verlag, Heidelberg, 2001, 290-311.
- Process capability plots. In *Encyclopedia of Statistics in Quality and Reliability*, Vol. 3, Editors: Fabrizio Ruggeri ; Ron S Kenett ; Frederick W Faltin, Wiley, 2007, 1470-75.

Publications in international conference proceedings

- *A statistical approach to composite beams*. Nordic Concrete Research, Publication No 1, The Nordic Concrete Federation, 1982. With Krister Cederwall.
- *A superstructure of capability indices—some distributional properties and implications*. Proceedings of the International Conference on Statistical Methods and Statistical Computing for Quality and Productivity Improvement, Seoul, Korea, August 17-19, 1995, Vol II, 822-828. With Samuel Kotz.
- *Capability indices when tolerances are asymmetric*. Proceedings of the Cochin-ISI/QISM Conference, Cochin, India, 28–31 December, 1996.
- *Process capability plots—a complement to capability indices*. Proceedings of the Sixth International Workshop on Intelligent Statistical Quality Control, Würzburg, Germany, 14-16 September, 1998, 270-283.
- *The distribution of C_{pm} when using a pooled variance estimator with some results*. In Proceedings of the 2001 Joint Statistical Meetings, Section on Quality & Productivity, Atlanta, Georgia. On CD, 6 pages. With Norma Hubele.
- *Monitoring unstable but capable processes with the $C_p(u,v)$ system of capability indices*. In Proceedings of 12th ISSAT International Conference on Reliability and Quality in Design, 220-224, ISBN:0-9763486-1-6, Chicago, Illinois, USA, 3-5 August, 2006. With Philippe Castagliola.
- *Monitoring capability indices using run rules*. In Proceedings of the International Conference on Industrial Engineering and Systems Management, in CDROM, ISBN: 978-7-302-15312-2, Beijing, China, 30 May-2 June, 2007. With Philippe Castagliola, Petros Maravelakis, and Stelios Psarakis.
- *A designed experiment in a continuous process*. In the proceedings of 10th QMOD Conference, Helsingborg, Sweden, June 18-20, 2007. With Erik Vanhatalo and Gunilla Hyllander.
- *The efficiency of the EWMA capability chart.* In Proceedings of 2007 IEEE International Conference on Industrial Engineering and Engineering Management, IEEM 2007; December 2-4, 2007, 1389-1393. With Philippe Castagliola
- *A method to determine transition time for experiments in dynamic processes*. In Proceedings of the Ninth Annual Meeting of ENBIS (European Network for Business and Industrial Statistics), Göteborg, Sweden, September 20-24, 2009, on CD. With Vanhatalo, E., Kvarnström, B., Bergqvist, B.

International scientific talks

- *With EDA and graphical methods beyond descriptive statistics*, at Seminar on Medical Statistics, Karolinska institutet, Stockholm, 28 April 1989.
- *A general class of capability indices—some distributional properties and implications*, at the Department of Statistics, University of Manitoba, Winnipeg, Canada. 26-29 March, 1995.
- *A superstructure of capability indices—some distributional properties and implications*, at the International Conference on Statistical Methods and Statistical Computing for Quality and Productivity Improvement, Seoul, Korea, 17-19 August, 1995.
- *Capability indices when tolerances are asymmetric*, at the Cochin-ISI/QISM Conference, 28–31 December, Cochin, India, 1996.
- *Process capability plots—a complement to capability indices*, at the Sixth International Workshop on Intelligent Statistical Quality Control, Würzburg, Germany, 14-16 September, 1998.
- *Using process capability plots to interpret process capability*, at the Department of Operations Research, The George Washington University, Washington, USA, 12 April, 1999.
- *The distribution of C_{pm} when using a pooled variance estimator with some result*, at the 2001 Joint Statistical Meetings, Section on Quality & Productivity, Atlanta, Georgia, USA, 5-9 August, 2001.

- *Quality Improvement using plots based on process capability indices*, at the Quality & Productivity Research Conference, Tempe, Arizona, 5-7 June, 2002.
- *Process capability plot—a tool for capability analysis*, at the Department of Statistics, Virginia Polytechnic Institute and State University, Virginia, USA, 23 March, 2004.
- *A Graphical Tool Useful in Capability Analysis*, at European Network for Business and Industrial Statistical Conference, Copenhagen, Denmark, 20-22 September, 2004.
- *How to Handle Autocorrelation in Capability Analysis?* at the European Network for Business and Industrial Statistical Conference, Newcastle, England, 14-16 September 2005.
- *A new method to handle autocorrelation in capability analysis* at the Fifth International Symposium on Business and Industrial Statistics, Lima, Peru, 11-13 January, 2006.
- *A model free approach to eliminate autocorrelation when estimating capability indices* at the Department of Informatics and Mathematical Modelling, Technical University of Denmark, Lyngby, Denmark, 24 Mars, 2006.
- *Process Capability Indices for one-sided specification intervals and skew distributions* at the European Network for Business and Industrial Statistical Conference, Wroclaw, Poland, 18-20 September, 2006.
- *Process capability analysis for zero-bound process data with zero-values present* at the European Network for Business and Industrial Statistical Conference, Athens, Greece, 22-24 September, 2008.
- *Process capability plots for efficient capability analysis* at the 52 Annual Fall Technical Conference in Phoenix, AZ, USA, 9-10 October 2008.

Pedagogical activities

Funded pedagogical project

Interaction between geochemistry, statistics, research data, and a computer in the classroom—applied environmental analysis. From Högskolans grundutbildningsråd. Totally 400 000 SEK during 1 July 1994-30 JUne 1996.

Award

The Adélie Prize, awarded for excellence in teaching by the Student Body of Luleå University, 1983.

Textbooks

- *Matematisk statistik.* 1984, Studentlitteratur. 2002. (In Swedish)
- *Kreativ statistik med EDA*. (With Andrejs Dunkels.) Förlagshuset Gothia, 1984. (In Swedish

International publications about teaching of statistics

- *How to convince a student that an estimator is a random variable*. Teaching Statistics 5 (1983), 49-54.

- *Statistics in industry and implications for teaching*. Proceedings of the Second International Conference on Teaching Statistics (ICOTS II), Univ of Victoria 11-16 August 1986, 355-356.
- *Some aspects of statistical graphics for secondary school teachers*. Training Teachers to Teach Statistics. Edited by Anne Hawkins. Proceedings of the International Statistical Institute Round Table Conference, Budapest 23-27 July, 1988, 110-125.
- *Come convincere uno studente che uno stimatore é una variabile aleatoria*. Induzioni. Demografia, probabilità, statistica a scuola Nr 0 (1990), 51-58.
- *Encouraging the engineering student to feel the importance of statistics.* Proceedings of the Third International Conference on Teaching Statistics (ICOTS III), Univ of Otago, Dunedin, 19-24 August 1990, Vol 2, ed David Vere-Jones, International Statistical Institute, 245-254.
- *Graphical methods to support understanding*, Proceedings of the 48th Session of the International Statistical Institute in Cairo, Egypt, 9-17 September, 1991.
- *Re-expression—a theme from EDA suitable for the mathematics teacher*. Proceedings of the International Statistical Institute Round Table Conference, Lennoxville, Québec 10-14 August 1992, ed by Lionel Pereira- Mendoza, International Statistical Institute, 159–176.
- *Discussant comments on the topic Education and training in statistics for quality improvement and engineering*. Proceedings of the 49th Session of the International Statistical Institute in Firenze, Italy, August 25-September 2, 1993, Book 4, 53-55.
- *Two teachers, a computer, and statistics—experiences of teacher cooperation*. Proceedings of the 8th SEFI European Seminar on Mathematics in Engineering Education, June 28-30, 1995 Prague, Czech Republic, 205-211.
- *Some experiences of teacher cooperation involving statistics, geochemistry, and a computer in the classroom*. Proceedings of the 50th Session of the International Statistical Institute in Beijing, China, 21-29 August, 1995, Book 2, 1218-1219.
- *Statistics teaching through teacher cooperation and a computer in the classroom*, Proceedings of the Second Scandinavian-Ukrainian Conference in Mathematical Statistics, Umeå Universitet, 8-13 juni, 1997, in Theory of Stochastic Processes, Vol 3 (19), no 1-2, 1997, 79-87.

International tasks

- *Organizer and chairperson* for the session *Statistics in Industry and Implications for Teaching* at Second International Conference on Teaching Statistics (ICOTS II) in Victoria, BC, Canada, 1986.
- *Member of International Statistical Institute (ISI) Education Committee,* 1987-1991 .
- *Chairperson in ISI Task Force for International Conferences on Teaching Statistics*, 1987-1993.
- *Member of SEFI:s Working Group on Probability and Statistics*, 1989–1991
- *Organizer and chairperson* for the session *Teaching Statistics for Technical and Engineering Students* at Third International Conference on Teaching Statistics (ICOTS III) in Dunedin, New Zealand, 1990.
- *Scientific Programme Vice-President of IASE* (International Association for Statistical Education) 1991-1993.
- *Organizer and chairperson* for the session *The Use of Graphical Methods in the Teaching of Statistics* at 48:de ISI-conference in Kairo, Egypt, 9-17 September 1991.
- *Chairperson of the plenary session at The First Scientific Meeting of IASE* in Perugia, Italy, 23-24 August, 1993.
- *Member of the program committee of Fifth International Conference on Teaching Statistics* (ICOTS V) in Singapore, 1998, 1995–1998.
- *Organizer and chairperson* for the session The teaching of mathematical statistics vid the Second Scandinavian-Ukrainian Conference in Mathematical Statistics, Umeå University, 8-13 June, 1997, Umeå.

- *International Representative of the Board of Directors of the American Statistical Association*, 1999-2001, 2003-2004.
- *Member of the program committee of the International Statistical Institute Round Table Conference 2004* in Lund, Sweden. 2003-2004.
- *Member of the Editorial Advisory Board* for the scientific international journal *Statistical Methods*, 1999–
- *Associate Editor* for the scientific international journal *Quality Technology and Quantitative Management*, 2002–
- *Council member of the Board of the European Network for Business and Industrial Statistical*, 2006–
- *Chair of the Programme Committee of ENBIS9* in Gothenburg, Sweden, 21-23 September 2009

Membership in statistical associations

- *Member* in the Swedish Statistical Association, 1969–.
- *Member* in the American Statistical Association, 1972–.
- *Member* in the International Statistical Institute, elected 1988–.
- *Member* in the European Network for Business and Industrial Statistics (ENBIS), 2004–.