Appendix A. Definition of key terms and abbreviations

JIT (Just In Time)	• Deliver the right product at the right time in the right quantity (Liker, 2004) • Continuous and forced problem solving via a focus on throughput and reduced inventory (Heizer and Render, 2008, p. 642) • The ordering and delivery of parts as they are needed in the production process to achieve minimum inventory and waste (Cooper, 1995, p. 349)
TPS (Toyota Production System)	• Focus on continuous improvement, respect for people and standard work practice (Heizer and Render, 2008, p. 642)
Lean Operations	• Eliminates waste through a focus on exactly what the customer wants (Heizer and Render, 2008, p. 642)
5S	• A technique for "housekeeping". The 5S stands for Sort, Simplify, Shine, Standardize, Sustain (Heizer and Render, 2008, p. 643)
Pull system	• A concept that results in material being produced only when requested and moved to where it is needed when it is needed (Heizer and Render, 2008, p. 644)
Variability	• Any deviation from the optimum process that delivers perfect product on time, every time (Heizer and Render, 2008, p. 643)

TPM	• Total preventive maintenance or total productive maintenance
Pokayoke	• So called foolproof, a mechanism to prevent defective work by putting various checking devices on instruments (Monden, 1983, p. 10)
Heijunka	• Leveling out the schedule, smoothing out the volume and mix of items produced so there is little variation in production from day to day. (Liker, 2004, p.8)
Kaizen	• Continuous improvement. The process of making incremental improvements, no matter how small, and achieving the lean goal of elimination all waste that adds cost without adding value (Liker, 2004, p.24)
TQM	• An intregrated product development strategy that focus on designing quality into products and ensuring that the production process is as defect free as possible (Cooper, 1995, p. 352)
Lean Enterprise	• An organizational form originating in Japan. It employs lean production methods, such as JIT production; TQM, team-work based arrangements, supportive supplier relations and improved customer satisfaction. The lean enterprise is capable of producing high-quality products economically in lower volumes and bringing them faster to market than mass-producer (Cooper, 1995, p. 350)

Appendix B. Questionnaire

Part 1: Lean assessment

Please indicate the extent of implementation of each of the following practices in your plant.

(1) No implementation
(2) Little implementation
(3) Some implementation
(4) Extensive implementation
(5) Complete implementation

Supplier feedback

We frequently are in close contact with our suppliers

We give our suppliers feedback on quality and delivery performance

We strive to establish long-term relationship with our suppliers

JIT delivery

Suppliers are directly involved in the new product development process

Our key suppliers deliver to plant on JIT basis

We have a formal supplier certification program

Developing suppliers

Our suppliers are contractually committed to annual cost reductions

Our key suppliers are located in close proximity to our plant

We have corporate level communication on important issues with key suppliers

We take active steps to reduce numbers of suppliers in each category

Our key suppliers manage our inventory

We evaluate suppliers on the basis of total cost and not per unit price

Involved customers

We frequently are in close contact with our customers

Our customers give us feedback on quality and delivery performance

Our customers are actively involved in current and future product offerings

Our customers are directly involved in current and future product offerings

Our customers frequently share current and future demand information with marketing department

Pull

Production is “pulled” by the shipment of finished goods

Production at stations is “pulled” by the current demand of the next station

We use a “pull” production system

We use Kanban, squares or containers of signals for production control

Flow

Products are classified into groups with similar processing requirements

Products are classified into groups with similar routing requirements

Equipment is grouped to produce a continuous flow of families of products

Families of products determine our factory layout

Low setup

Our employees practice setups to reduce the time required

We are working to lower setup times in our plant

We have low set up times of equipment of our plant

Controlled processes

Large number of equipment/processes on shop floor is currently under SPC

Extensive use of statistical techniques to reduce process variance

Charts showing defect rates are used as tools on the shop-floor

We use fishbone type diagrams to identify causes of quality problems

We conduct process capability studies before launch

Involved employees

Shop-floor employees are key to problem solving teams

Shop-floor employees drive suggestion programs

Shop-floor employees lead product/process improvement efforts

Shop-floor employees undergo cross functional training

Productive maintenance

We dedicate a portion of every day to planned equipment maintenance related activities

We maintain all our equipment regularly

We maintain excellent records of all equipment maintenance related activities

We post equipment maintenance records on shop-floor for active sharing with employees

Part 2: Firm Performance

For the following seven performance criteria, please indicate the company's changes in performance in the last three years

	Decreased tremendously				Increased tremendously	
1	2	3	4	5	6	7
Productivity						
Cost savings						
Product Quality						
On-time delivery						
Sales growth						
Operating profit						
Market share						

Part 3: Demographics

Occupational Level

Production Manager

Logistics-/Material control manager

Production planner

Other

Length of service in current company

0 to 2 years

Above 2 to 5 years

Above 5 to 10 years

More than 10 years

Number of employees

0-149

150-499

500 or more

Ownership of the company

Swedish

Foreign

Industry

Electrical and electronics

Iron, steel and metal

Food and beverage

Rubber and plastic

Paper, printing, packaging

Chemicals and chemical products

Pharmaceutical, medical equipment, cosmetics

Furniture and wood

Textile, clothing and footwear

Machinery and equipment

Motor vehicles and accessories

Other manufacturing

Appendix C. Descriptive statistics

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
SUP_FEED1	35	3	5	4.20	.719
SUP_FEED2	35	3	5	4.03	.785
SUP_FEED3	35	2	5	4.11	.718
JIT_DEL1	35	1	5	3.23	1.060
JIT_DEL2	35	1	5	3.00	1.188
JIT_DEL3	35	1	5	3.31	1.231
DEV_SUP1	35	1	5	2.37	1.215
DEV_SUP2	35	1	5	2.43	.979
DEV_SUP3	35	3	5	3.94	.591
DEV_SUP4	35	1	5	3.31	.993
DEV_SUP5	35	1	5	2.00	1.213
DEV_SUP6	35	1	5	3.14	1.167
INV_CUST1	35	3	5	4.09	.742
INV_CUST2	35	2	5	4.11	.758
INV_CUST3	35	1	5	3.51	.951
INV_CUST4	35	1	5	3.43	1.008
INV_CUST5	35	2	5	3.43	.948
PULL1	35	1	5	3.03	1.403
PULL2	35	1	5	3.11	1.323
PULL3	35	1	5	2.97	1.272
PULL4	35	1	5	2.43	1.267
FLOW1	35	1	5	3.46	.950
FLOW2	35	1	5	3.06	1.110
FLOW3	35	1	5	3.43	1.092
FLOW4	35	1	5	3.49	1.173
SETUP1	35	1	5	2.77	1.003
SETUP2	35	1	5	3.54	.919
SETUP3	35	2	5	3.26	.980
CONT_P1	35	1	4	2.06	.938
CONT_P2	35	1	5	2.29	1.045
CONT_P3	35	1	5	2.83	1.485
CONT_P4	35	1	5	2.86	1.192
CONT_P5	35	1	5	2.57	1.399
INV_EMP1	35	2	5	3.66	.838
INV_EMP2	35	1	5	3.51	1.121
INV_EMP3	35	1	5	2.91	.919
INV_EMP4	35	1	5	2.83	.785
PROD_M1	35	1	5	3.17	1.175
PROD_M2	35	2	5	4.03	.954
PROD_M3	35	1	5	3.17	1.071

PROD_M4	35	1	5	3.00	.970
Valid N (listwise)	35				