

Sustaining local manufacturing: a longitudinal study of Swedish companies

*Mats Winroth (mats.winroth@chalmers.se)
Chalmers University, Sweden*

*Muhammad Abid
Chalmers University, Sweden*

*Bengt Almgren
SolvingEfeso AB, Sweden*

*David Bennett
Aston University, UK & University of South Australia*

*Breno Nunes
Aston University, UK*

Abstract

This paper reports an investigation of local sustainable production in Sweden aimed at exploring the factors contributing to survival and competitiveness of manufacturing. Eight companies were studied on two occasions 30 years apart; in 1980 and 2010. To provide a valid longitudinal, perspective a common format for data collection was used. As a framework for data collection and analysis the DRAMA methodology was employed (Bennett and Forrester, 1990). There are a number of results reported in detail concerning long term competitiveness and sustainability of manufacturing companies.

Keywords: Swedish manufacturing, longitudinal study, sustainable production

Introduction

A company's competitiveness refers to its capacity to create and sustain cost and/or product advantages to gain or maintain strong positions in the markets for its products and a high level of profitability. In general, the advantages are based on the ability of a firm to (a) successfully define its scope, (b) manage and coordinate the core functions and operations within the enterprise as well as relationships with suppliers and customers, and (c) be aware of market demand characteristics and respond to them appropriately (Bennett and Vaidya, 2005). The strategy literature relating to competitiveness is divided into two general strands relating to the "market-based" view and the "resource-based" view of the firm (Makhija, 2003). The market-based view suggests that strategic plans should be derived from a careful analysis of market trends

and of the market's potential evolution and the resource-based view suggests that companies should concentrate on managing internal resources and find markets where they can be deployed. Many authors, for example Slack and Lewis (2008), propose that a balanced approach is preferable, and that market-based and resource-based perspectives should be reconciled. Other relevant literature strands for this study include the concept of sustainable competitive advantage proposed by Dierickx and Cool (1989) who suggest that, generally, assets required to undertake a certain strategy are readily available in the input markets. Also the "sand cone" model (Ferdows and De Meyer, 1990) suggests that before firms can move towards the strongest competitive position, accumulated capabilities are needed starting from basic foundations. The study was conducted from the perspective of economic and social sustainability. The companies were all in industries where Sweden has traditionally demonstrated manufacturing strength; i.e. automotive, complex engineered products and design intensive housewares. The results supplement and build on other related work carried out into company manufacturing strategy, especially into the sources of competitive advantage for companies in the traditional industrial economies and smaller developing countries facing competition from countries with huge labour and natural resources (e.g. China, India and Brazil). See for example Leseure et al (2009) and Löfving et al (2008). The findings of the study from all 8 companies support especially the importance of the resource based view for companies in traditional industrial economies that are seeking to maintain a sustainable manufacturing presence locally. The findings also reinforce the idea of the "sand cone" model with engineering design and quality being at the core. On the other hand there is the limitation of the study being undertaken only in Sweden and related studies by the authors' in other countries reveal differences that contextualize the results. These are reported elsewhere.

Methodology

A Multiple case study approach was used in the project, which allows the researcher to investigate the diversity among the cases and aims to make comparisons between them (Yin, 2003). The same basic format for data collection was used during the visits to companies in 1980 and 2010, i.e. introduction to the company (30 minutes), tour of manufacturing facilities (30+ minutes allowed), interviews with open-ended questions (approximately 90 minutes). The 2010 visits were planned in the same month and week as they were undertaken 30 years previously. All the visits were carried out sequentially in one week, which required careful preparation to arrange the most efficient itinerary and maximize the amount of time for data collection in the firms. Before the visits the companies were thoroughly briefed about the purpose of the study and an indication provided in advance of the data required and areas to be covered in interviews. In addition, before the 2010 visits the companies were sent the report from the 1980 study. In the 2010 visits, the interviews were also recorded and transcribed as well as written notes being taken. After the visits the collected materials were shared among the members. As a framework for data collection and analysis the DRAMA methodology (Decision Rules for Analyzing Manufacturing Activities) was employed (Bennett and Forrester, 1990). This disaggregates production system design activity into ten components, i.e. Market and Environment; Manufacturing Strategy; Organization; Justification; Project Management; Physical System Design; Control and Integration; Work Design; Implementation; Evaluation. Analysis has been undertaken at the level of the factory rather than the company as a whole. Another characteristic of the study is that all the companies were made known to each other, which was possible because none of the 8 were competitors. This facilitated benchmarking and enabled meaningful

comparisons to be made within a spirit of openness. Although the DRAMA methodology contained a component called “manufacturing strategy”, in the analysis of the visited companies the operation strategy matrix of Slack & Lewis (2008) was also applied. The performance objectives of the companies were analyzed by keeping in view the decision areas. Depending on the priorities, the company performance objectives can be ranked accordingly. In other words it is not necessary that a performance objective is made equally important for all the companies. However, it helps in identifying the most relevant objective and the respective decision area affecting overall company resources. Since there were eight companies studied and to preserve their anonymity it was decided to name them as Company A, B and so on.

Theory

The DRAMA Methodology

A team at Aston Business School developed the DRAMA methodology during a 1985-89 study conducted at International Computers Limited (ICL) in the UK to analyse process design activity of its main assembly plant. During that time an integrated production system methodology was developed called “Design Routine for Adopting Modular Assembly” i.e. DRAMA (Bennett & Forrester, 1990). Subsequently a refined version called DRAMA II developed as an analytical tool for linking strategy with system design (Bennett & Forrester, 1990). It is a set of quantitative guiding principles that helps users in analyzing their competitive position and ultimately in designing a production system “the analytical components of the conceptual DRAMA model are generic in nature” p.93 (Bennett & Forrester, 1993). There are ten components of the DRAMA: (i) Market and Environment, which covers analysis of the socio-government aspects, analysis of customers i.e. their demographics, drivers, and trends etc., analysis of competitors, corporate policy and market strategy; (ii) Manufacturing Strategy; (iii) Organization, which covers structure and state, i.e. training and development, financial versus non-financial incentives; (iv) Justification, which covers strategic needs, new and modified production system, capital expenditure, new projects etc.; (v) Project Management, which covers team composition and structure, project management control i.e. centralized or de-centralized structure etc.; (vi) Physical System Design; (vii) Control and Integration, which covers production planning and control, information control; (viii) Work Design, which covers autonomous working etc (ix) Implementation; (x) Evaluation. The basis of the DRAMA methodology was case study analysis. Its contents help to bring together cross functional activities and their relationships in decision making. The selection of particular component in the methodology is based purely on individual needs, which results in both longitudinal and hierarchical analysis. Since the DRAMA methodology was developed as a system design approach, relevant models and methodologies are also included depending on the boundaries of decision making from top to bottom of the managerial hierarchy (i.e. on strategic, tactical and operational levels). Therefore the DRAMA methodology supports both open and closed systems approaches. This characteristic also supports market-driven approach in formulating operational strategies.

The Operations Strategy Matrix

Slack & Lewis (2008) proposed the operations strategy matrix for integrating performance objectives with decision areas. They formed two sides of market requirements and operations resources in order to build the matrix dimensions. Since there is a junction in the matrix between a company’s performance objectives and its decision areas, it is a good tool in illustrating operations strategy. By selecting the

relative performance objectives as a priority function, the matrix helps to focus on each decision area within existing capabilities. The performance objectives, which are mentioned in the matrix, are: quality, speed, dependability, flexibility, and cost. The decision areas supporting these objectives are: capacity, supply network, process technology, and development & organization. For instance, the matrix explains how cost, in terms of minimizing operating capital and work, intersects with strategic capacity decisions, thus minimizing unit cost, providing evaluation of trends for supply adjustments, improving effectiveness of the operations process, and enabling efficient utilization of resources. Similarly it also explains how quality of product and services influences supply network in terms of managing risks in global outsourcing regarding complexity and so on.

Empirical Findings

The Company Descriptions

There were eight companies in the study. Due to the limitations of disclosing the names, the companies are described anonymously.

Company A is situated in Gothenburg and is one of the world's leading bearing manufacturers. The company was founded in 1907. Initially production took place at the owner's own workshop but soon a separate factory was built in Gothenburg. In 1980 it was reported that the company was the world's largest producer of ball and roller bearings. There were 55,000 employees in 1980 and 41,000 employees now. After 1980 there were a number of acquisitions and joint ventures. Currently the company has five product platforms, three major divisions, and 40 customer segments. 2 - 3% of the budget is allocated every year to R&D. The company has 218 applications of patents which reflect R&D progress over the passage of time. Currently there are four factory divisions within the overall premises. 30% of the factory personnel are engineers. The average level of education in the factory is about the same as in the offices. There have been many environmental improvements in 30 years. During the past 8 years, sustainability became one of the key focus areas of the company's strategies.

Company B is situated at Tranås. Table tennis equipment was the first product group that highlighted the company in 1938. In the 1950s the company started producing lawn mowers and this was the beginning of its venture into garden machines. The company's ownership has moved from industrial groups to financial investors, which has had some positive effects from the factory perspective because the owners were willing to provide money for improvements and increase the asset value of the company, which adds ultimately potential value for the future. There were 680 employees in 1980 and there are 300 now. The sales turnover was 212 MSEK in 1980 and 1.2 billion SEK now. The cost of living in Tranås is quite low but the company still has difficulty in attracting employees with the right competencies. The main development in production has been the installation of a new line for making domestic lawn mowers in high volumes. The main external competition in lawnmowers for the company comes from Husqvarna, which is located fairly close by in Southern Sweden. Regarding environmental actions, most of these are responding to legislation and consumer demands. The company is in the forefront in this perspective and the development is following the car industry.

Company C is situated at Mullsjö and started in 1946. At the beginning of the 1950s it obtained its first direct order from the automotive industry and since then the number of employees increased gradually. There were 160 employees in 1980 and 387 employees now. The sales turnover was 6 MSEK in 1980 and 622.8 MSEK now. In the early 1990s there was a general business recession that forced the company to have a considerable staff rundown. In 1980, 80% of the company's production went to the

Swedish companies Saab and Scania, but now most of the world's major automotive manufacturers are customers while Saab only buys a very small percentage of the total output. The company's competitive advantages include market leadership in attractive and complementary market segment, strong growth opportunities, global presence-local execution, diversified product and customer portfolio, high degree of customer orientation, high level of quality and commitment to continuous improvements. The company now has 50 locations worldwide and it is part of a larger group. The main focus for the company is currently the Asian region and China especially. It was highlighted that the delivery performance was not so important in the 80s, but due to competition in the market the company is stricter about delivering the right quantity on right time. There are a number of environmental initiatives, but mainly these are in response to legislation.

Company D is situated at Mjölby and makes materials handling equipment. The company is part of world-leading automotive group having 13 different corporations. Between 1980 and 2000 the Swedish company made a number of acquisitions. There were 3,156 employees in 1980 and 1,250 employees now. There are 130 people in product development and added value is 30%. The sales turnover was 894 MSEK in 1980 and 15 billion SEK now. All products are built to customer order. However, suppliers vary in JIT philosophy; the products having longer lead-times are delivered based on forecasting. In 1989 there were 1,350 employees and productivity was 9,000 trucks, however in 1990 there were 760 employees and productivity increase to 12,000 trucks. In recession the demand for smaller hand trucks reduces more quickly than for powered trucks. The factory at Mjölby has been reorganized consistent with the "Toyota Way", Kaizen, Challenge, Teamwork, and Respect. The main focused areas include Safety, Quality, New product, and TPS. It was highlighted that the product quality should last and quality focused production also supports improved productivity. TPS training is undertaken in Japan. The company has implemented the overarching principles of the Toyota (lean) production system. Some products are seasonal, especially at Christmas time because customers want new products in the second quarter of the year. The main challenge is to match the work speed in Japan.

Company E is situated at Motala. There were 82,000 employees (worldwide) in 1980 and 51,000 employees (worldwide) now. In 1991 the low energy refrigerator was launched. Till 1998 the core business was comprised of household appliances, professional appliances and outdoor products. In 2001 the plant was part of the "Dometic" division and focused on production of cookers since refrigerator production was moved to another plant in Sweden. In January 2010 it was formally announced that the company would close its facility at the site and production of cookers would move to Poland. The efficiency and condition of the plant at Motala made it an attractive acquisition for another company and therefore it was sold to a Swedish company that makes solar panels and tanks for heating systems. The new owner assumed ownership of the plant on 1st November 2010. Some employees are taken over by the new company, which will make totally different products. For the first period of about half a year, the new company will however help Company E in phasing out the production of cookers. The company's manufacturing system was introduced around 5 years ago (i.e. a lean production concept based on the Toyota Production System). The manufacturing system took the company from a white-collar driven environment to being blue-collar driven.

Company F, situated in Orrefors, is the oldest existing manufacturer of glass products in Sweden. There were 350 employees in 1980 and 80 employees now. For much of the 20th Century the company was renowned for its technical innovations and

decorative aesthetics, producing both everyday household and artistic pieces. A number of tourist attractions have also been developed, including outlet stores for the glassworks, independent outlets and a hotel with glass as a theme. At one time there was a big supporting infrastructure for the Swedish glass industry, so anything the firms could not do for themselves they could outsource locally. The company's three glassworks have been reorganized so they share costs where possible and each specialises in particular products and process. There is a production technology and logistics department at the site that serves the other two glassworks. There have been a number of environmental initiatives in recent years. In contrast with traditional glassmaking the materials used now are mainly organic and less hazardous.

Company G is situated at Braås and is part of a much larger group that had 44,500 employees in 1980 and 90,210 employees now. Its core values are quality, safety and environment. The company is responsible for the construction equipment business area within the group, which ranks no. 3 in the world after Caterpillar and Komatsu. The company has made a number of acquisitions in order to increase in size and to achieve the scale necessary to compete with the big players in the construction equipment industry. Two and a half years ago the Braås plant adopted the new production system. Unlike the Toyota Way, their production system has five principles such as: teamwork, process stability, built-in quality, JIT, continuous improvement and customer.

Company H is a Swedish car manufacturer situated at Trollhättan. There were 11,000 employees in 1980 and 3,400 employees now. The main difference concerning the company since 1980 relates to changes in ownership. In March 1990 General Motors bought a 50% share from the previous owner and it was turned into an independent company. Then in 1999 GM acquired the other 50% and incorporated it into their global operations. During 2009 GM started looking for a buyer and in January 2010 eventually came to an agreement with a Dutch company that allowed it to acquire the Swedish car manufacturer subject to regulatory and government approval. The sale was completed in February 2010.

Analysis of Company Changes and Developments

Table 1 provides a summary of the results and shows common issues and company development over time. All the companies now have several business units or divisions in their business area. The organizational structures are functional and all business functions such as manufacturing, administration, product development, sales and marketing are located on the same site, which enables cross functional collaboration in development and production at single premises. Market shares of the companies have also increased over the passage of time and they all sell into overseas markets. Besides cross-functional involvement in development projects, supplier and customer involvement are also principal areas of concern in decision making. A number of acquisitions and mergers have been established during this 30 year period, which is naturally due to expansions in business activities or changes in ownerships as well as being due to the pressure which comes from local and foreign competitors. All companies are ISO 14000 & ISO 9001 certified. The product life cycle of existing main products are 10 to 15 years.

Table 1 – Common issues and development over time

S.No	Common Issues	Case A		Case B		Case C		Case D		Case E		Case F		Case G		Case H	
		1980	2010	1980	2010	1980	2010	1980	2010	1980	##	1980	##	1980	2010	1980	2010
1	Business unit (division / business area)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
2	Business unit functions (manufacturing, administration, product development, sales & marketing)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
3	Overseas market access	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
4	Customer base growing	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
5	Value driver is quality rather cost			x				x				x		x		x	
6	No seasonal factor	x	x			x	x	x	x	x	x	x	x	x	x	x	x
7	Trends changed overtime				x			x				x		x		x	
8	Competing in related product / market with other companies	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
9	Mergers & acquisitions			x							x				x		
10	In house machine & tools manufacturing			x	x	x							x		x		
11	Standardized products	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
12	Competitive pressure from local and foreign companies	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
13	Part of local society (mainly in small towns)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
14	Commitment to innovation & entrepreneurship and hence continued survival	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
15	Act of Faith			x				x					x		x		
16	Loyalty of employees (lower labor turnover rates)		x					x						x			x
17	Plant working at full capacity			x				x					x		x		
18	Plant location (labour with appropriate skills)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
19	Common distribution centres																
20	Outsourcing (locally & globally)		x		x			x			x		x		x		x
21	Use of technology such as EDI							x									x
22	Vertically integrated supply network		x		x			x				x		x		x	
23	Lean		x		x			x				x		x		x	
24	Six-Sigma		x														
25	5S				x			x				x		x		x	
26	PDCA		x		x			x				x		x		x	
27	SMED							x								x	
28	Measuring labour productivity								x			x				x	
29	Measuring production effectiveness								x			x				x	
30	Customer enquiry report							x									
31	Automation	x	x		x			x		x	x			x		x	
32	Improvement programmes			x	x			x						x		x	
33	Product safe & ecologically sound in life cycle				x				x							x	
34	Products designed durable, repairable compostable or easily biodegradable		x		x			x								x	
35	Production & packaging with harmless material & energy												x		x		
36	Eliminating hazardous chemical substances or physical agents in product design & operations		x					x								x	
37	Ergonomically & non hazards work places		x		x			x				x				x	
38	Enhancing workers efficiency & creativity		x		x			x								x	
39	Workers' security and wellbeing as priority concern		x		x			x								x	
40	Continuously developing workers' abilities & competences		x		x			x								x	
41	Cut energy consumption		x		x			x					x		x		
42	Health & safety consideration		x		x			x								x	
43	Focus on development of products & solutions		x		x			x								x	
44	CO2 emission reduction		x														x
45	Solvent use reduction		x														
46	Functional organization	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
47	Incentive schemes				x				x					x		x	
48	Openly accepted workers participation in decision making		x		x			x						x		x	
49	Continuous evolution & improvement performance of the firm		x		x			x						x		x	

Compared with 1980 the companies are now more concerned with sustainability issues, especially Company A, which during the past 8 years has started a number of programmes related to sustainable production and drive continuous performance improvement. These have covered business processes, environment, employee involvement, and community care issues. It is recognized as the best company in Sweden for environment and human rights by Folksam, the major Swedish insurance company. Company A also launched a crisis management programme in response to the financial crisis. As highlighted in Table 1, it now ensures the development of ecological, durable and repairable products. The company is more concerned with using harmless chemicals in both production and packaging; for instance biodegradable plastic boxes are now used for shipping finished products. Also, efforts have been made to cut down energy consumption on yearly basis. Its concerns are not only with environmental issues but with social and economic issues as well, including initiatives that have helped enhance workers' efficiency and creativity, developed ergonomically and nonhazardous workplaces, and promoted diversity at the work place resulting in hiring employees from different backgrounds. Some of the companies considered incentives schemes as a means of compensation, while workers are encouraged to participate in decision making processes. In all 8 cases the location of the plants were still in the same place as 30 years ago, i.e. mainly in small towns, which demonstrates that the companies are still important parts of the local society and was the incentive for Company E to sell the plant to another Swedish firm. Similarly it is worth noting the

lower labour turnover rates that shows the loyalty of the employees to the organization even during hard times. Availability of skilled workers was never an issue for the companies; they found people with appropriate skills relatively easily. During the last decade sustainability has become one of the key focus areas for all the companies. The “lean philosophy” has taken the place of the “Swedish way of work organization” i.e. abandonment of autonomous work groups that were a feature in the 1980s. So, the companies have changed from “Swedish way” of production to the “Japanese way” prompting a number of improvement programmes to be launched since 1980. The “road to lean” is being followed leading to continuous improvements rather than radical changes. As a part of continuous improvement programmes, manufacturing and testing capabilities have been increased. The tools within the Toyota Production System (TPS) have also been exercised which resulted in increased labour productivity and production effectiveness. Automation levels of the companies have been increased during this time. The driver for lower cost has increased the level of automation and reduced the craftsmanship element. Over the passage of time process technology helped in improving the specification of the product, which resulted in increased customer value. However, core processes remained the same as 30 years ago. The basic or core products are also the same, but some changes in their capacity and specifications have been made in order to meet today’s market demand. Delivery performance was not so important in the 1980s but due to competition in the market it is stricter now to deliver the right quantity, on time, to the right location, and at the right quality. There are several challenges for the companies today. For instance it is noticed that there is a need for cost reduction in a high skilled and high variety production environment, which in the case of automotive production drives a shift towards Asia resulting in strong challenges for Swedish industry from international competitors. There is therefore a need to regain economies of scale and reductions in cost.

The next section considers how five performance objectives i.e. cost, flexibility, quality, dependability, and speed, affected the decision areas of the companies. It is also analyzed how these companies have sustained themselves during the past 30 years. What were their major strategies which drove them to the road to success? It is also discussed how a market-focused production system can lead to competitiveness and especially why the companies moved towards the Japanese way of work and what could be future challenges for the companies relating to their existing strategies.

Analysis and Discussion

The companies are all struggling to be competitive and sustainable these days. There are several factors leading to sustainable production systems. This longitudinal study of eight Swedish companies provides us with a holistic view regarding their efforts to be economically, environmentally and socially sustainable in the competitive world. Each company has its own performance objective as a priority which interacts with the decision area. For instance, quality is a main performance objective for all companies. But considering the cost factor and with international competitors one must consider cost as important as quality. Especially in the automotive sector the supply network plays a vital role (in this multi-case study there were four automotive manufacturing companies or automotive parts manufacturers). By considering cost and dependability as their performance objectives they can still compete in the marketplace with companies in China and South-East Asia. Cost was a major issue that made company E move from Sweden which also strengthens this argument. However, company F, which is the oldest glass manufacturer in Sweden, prosper on their brand name and their

designers are famous worldwide. In this case, quality and flexibility as competitive priorities play a major role while making decisions regarding process choices. It was noticed that the reduction in product cost drove decisions to implement automated machinery. This leads them to be competitive in the market. There were several reasons for sustainability of these eight companies during the last 30 years such as:

- (i) At national level, the Swedish economy was quite stable except the recession which occurred recently; by focusing on their core products which ultimately enabled concentration on their core competence;
- (ii) The companies are consistent to keep their skilled employees especially in case of the company F; accessing global market; acquisitions & mergers also let the companies themselves to sustain their brand names since the new owners kept the core products & processes;
- (iii) They focused on lean philosophy & used the same tools that are available in the Toyota Production System. This was a major shift in the strategies because it drove them to continuous improvement, making long term decisions, developing the employees etc. At factory level, it was focused on waste management, team work, changed production system to pull flow in order to avoid overproduction, used visual control and techniques in order to solve the problem at first stage i.e. followed 5s program and so on.

The work on which this paper is based has been carried out partly within the Sustainable Production Initiative and the Production Area of Advance at Chalmers University. This support is gratefully acknowledged.

References

- Bennett, D. and Forrester, P. (1990), "The DRAMA Methodology for Analyzing Strategy and its Links with Production System Design", in Voss C (Ed) *Manufacturing Strategy – Theory and Practice*, Proceedings of the UK Operations Management Association Annual Conference, University of Warwick, June.
- Bennett, D. and Forrester, P. (1993), *Market-Focused Production Systems*, Hemel Hempstead, UK: Prentice Hall International.
- Bennett, D. and Vaidya, K. (2005), "Meeting Technology Needs of Enterprises for National Competitiveness", *International Journal of Technology Management*, Vol 32, Nos 1&2. pp 112-153.
- Dierickx, I. and Cool, K. (1989), "Asset Stock Accumulation and Sustainability of Competitive Advantage", *Management Science*, Vol. 35, pp. 1504-1511.
- Ferdows, K. and De Meyer, A. (1990), "Lasting Improvements in Manufacturing Performance: In Search of a New Theory", *Journal of Operations Management*, Vol. 9, pp. 168-184.
- Leseure, M., Bennett, D. and Hurreeram, D. (2009), "Playing Catch-up with China: Challenges and Strategies for Smaller Developing Countries", *Technology Analysis and Strategic Management*, Vol 21, No 5. pp 617-637.
- Löfving, M., Johansson, C. and Winroth, M. (2008), "Manufacturing Characteristics of Subcontractor SMMEs - an Empirical Study", in *Manufacturing Systems and Technologies for the New Frontier*, Part 2, Springer Verlag, pp. 51-56.
- Makhija, M. (2003), "Comparing the Resource-Based and Market-Based Views of the Firm: Empirical Evidence from Czech Privatization", *Strategic Management Journal*, Vol. 24, No. 5.
- Slack, N. and Lewis, M. (2008), *Operations Strategy* (3rd Ed.). Harlow, UK: Prentice Hall.
- Yin, R.K. (2003), *Case study research: Design and methods* (3rd Ed.). Thousand Oaks, CA: Sage.