DEVELOPING EXCELLENCE IN MEDICAL TECHNOLOGIES

Survey and Case Study Report for Medicon Valley Dk/S

A report prepared for
Advantage West Midlands

Institute for Employment Research
Warwick Manufacturing Group
Economix Research and Consulting
Ramboll Management

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CONTENTS

1. Introduction

Business registers with relevant sector and contact information have been provided from “Dun & Bradstreet”, Sweden and “Koebmandsstandens Oplysningsbureau”, Denmark for the Medical Technology Skills Study survey. A gross sample of all entries in the applied databases covering the geographic regions of Zeeland in Denmark and Skaane in Sweden consisted of 626 Danish and 281 Swedish establishments. As none of the statistical codes contain only medical device manufacturers, the lists of establishments, however, included irrelevant enterprises that had to be excluded from the sample. About half of the sample was deemed relevant on the basis of a detailed desk survey. Among the remaining 515 establishments in the net sample 279 did not want to participate and 133 were not possible to contact within the interview period, since some have apparently moved or closed down. The remaining 103 establishments that have answered the questionnaire consist of 74 Danish and 29 Swedish establishments. The net response rate is 22% in Denmark and 16% in Sweden.

Table 1

	Zeeland, Denmark	**Skaane, Sweden**
Total sample	626	281
Relevant part	333	182
Did not want to respond	178	101
No contact possible	81	52
Responded	74	29
Response rate	22%	16%

In this study the participating establishments have been divided into small, medium sized and large establishments based on the number of employees. There are 58 small establishments with 9 employees or less, 27 medium sized establishments (10-99 employees), and 17 large establishments with 100 employees or more. One establishment did not answer the question on employment.

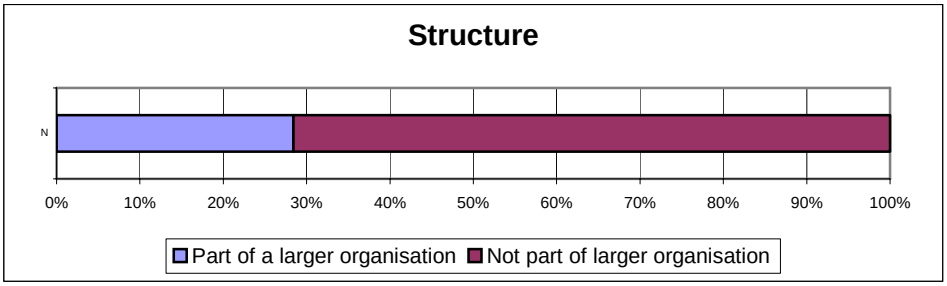
2. *Characteristics of organisations*

This chapter deals with the characteristics of organisations by addressing the ownership of the companies, their product ranges, sales values and market trends.

2.1 Ownership of Companies

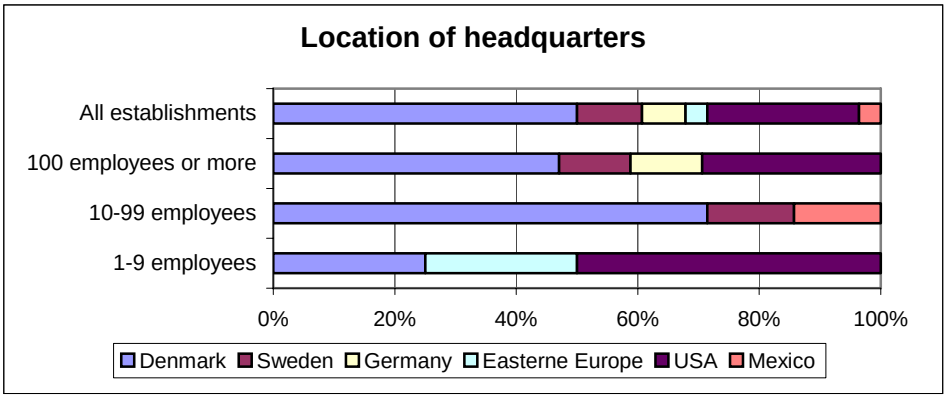
About 30% of the establishments are part of a larger organisation, which is shown in Figure 1.

Figure 1



Among the 30% that are part of a larger organization, more than half of both small and large establishment have headquarters located inside national borders, and among the establishments with headquarters outside national borders the US is the most frequent location of both small and large establishments.

Figure 2



It is seen from Figure 3 that more than 80% of the establishments have always been located in the region, and the remaining establishments have been relocated to the region from 1965 and onwards.

Figure 3

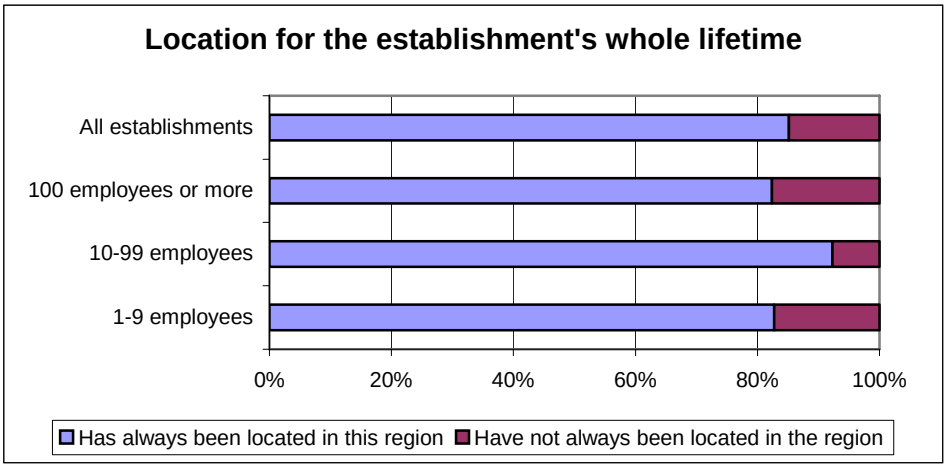
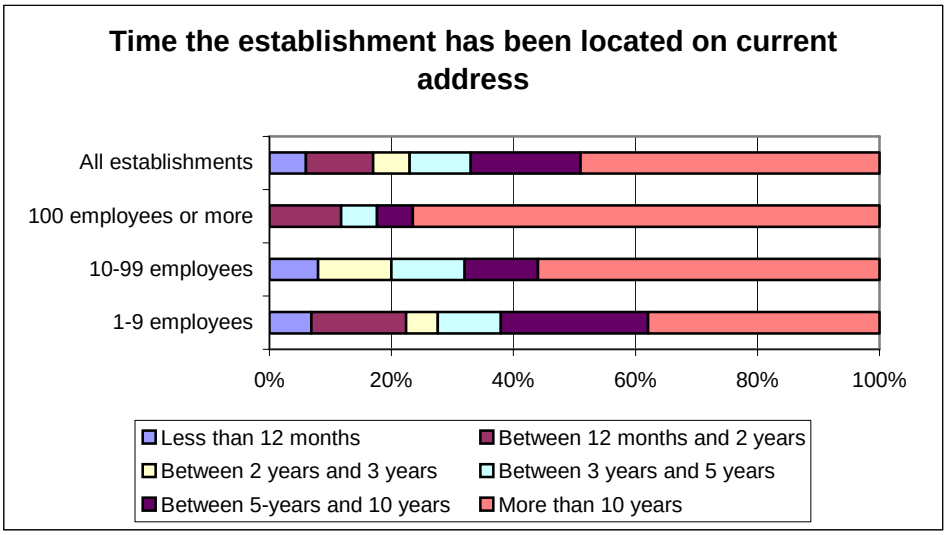


Figure 4 shows that about 65% of the establishments have been located at the current address for more than 5 years, and that about 15% has been located at the current address for less than two years. Furthermore, the larger the establishment the longer it has been located at the current address, which may be explained by a higher average lifetime.

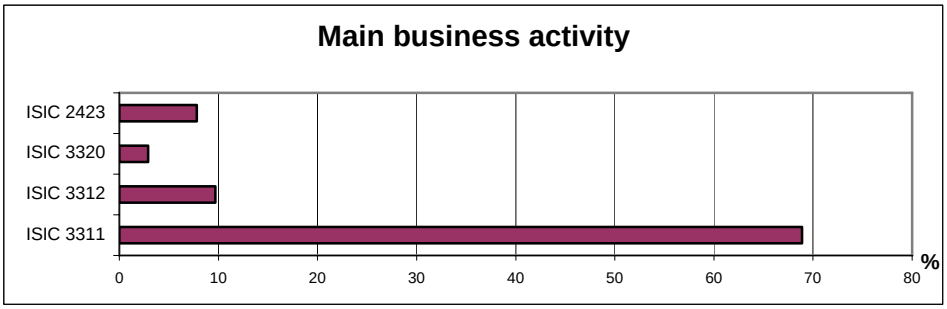
Figure 4



2.2 Product Range

Figure 5 shows that more than two thirds of the establishments operate mainly in the ISIC3311 industry (Manufacture of medical and surgical equipment and orthopaedic appliances), and that the remaining establishments are mainly in ISIC 2423 (surgical dressings), ISIC 3320 (corrective spectacle lenses) or ISIC 3312 (manufacture of thermometers).

Figure 5



As shown in Table 2, the participating establishments represent a very broad range of products and services.

Table 2

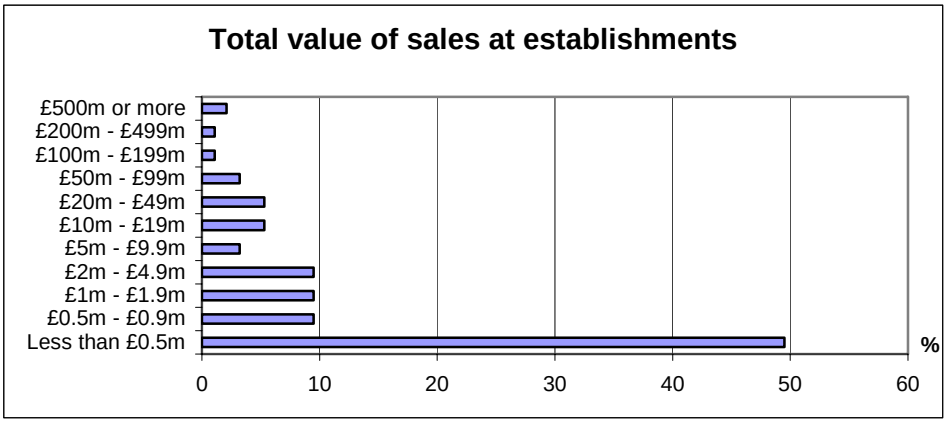
Medical products and services	Number of establishments	Distribution of Responses
Medical Devices	52	34,7%
Surgical Devices	6	4,0%
Orthotics	8	5,3%
Prosthetics	23	15,3%
Pharmaceuticals	8	5,3%
Hearing Aid	7	4,5%
Dentist Equipment	14	9,3%
Measuring Equipment and scanners	9	6,0%
Various Services	5	3,3%
Various equipment	6	4,0%
Other	12	8,0%
Total Responses (Cases = 102)	150	

Note: This question has been open for multiple answers per establishment

2.3 Value of Sales

Approximately half of the establishments have annual sales of less than £0,5 million, while about a fourth have sales of £5 million per year or above.

Figure 6

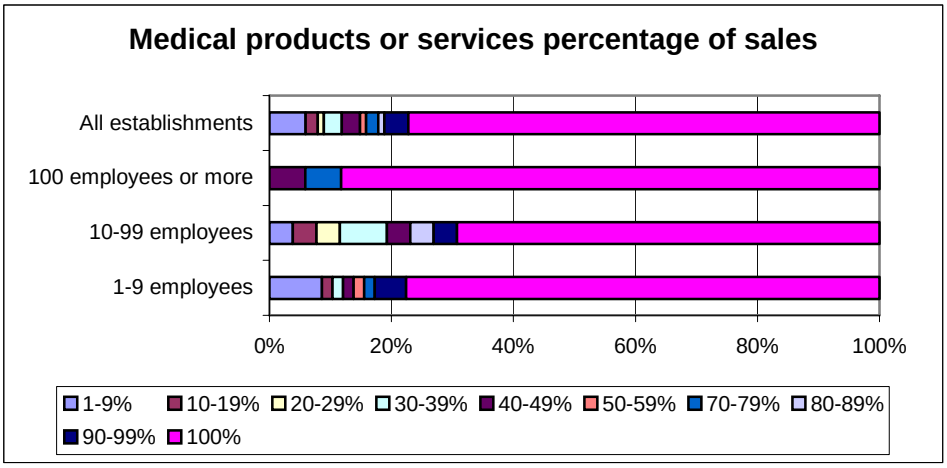


2.4 Share of Output related to Medical Technologies

Most of the participating establishment are specialising in medical products and services. More than two thirds of the establishments sell only medical products or services, and only about 15% sell less medical than other products and services.

The largest establishments (100 employees or more) are more specialised than small (1-9 employees) and medium sized establishments (10-99 employees), with about 90% of the large establishments selling only medical products and services, and with none having less than 40% of revenue from medical products.

Figure 7



2.5 Trends in market/output

Figure 8 shows the growth pattern since November 2002 for the participating establishments. In general, the establishments have experienced high growth rates, and about 35% of the establishments experienced growth of more than 10%. Moreover, a few small enterprises experienced a growth rate of 100% or more.

Figure 8

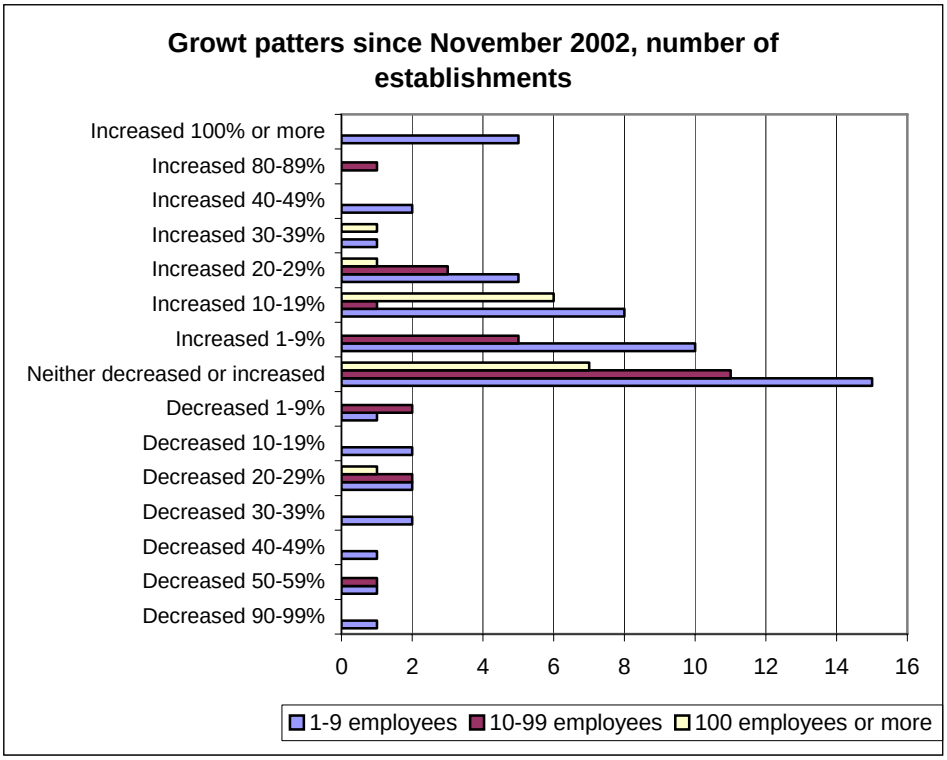
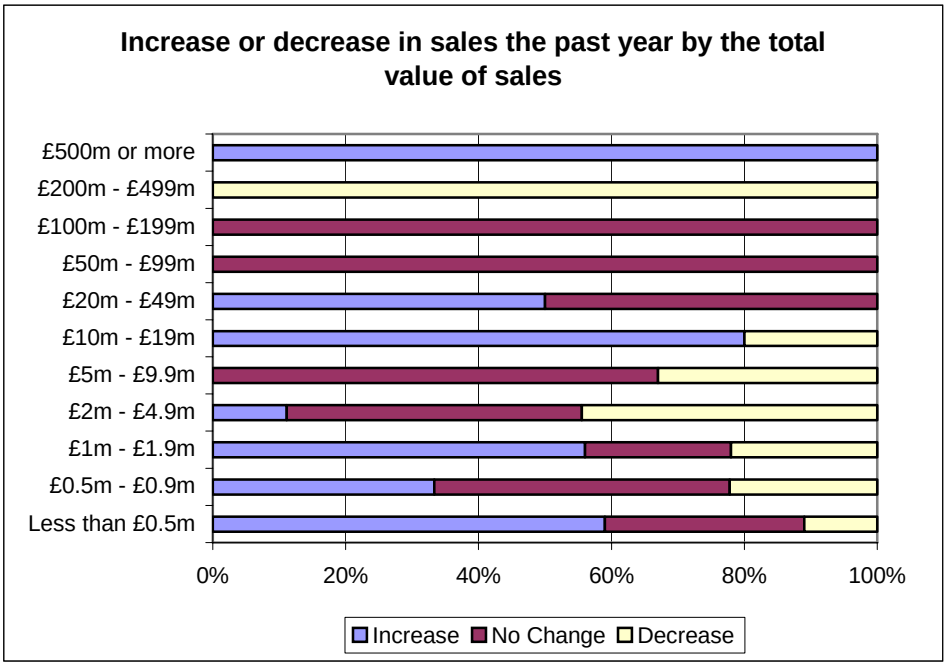


Table 3

	Less than £0.5m	£0.5m - £0.9m	£1m - £1.9m	£2m - £4.9m	£5m - £9.9m	£10m - £19m	£20m - £49m	£50m - £99m	£100m - £199m	£200m - £499m	£500m or more	Total
Increase	59	33	56	11	0	80	50	0	0	0	100	48
Decrease	11	22	22	44	33	20	0	0	0	100	0	17
No Change	30	44	22	44	67	0	50	100	100	0	0	35
	100	100	100	100	100	100	100	100	100	100	100	100

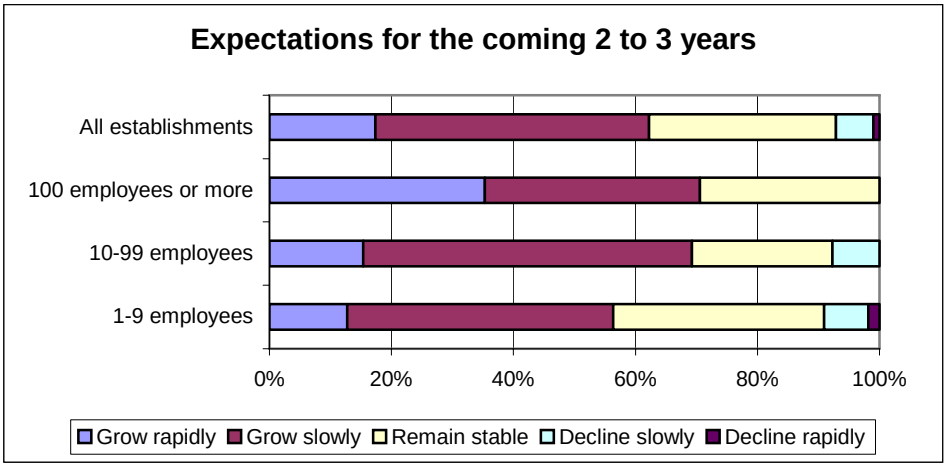
The dynamics of sales values are shown in Table 3 and Figure 9. Only a few enterprises have experienced decreasing sales during the past year are.

Figure 9



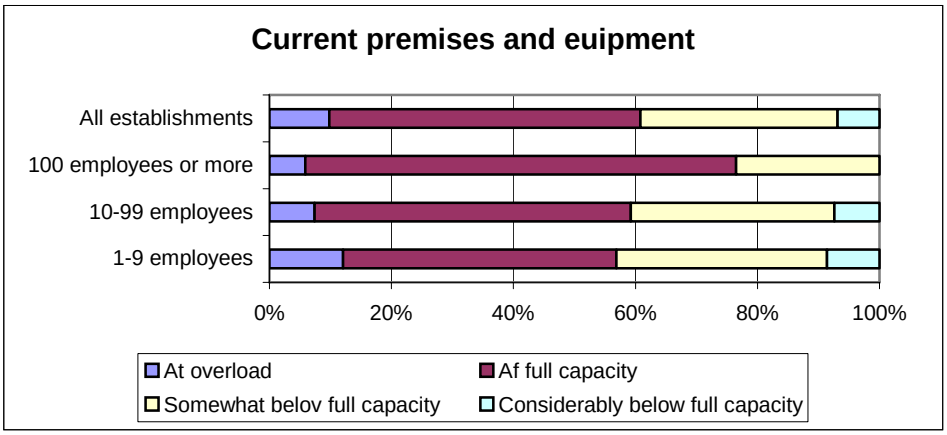
Almost two out of three of the responding establishments expect the medical product and service market to grow during the coming years, which is shown in Figure 10. Large establishment do not expect to decline, and only very few small establishments expect to decline rapidly. There are more large establishments than small and medium sized establishments expecting to grow rapidly.

Figure 10



More than 60% of the responding establishments are at full capacity or at overload (see Figure 11). Establishments working considerably below full capacity only consist of establishments with less than 100 employees. Furthermore, large establishments (with 100 employees or more) to a higher extent work at full capacity than medium and small sized establishments do. Combined with the above statements on expected growth patterns, it is evident that the sector will need to do large investments over the coming years.

Figure 11



To sum up the sample of enterprises having been interviewed in this part of the study contains about 70% that are not part of a larger organisation, and most of the remaining 30% that are part of a larger organisation have the headquarter placed inside national borders. Close to 90% are thus based in Denmark/Sweden. Most of the establishment are highly specialized in medical product and services. The sample establishments represent a broad range of sales values with about 50% having total sales values of less than £0,5 million and about 25% more than £5 million. A third of the establishments have experienced growth rates of more than 10% during the past 12 months, and almost two thirds expect to continue to grow during the coming years.

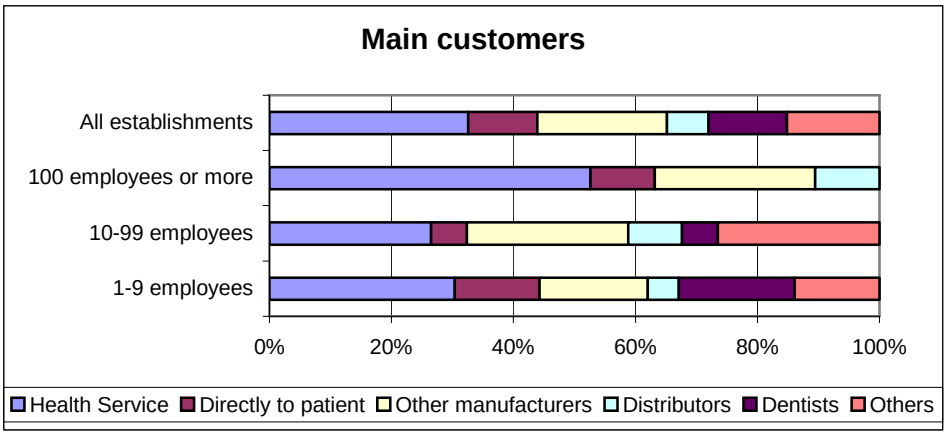
3. Product Market Position

In this chapter the product market position is addressed by focusing on the customer base, and the product market position and strategy.

3.1 Customer Base

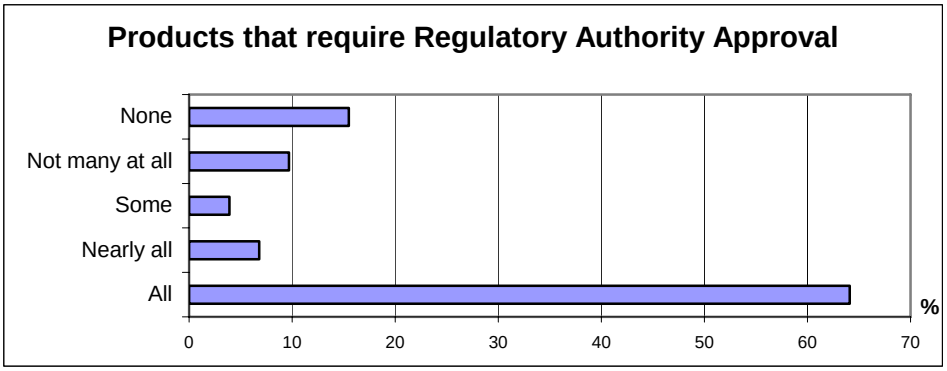
The participating establishments sell to a broad range of customers, which is shown in Figure 12. Large establishment sell more to health service than do medium and small establishments. Among the small and medium sized producers the customers are more diverse, and a large part sell to dentists and others, including eg. chemists and health food shops.

Figure 12



About 65% of the establishments need an approval from regulatory authority for all products, and only about 16% of the establishments need no approval at all from regulatory authorities.

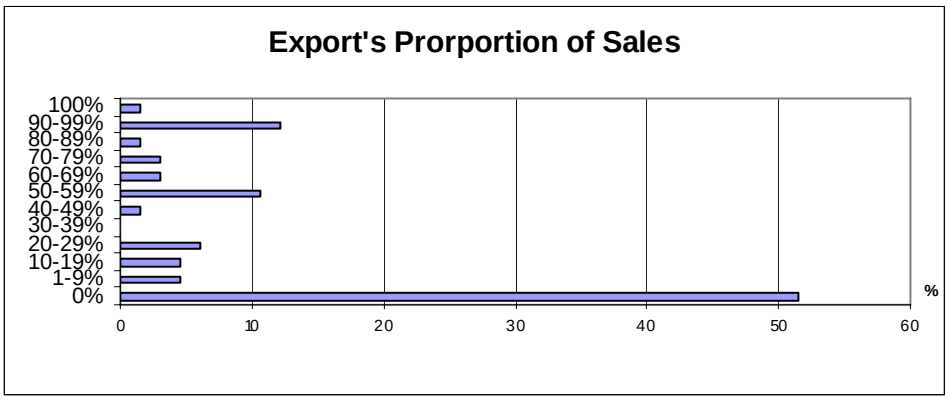
Figure 13



3.2 Location of Customer Base

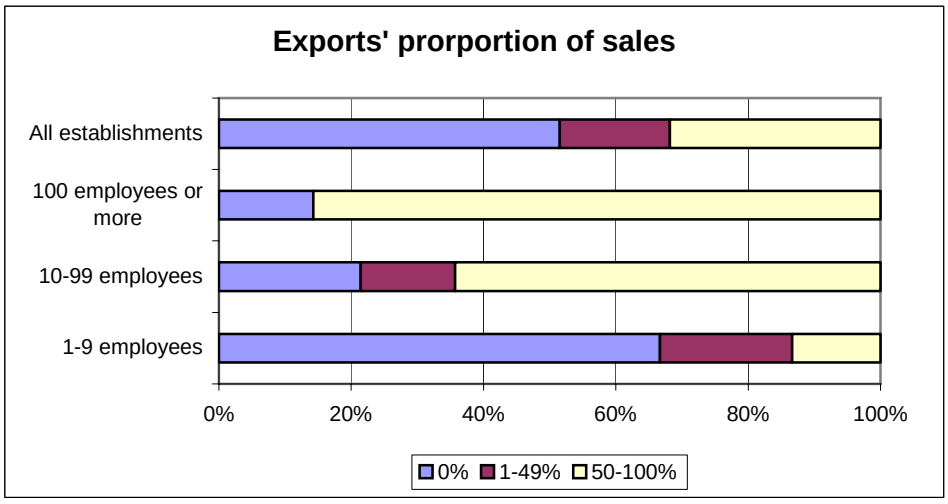
More than half of the sample of establishments does not export, but a large part of those who do have high export rates. About one third of the establishments export more than 50% of their sales, which is shown in Figure 11 below.

Figure 14



Half of the establishments carry out export activities. There is a very clear relationship between size of enterprise and export rates. The larger the establishment the larger are in general the export rates, which is seen from Figure 15. Furthermore, 90% of the large establishments (100 employees or more) export 50% or more of their production of medical products and services, and the remaining large establishments do not export. Two out of three medium establishments (10-99 employees) export 50% or more of total sales, and only about 20% of medium establishments do not export. On the other hand, about 70% of small establishments (9 employees or less) do not export, and only about 15% of small establishments export 50% or more.

Figure 15



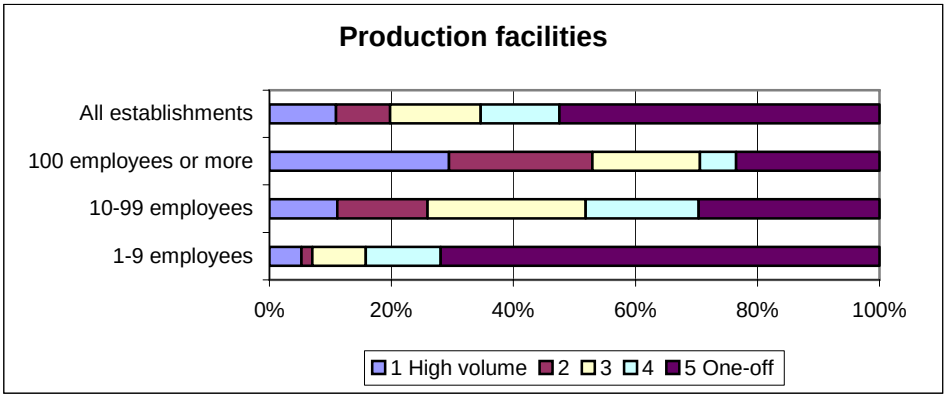
3.3 Product Market Position

The establishments have been asked to rank their establishment on a scale from 1 to 5 in relation to a number of statements. For instance in Figure 15, '1' means that the establishment produces at high volume, and "5" means that the establishment produces customer specific solutions (one-off).

It is seen that the larger establishments are in general, to a higher extent than smaller, high volume manufacturers. More than half of the participating establishments and more than 80% of the small establishments characterize themselves as mainly one-off producers.

The average answer to this question is 3,843.

Figure 16



The establishment in general produce complex products and services, with more than 40% of the participating establishments producing products or services that are highly complex. The larger the establishment the greater are the products' complexity. About 15% of both small and medium sized establishments produce simple products and services (answer 4 and 5).

The average answer to this complexity question is 2,066.

Figure 17

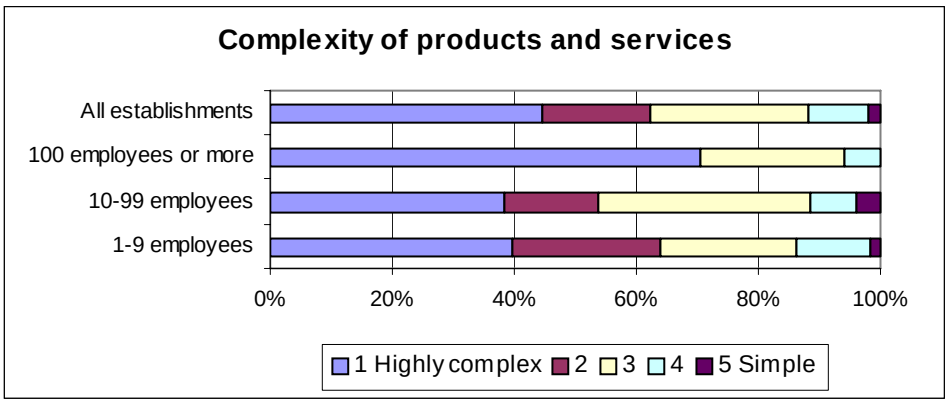
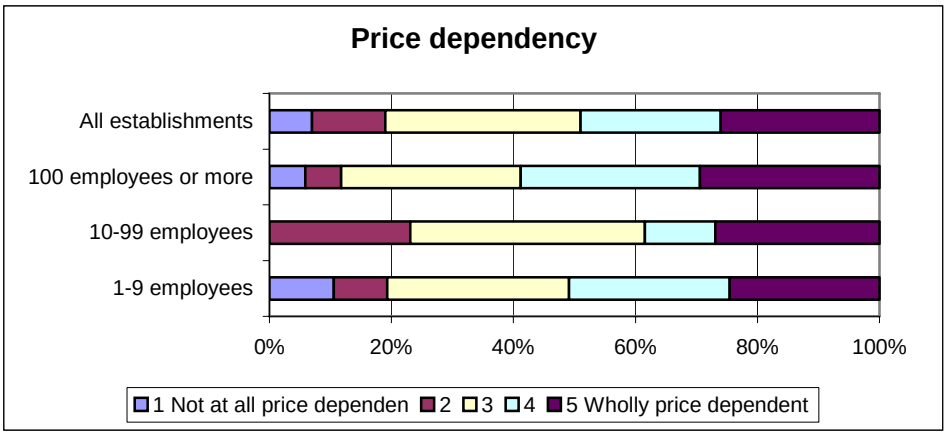


Figure 17 shows that price is an important competition parameter in the Danish and Swedish medical device industry. 18% of the establishments claim that their products are not price dependent (answer 1 and 2), and about half of the establishments characterize their products as price dependent (answer 4 and 5).
The average answer to this question is 3,437.

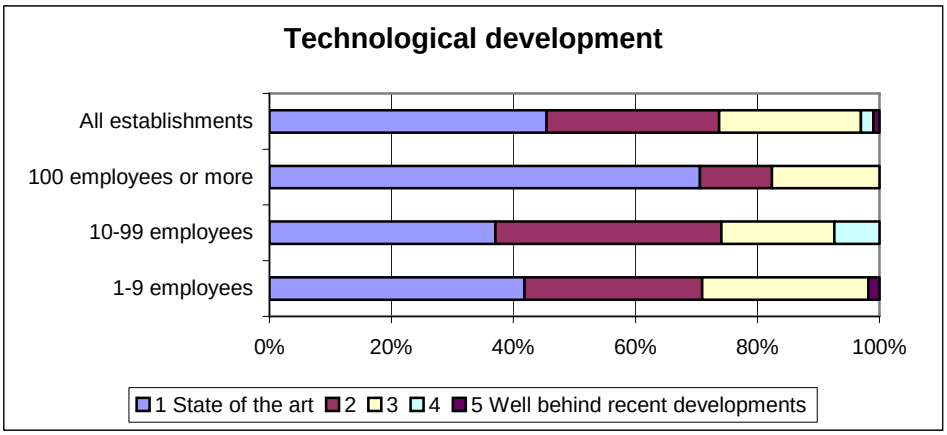
Figure 18



In general the establishments see themselves as producing state of the art products and services. About 50% of the establishments are at front with technological developments, and less than 5% think they are behind recent developments (answer 4 and 5), which is shown in Figure 19. The larger the establishment the more they are characterizing their technological development as state of the art.

The average answer is 1,821.

Figure 19



About 20 % of the establishments tell that their production is automated (answer 1 and 2). It is shown in Figure 19 that the larger the establishment is, the more automated the production becomes. About 50% of the large establishments have automated production (answer 1 and 2), whereas the percentage falls to about 10% for small establishments, and about two out of three small establishment are not automated at all. The average answer to this question is 3,341.

Figure 20

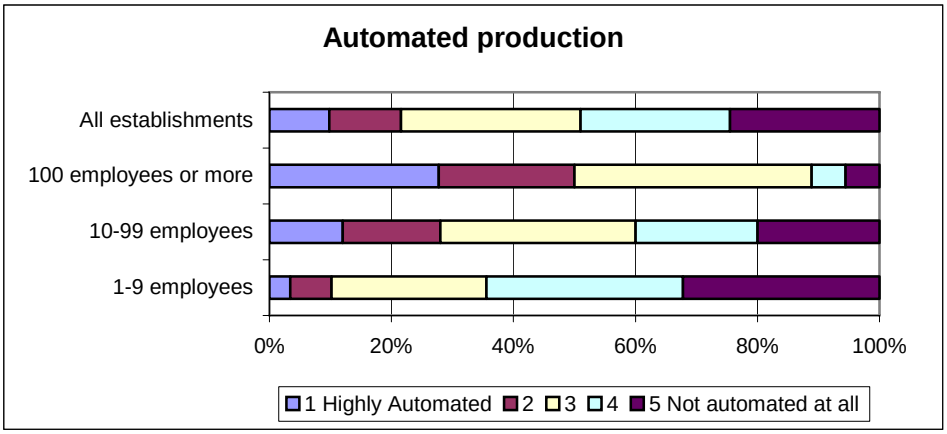
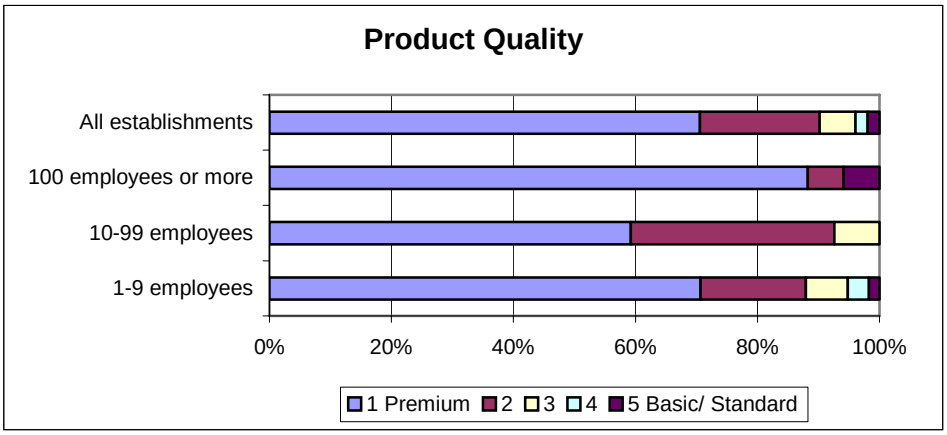


Figure 21 shows that about 70% of the establishments tell that they sell their products at a market focusing on premium quality, and only about 10% of the establishments are characterizing their markets as a standard quality market. (answer 4 and 5).

The average score is 1,442 to this question.

Figure 21



3.4 Changing Product Market Strategy

About 50% of the establishments tell that within their industry there have not been made changes to the products and services offered or the way that they are delivered for the past years, and this is in particular the case for the larger establishments. 90% of the large establishments are part of an industry that has not made any major changes within the last years, which is shown in Figure 21.

Figure 22

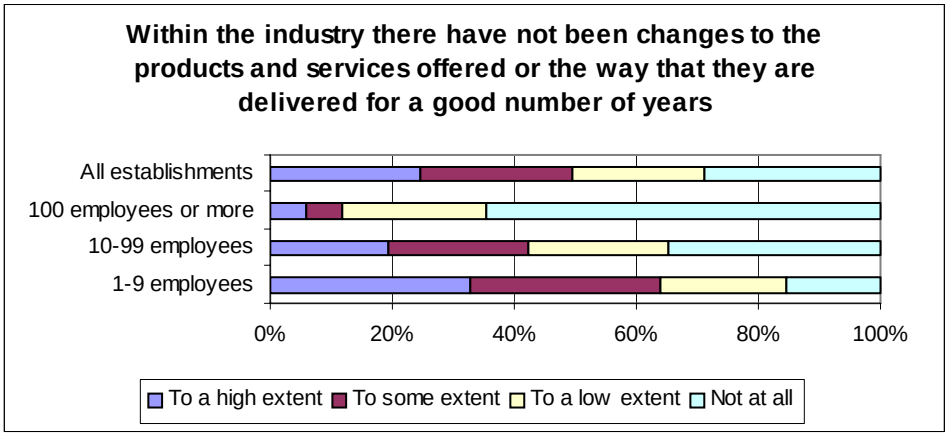
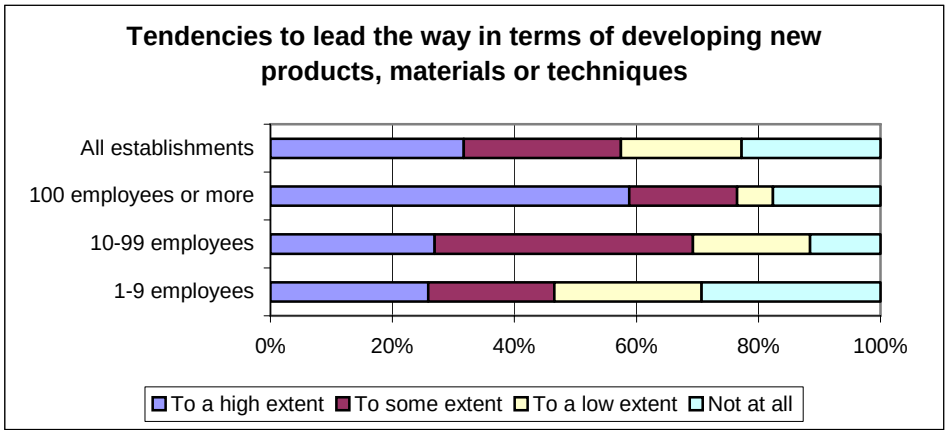


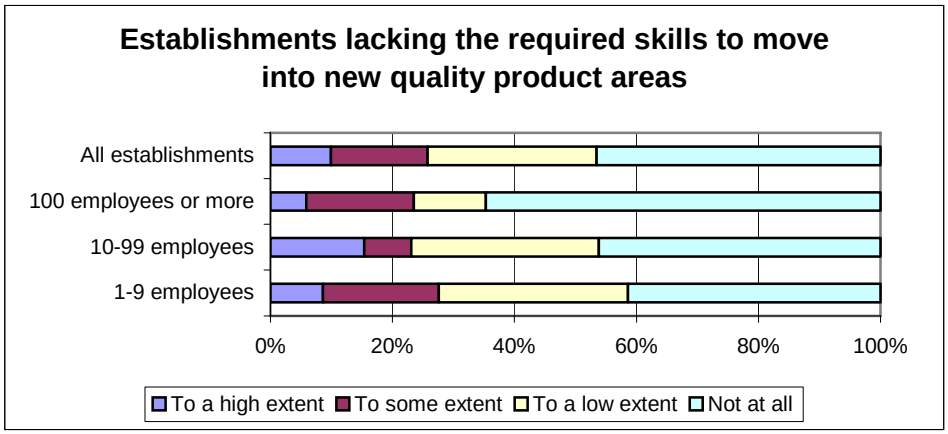
Figure 23 shows that larger establishments are more likely than smaller to consider themselves as taking lead in technological developments.

Figure 23



Roughly 25% of the establishments, both large and small, tell that they lack the skills of the workforce to move into new, high quality product and service areas.

Figure 24



About 60% of the participating establishments face competition from low cost countries, and more than half of these to a high extent. The picture is the same for small and larger establishments.

Figure 25

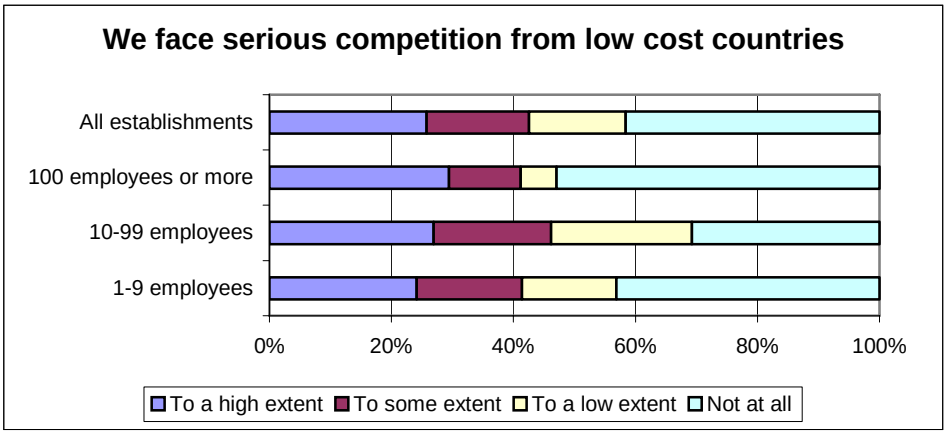
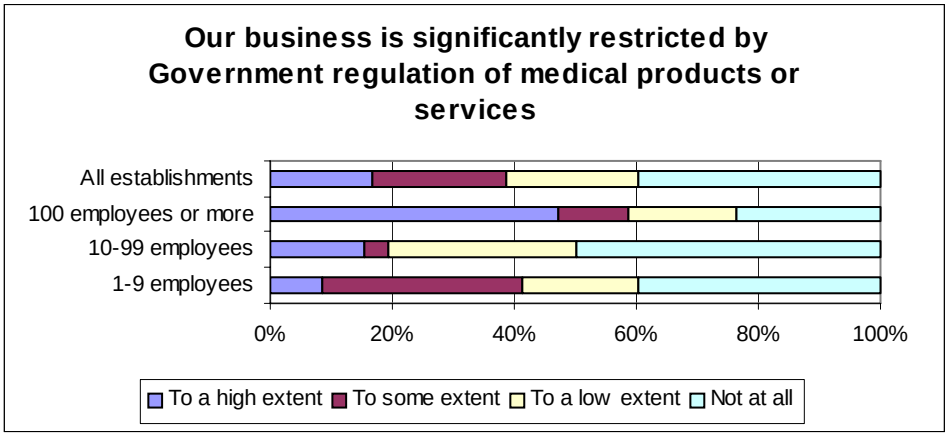


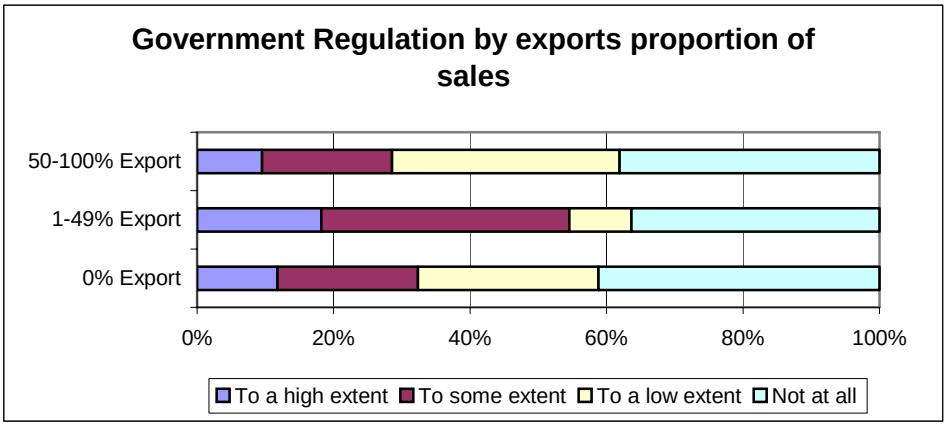
Figure 26 shows that about 60% of establishment tell that they are restricted by government regulation of medical products or services, and about half of the large establishments see themselves as restricted by Government regulations to a high extent.

Figure 26



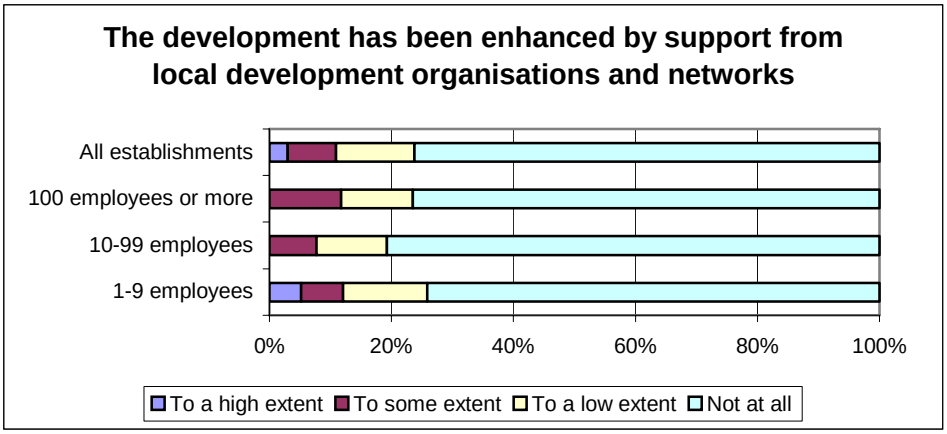
The extent to which the establishments feel themselves restricted by government regulation is also about the same for companies with high and low export rates.

Figure 27



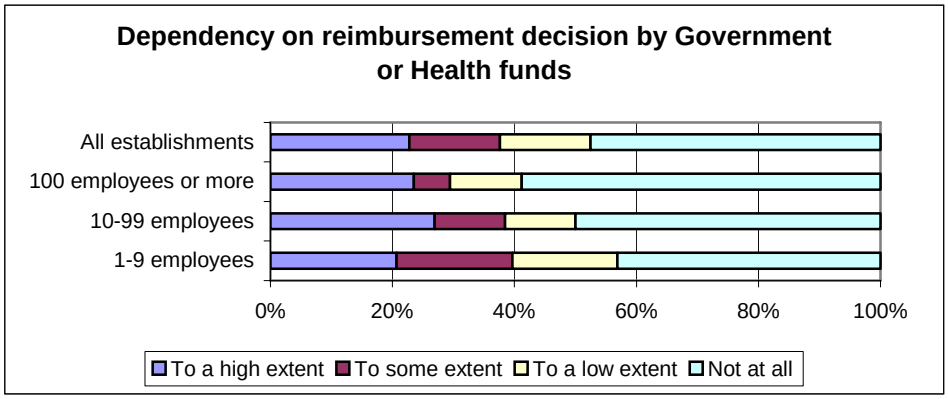
Almost 80% of the participating establishments claim not to have been supported by local development organisations and networks, and only a very few small establishments have experienced support that has enhanced development to a high extent.

Figure 28



About half of the establishments tell that they are not dependent on reimbursement decisions by Government or Health funds, but more than 20% of the establishments tell that they are dependent on the reimbursement decisions to a high extent.

Figure 29



In general, independent of size, the responding establishments are generally characterized by having experienced and expecting high growth rates. About 25% of all establishments lack the needed skills to develop into quality product areas, and 40% in general are competing with low cost countries to a high or to some extent. Almost no establishment feel that they have received support from local development agencies that has enhanced their development.

The larger establishments are in general characterized by being high volume producers, producing more complex products, being technologically more advanced and being more automated than the smaller ones. The smaller establishments do more often make changes to their products and services than the larger do.

There is a great variety among the establishments regarding types of products, customers and markets and also regarding price dependency and the extent to which they are restricted by Government regulations.

4. Employment Characteristics

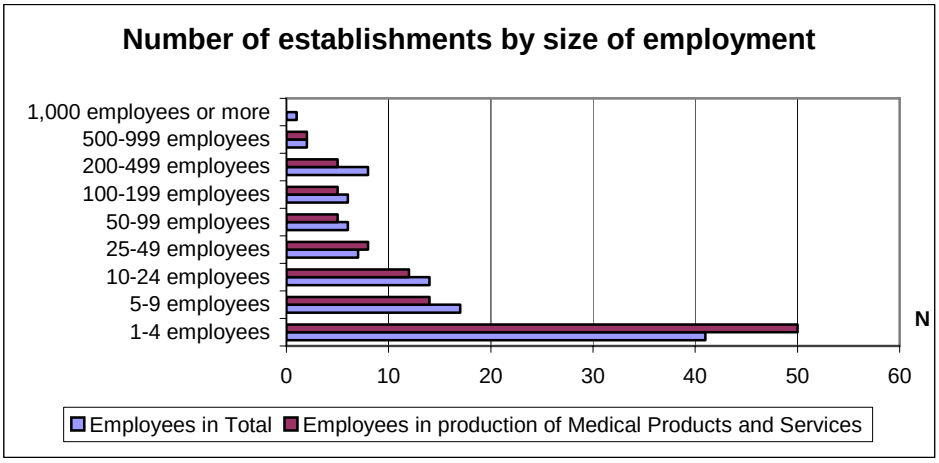
This chapter deals with the employment characteristics by addressing the total employment, trends in employment, occupational structure of employment and employment in R&D.

4.1 Total Employment

The participating establishments represent a broad range of sizes, with 58 establishments employing 9 employees or less (small establishments), 27 establishments with 10-99 employees (medium establishments) and 17 establishments employing more than 100 people (large establishments), which is shown in Figure 30. In small and medium-sized establishments most of the employees are directly related to the production of medical products and services, whereas in the larger sized establishments more people are employed in other areas.

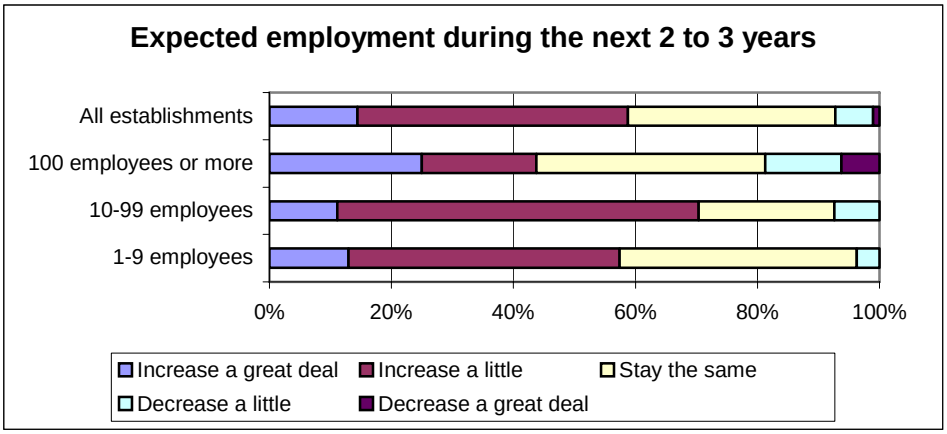
Based on exact numbers from 74 establishments and middle interval estimates for the remaining 28 establishments, the total number of persons employed in the participating establishments is 7035.

Figure 30



More than half of the participating establishment expect an increase in employment during the next 2 to 3 years, and about 25% of large establishments expecting to increase a great deal.

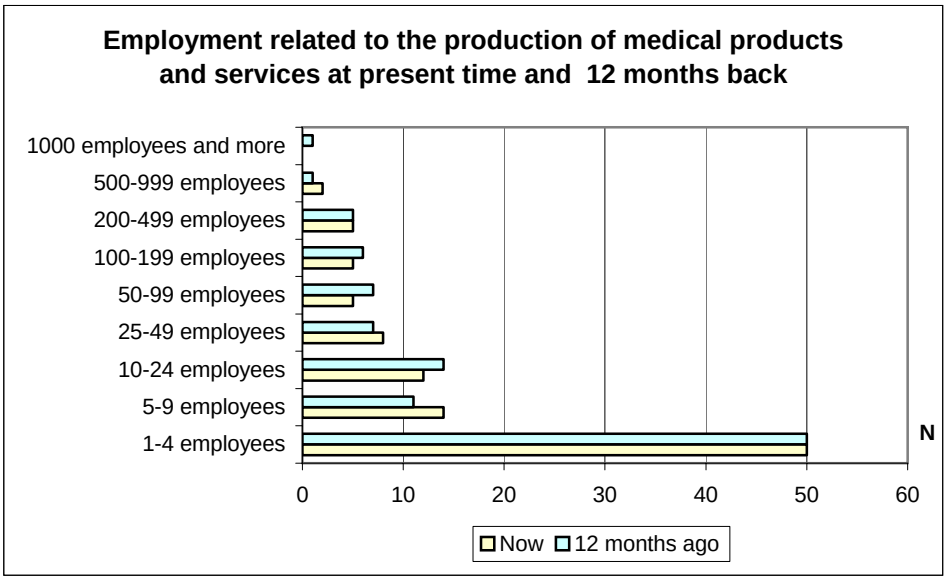
Figure 31



4.2 Trends in Employment

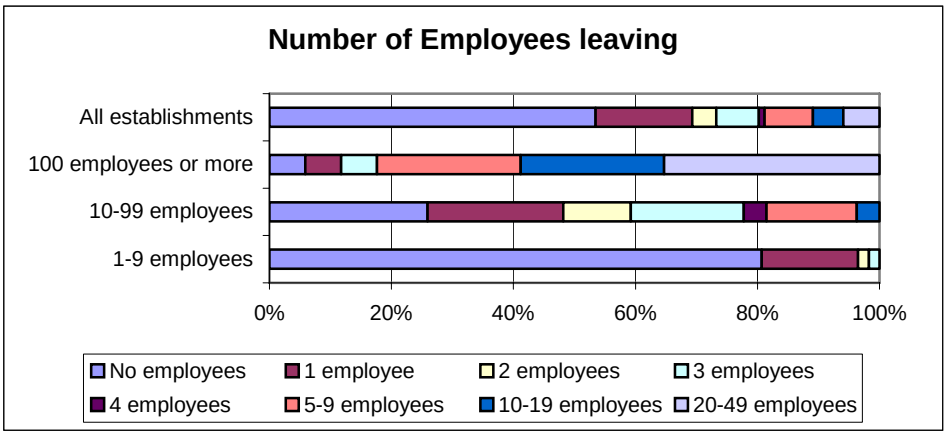
Small, medium and large establishments have had increasing and decreasing employment in the production of medical products and services. The changes in the distribution by employment categories over the last year are shown in the following Figure 32.

Figure 32



In about 80% of the small establishments no employees left within the past 12 months. In half of the medium establishments less than 2 employees left, and in about 40% of the large establishments less than 10 employees left the establishment within the past 12 months. It appears that the stability of the employment is quite high in the sector.

Figure 33



In Table 4 is shown the average number of employees leaving by size of establishment. It is seen that in the larger establishments, the employees are less likely to leave than in medium and small establishments.

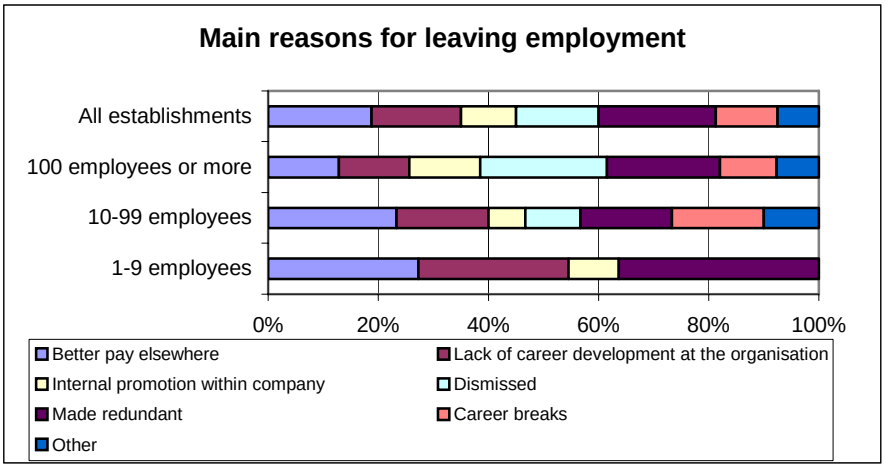
Table 4

Size of establishment	Average number of employees leaving	Employees leaving as percentage of staff
Small	0,25	7,67%
Medium	2,59	8,29%
Large	13,94	3,95%
All establishments	3,18	4,61%

Note.: Based on answers from 101 establishments

Many different reasons have been given for employees leaving the establishments, but it is interesting to note that in the small establishments (9 employees or less) the reasons most often mentioned are: made redundant, better pay elsewhere and lack of career development. The reasons in medium and large establishments are more divided. About 35% of indicated reasons can be characterized as positive reasons (better pay elsewhere, internal promotion within company).

Figure 34[1]



4.3 Occupational Structure of Employment

In Table 5 is shown the average number of employees with different job titles or qualifications in the small, medium, and large establishments, and in total.

The small establishments employ almost double as many apprenticed employees than semi-skilled workers, whereas the distributions of semi-skilled and apprenticed employees are more equal among medium sized and large establishments.

The establishments in general have more employees with degree level qualifications in science or engineering than in clinical or medical subjects. Almost half of the large establishments do not employ any staff with a degree level qualification in clinical or medical subjects, and almost 80% of the small establishments have no employees with a degree in science or engineering subjects.

Table 5

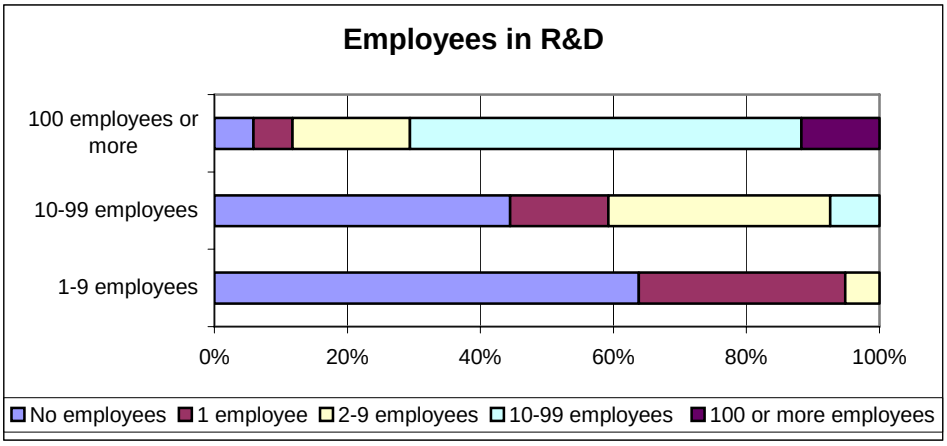
	1-9 Employees	10-99 Employees	100+ Employees	All establishments	N
Managers	1,21	3,38	25,35	6,39	90
Scientist and engineers	0,88	3,92	55,18	16,02	66
Fully apprenticed manual employees	2,06	6,83	76,50	20,19	72
Semi-skilled production workers	1,15	8,13	65,00	22,12	51
Degree level qualification in clinical or medical subjects	0,40	1,55	15,38	3,35	89
Degree level qualification in science or engineering subjects	0,32	4,57	52,79	10,23	84
Employees in total	189	884	6002	7035	102
Average number of employees	3,26	31,26	353,06	68,97	102

[1] Other includes e.g. personal causes and disagreements.

4.4 Employment in R&D

Almost half of the establishments have no employees in research and development of medical products and services. However, 70% of the large establishments employ 10 employees or more in this field.

Figure 35



The average number of employees in research and developments in the different sizes of establishments and in total, is shown in the beneath table.

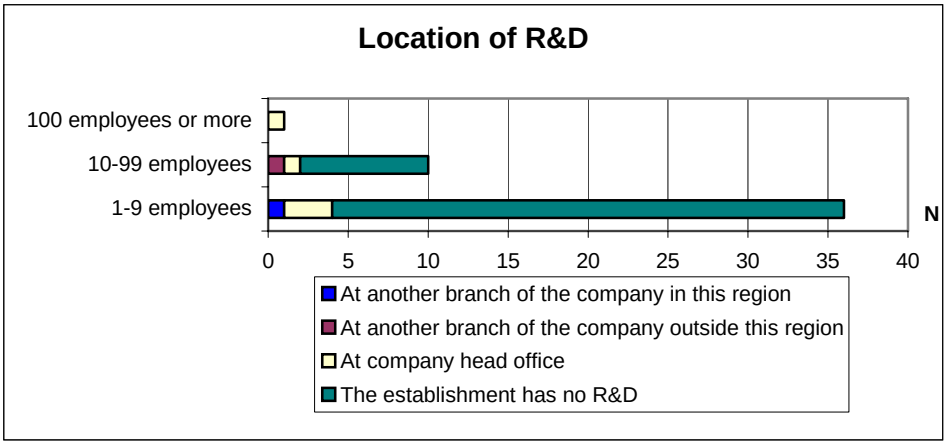
Table 6

Size of establishment	The average number of employees in R&D	Employees in R&D as a percentage of staff
Small	0,47	14,4%
Medium	2,52	8,06%
Large	52,94	14,96%
All establishments	10,18	14,76%

Note: Based on the answers of 102 establishments

Figure 36 shows that only a few of the establishments with no employees in research and development have research activities carried out by others, like at company head office or another branch in or outside the region.

Figure 36



The establishments under the survey have in general a quite stable and growing staff. Compared to enterprises in general in the same geographical area, the number of engineers and scientists is high and in particular the larger establishments have a large number of staff in R&D. However, a large part of small and medium-sized establishments have no R&D at all in the establishment or externally with mother or sister companies.

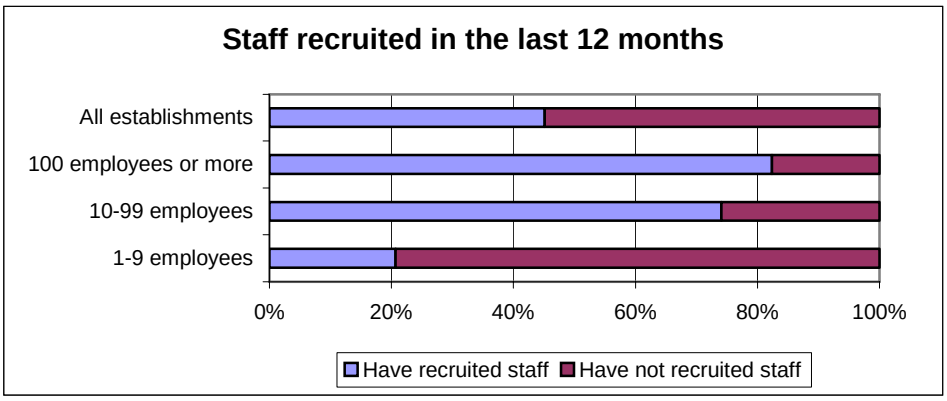
5. Recruitment

This chapter addresses recruitment by considering the level of vacancies, the recruitment practices and recruitment problems, skill-shortage, and the implications of and responses to recruitment problems.

5.1 Level of vacancies

Almost half of the establishments have recruited staff during the last year. About 20% of the small establishment have recruited staff during the last 12 months, and about 80% of the medium and large have had recruitments, see Figure 37. There is a good correspondence with Figure 31 in chapter 4, from which it was seen that during the same period a similar number of establishments in the three groups experienced staff leaving them.

Figure 37



About 70% of the small establishments had no vacancies during the past 12 months, whereas about 90% of the large establishments had 5 vacancies or more, and 70 of the medium sized establishments had 2 vacancies or more during the past 12 months. The total number of vacancies for the participating establishments is 345. There are a total of about 7035 employees in the participating establishments, and 345 vacancies out of 7035 amount to a share of 4.9%.

Figure 38

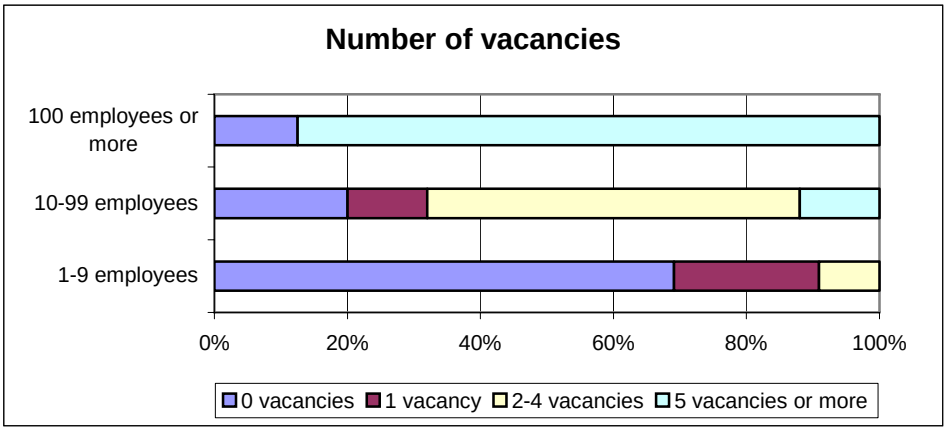


Table 7 shows the average number of vacancies by the size of establishment. The small establishments have proportionally more vacancies than medium and large establishments. The average number of vacancies is close to the average number of employees leaving, see table 2.

Table 7

Size of establishment	The average number of vacancies	Vacancies as a percentage of staff
Small	0,44	13,5%
Medium	2,44	7,8%
Large	13,75	3,9%
All establishments	3,18	4,6%

Note: Based on the answers of 96 establishments

A specification of the number of vacant jobs among the establishments represented by the respondents during the past 12 months is shown in Table 8. The differences among groups of staff may be due to differences in demand or in staff turnover rates

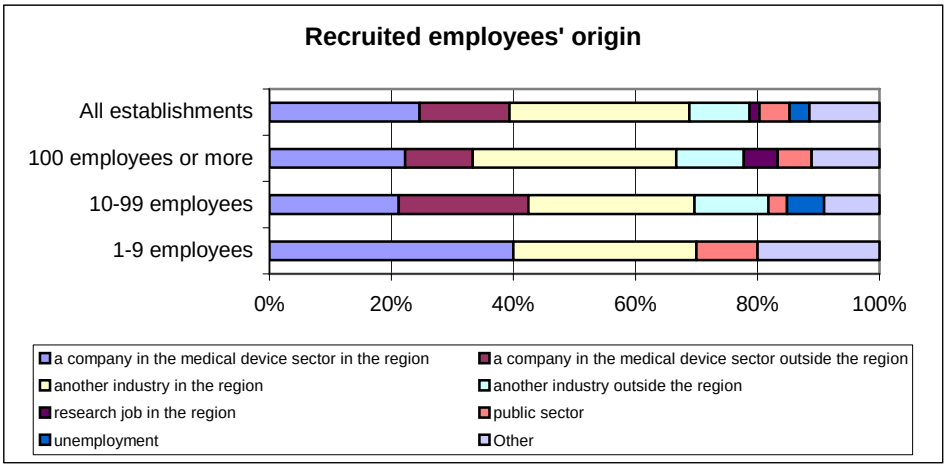
Table 8

	N	%
Process, plant and machine operatives (semi skilled	123	35,65
Skilled trades occupations (fully apprenticed manual employees)	49	14,20
Professional scientists and engineers	48	13,91
Managers	8	2,32
Others	117	33,91

5.2 Recruitment practices

About 60% of the participating establishments recruit employees from the region, and only few establishments recruit from the public sector, research jobs or unemployment. Mainly the small establishments recruit employees from other medical device companies in the region.

Figure 39



5.3 Evidence of recruitment problems

Table 3 shows the number of hard to fill vacancies and the number of vacant job in the category. All 4 of the vacant orthopaedic shoemaker and both surgical appliance maker positions were hard to fill, whereas only 4,2% or one position of the vacant administration worker positions was hard to fill. The percentage of hard to fill vacancies related to the total employment is 0,54% (38/7035*100), and hard to fill vacancies related to the total number of vacancies is 11,0% (38/345*100).

Table 9

	Number of hard to fill vacancies	Distribution of hard to fill vacancies	Hard to fill vacancies as a percentage of vacancies in the category
Production workers	5	13,16	6,2%
Unskilled workers	5	13,16	15,6%
Engineers	5	13,16	16,1%
Dental technicians	9	23,68	33,3%
Administration workers	1	2,63	4,2%
Skilled workers	2	5,26	18,2%
Scientists	2	5,26	20,0%
Managers	1	2,63	12,5%
Storeroom employees	1	2,63	14,3%
Technicians	1	2,63	20,0%
Orthopaedic shoemakers	4	10,53	100%
Surgical appliance makers	2	5,26	100%
Total	38	100	

5.4 Evidence of skill-shortages

16 of the 38 vacant jobs were hard to fill due to not-skill related reasons, and 22 vacant jobs were hard to fill due to skill related reasons. The number of hard to fill vacancies due to skill shortages amount to 0,3% of total employment (22/7035), and 6,4% of total vacancies (22/345).

Figure 40

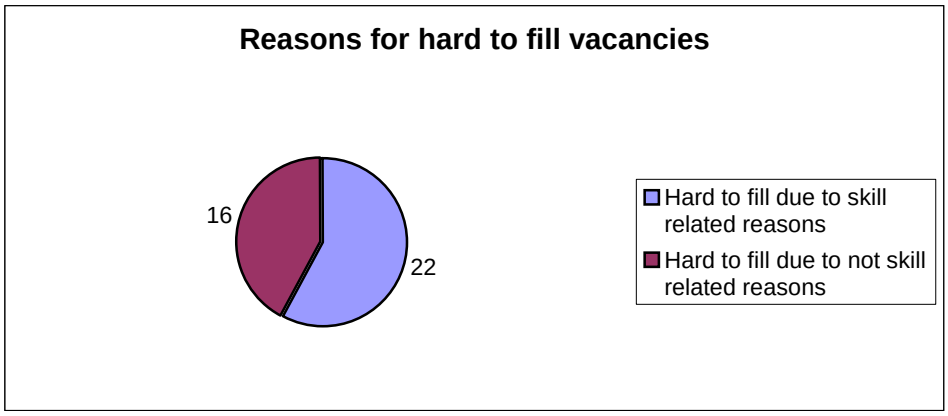


Table 10 shows the reasons for the vacancies being hard to fill, and the positions that were affected by the indicated reasons. The reason “low number of applicants with the required skills” is the most often mentioned reason.

Table 10

Reasons for vacancies being hard to fill	Positions affected
Lack of work experience	▪ 2 engineers ▪ 1 dental technician ▪ 1 production worker
Lack of qualification of applicants	▪ A number of engineers ▪ 5 dental technicians ▪ 1 production worker.
Low number of applicants with the required skills	▪ 2 scientists ▪ 2 dental technicians ▪ 2 surgical appliance makers. ▪ 5 1 skilled worker ▪ production workers

5.5 Skills difficult to find

A list of the vacant jobs that were hard to fill due to skill related reasons is given in

By each job, the specific skills that the applicants lacked for this position are indicated. Surgical appliance makers lacked the largest amount of skills.

Table 11

Position	Skills lacking
Storeroom employee	▪ general IT user skills ▪ communication skills ▪ customer handling skills ▪ team working skills ▪ numerical skills ▪ literacy skills ▪ other technical and practical skills
Semi-skilled workers	▪ team-working skills ▪ problem solving skills ▪ other technical and practical skills
Production worker	▪ communication skills ▪ team working skills ▪ foreign language skills ▪ problem-solving skills ▪ scientific skills ▪ other technical and practical skills.
Surgical appliance makers	▪ general IT user skills ▪ communication skills ▪ customer-handling skills ▪ team-working skills ▪ problem solving skills ▪ literacy skills ▪ engineering skills ▪ scientific skills ▪ clinical/medical skills ▪ skills related to product regulations ▪ other technical and practical skills
Dental technician	▪ problem-solving skills ▪ clinical/medical skills ▪ other technical and practical skills.
Scientist	▪ customer-handling skills ▪ management skills
Development-engineers	▪ scientific skill ▪ other technical and practical skills ▪ skills related to product regulations
Engineers	▪ problem solving skills ▪ literacy skills ▪ engineering skills ▪ scientific skills

5.6 Causes of recruitment problems

The different causes of recruitment problems by job category are shown in

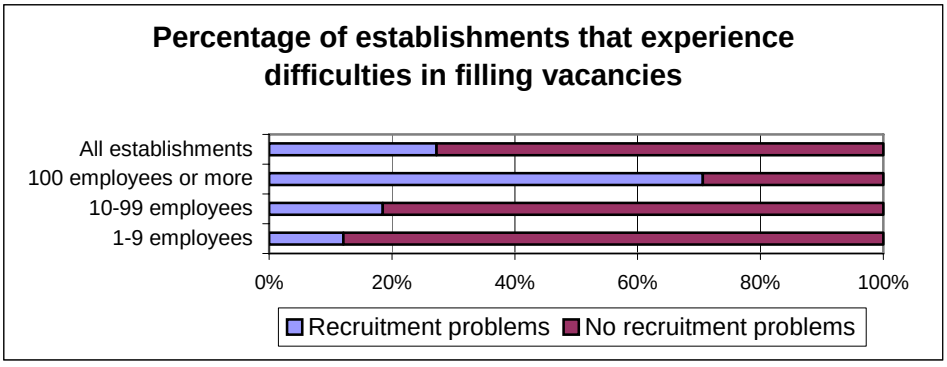
Table 12

Positions	Causes of recruitment problems
Surgical appliance	▪ too much competition from other employers ▪ not enough people interested in the job and ▪ a low number of applicants with the required skills, motivation or personality.
Engineers	▪ too much competition from other employers, ▪ lack of work experience ▪ lack of qualifications ▪ a low number of applicants generally
Scientist	▪ not enough people interested in the job ▪ a low number of applicants with the required skills.
Production workers	▪ the poor terms and conditions offered for the post (e.g. pay) ▪ the low number of applicants with the required skills, motivation or personality ▪ the low number of applicants in general
Dental technicians	▪ not enough people interested in the job ▪ a low number of applicants with the required skills ▪ a low number of applicants in general ▪ the lack of work experience and qualifications by applicants

5.7 Implications of and responses to recruitment problems

24 establishments have experienced recruitment problems, and Figure 41 shows that more of the large establishments experience more recruitment problems than medium and small establishments do. About 70% of the large establishments are experiencing recruitment problems.

Figure 41



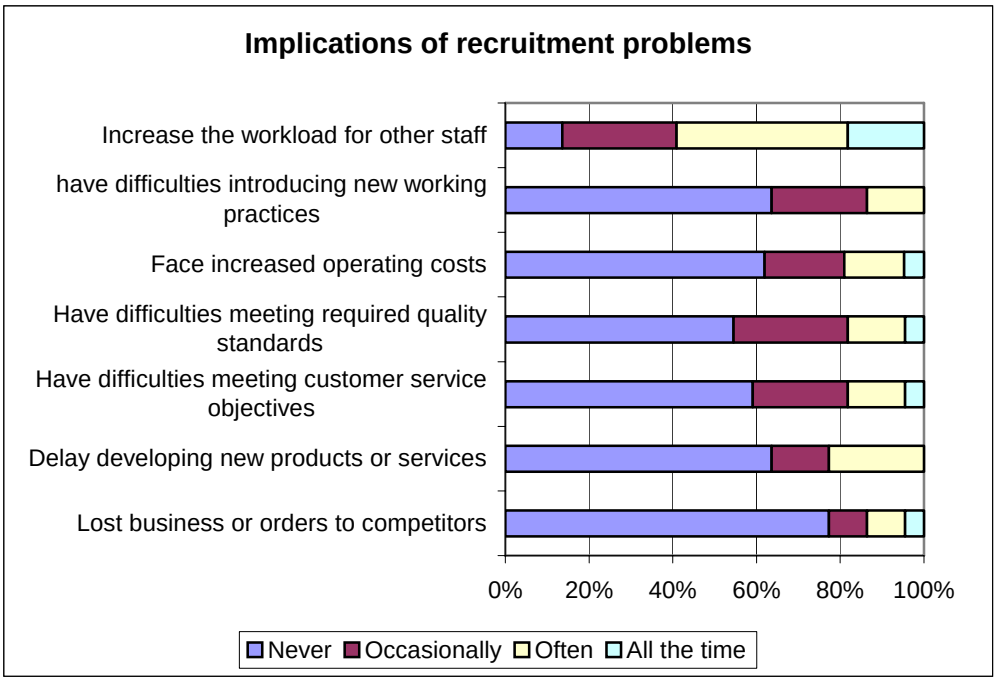
On the other hand, small establishments have generally more difficulties in filling the vacant positions than medium and large establishments have, which is shown in Table 13. Large establishments only have difficulties in filling about 8% of their vacancies, whereas small establishments have difficulties in filling 25% of their vacancies.

Table 13

	Number of employees in total	Number of hard to fill vacancies	Number of vacancies	Hard to fill jobs as a percentage of vacancies
1-9 employees	189	6	24	25,00%
10-99 employees	844	11	61	18,03%
100 employees or more	6002	20	260	7,69%
All establishments	7035	38	345	11,01%

The establishments with recruitment problems have mentioned different implications of the problems. “Increasing the workload for other staff” is the implication most often mentioned. It is seen that about 20% of the establishments have experienced, often or all the time, the reasons indicated.

Figure 42

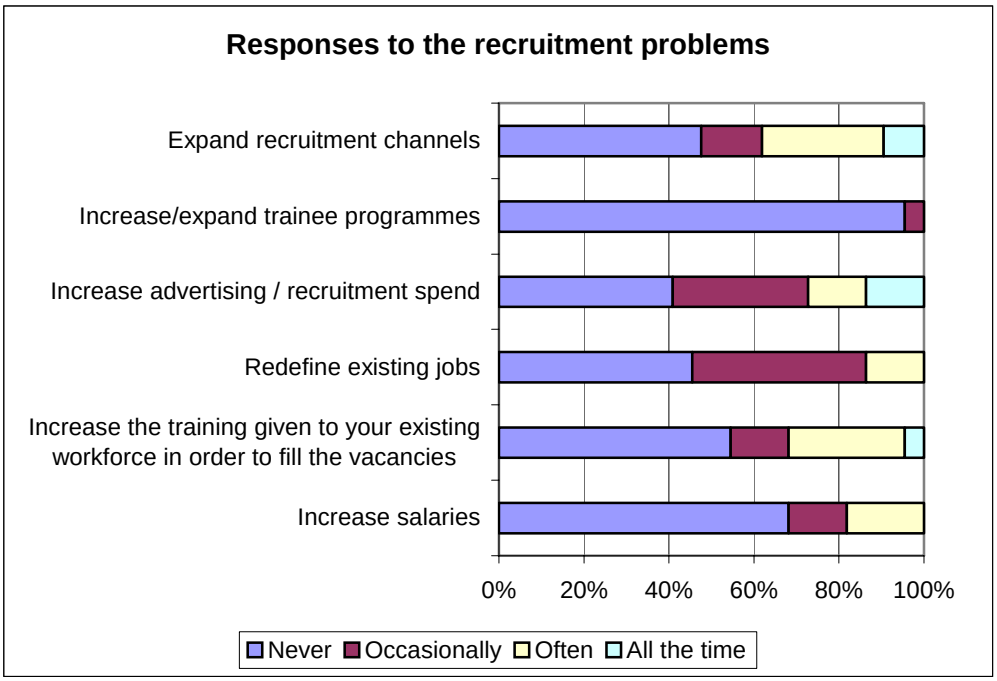


5.8 The responses to the difficulties in filling vacant jobs

More than half of the establishment with recruitment problems have expanded recruitment channels or increased advertising as a response to their problems. Figure 43 also shows that more than half of the establishments with recruitment problems have redefined existing job, at least occasionally. About 45% of the establishments with recruitment problems have increased the training to the existing workforce, whereas only about 30% of the establishments with recruitment problems have increased the salaries due the recruitment problems.

Increasing or expanding a trainee programmes has only been applied as a response to recruitment problem by small establishments, whereas redefining positions has not been used by small establishments having responded in the survey.

Figure 43



The small establishments had more difficulties with filling vacant positions than medium and large establishments. The participating establishments had the most difficulties with filling positions, involving special skills. More than half of the hard to fill vacancies were due to skill related reasons. The reactions to the recruitment problems are increasing workload of other staff, difficulties in meeting quality standards etc. The establishments responded to the recruitment problems by for instance increasing the amount spend on advertising for recruitment, redefining the existing jobs, increasing the training to existing workforce.

6. Internal skill problems

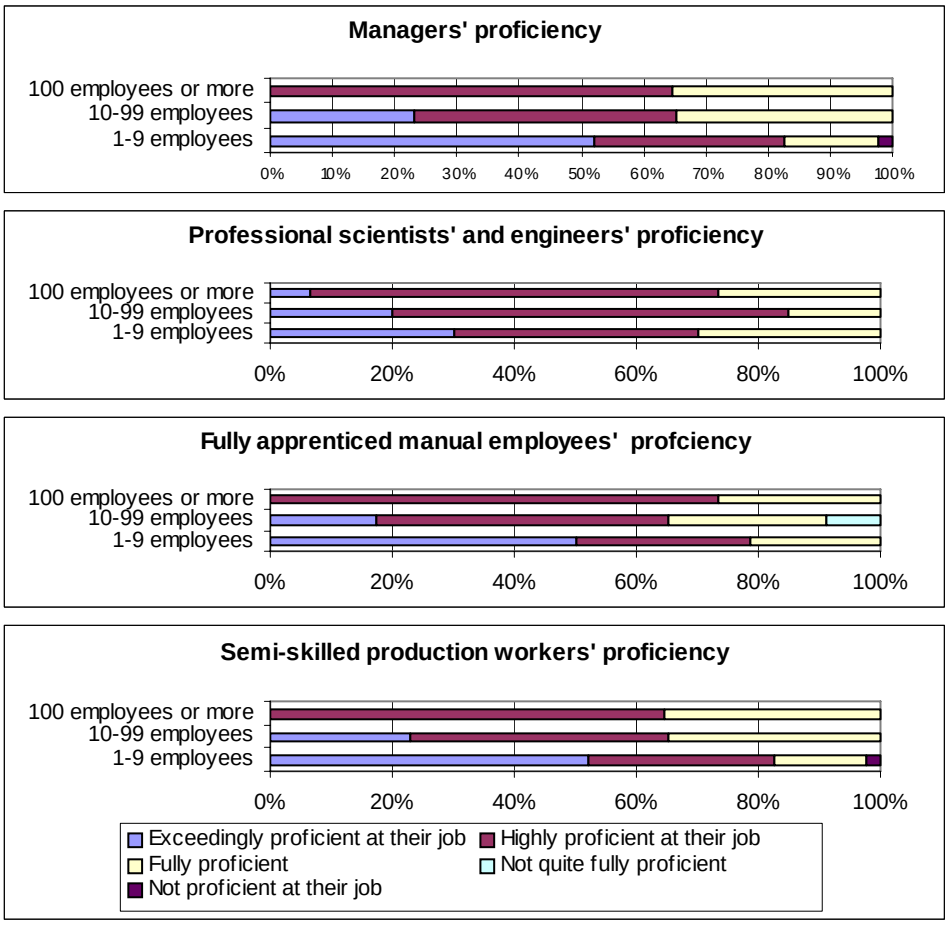
This chapter about internal skill problems addresses the proficiency of existing staff, the skills in which staff lack proficiency, the cause of skill gaps, the implications and responses to skill gaps and the future prospects.

6.1 Proficiency of existing staff

The respondents have in general found the management of their establishment proficient, and among the small and medium sized establishments a considerable number have characterized it as exceedingly proficient, see Figure 44.

The same pattern applies to the other categories of employees, and the only deviation from the general picture is seen in the group of professional scientists and engineers. More than 50% of the smallest establishments have characterized all other staff as exceedingly proficient, but only 30% applies this description for professional scientists and engineers. On the other hand, none of the largest establishments have characterized any of the staff categories as exceedingly proficient, except for the same group of professional scientists and engineers. This group is apparently appreciated less by the small establishments.

Figure 44



Only 5 establishments have declared that part of their staff are not proficient at their job.

6.2 Skills in which staff lack proficiency

The five establishments with staff, not proficient at their job tell that they need the following skills improved:

- IT skills
- Language skills
- Management skills
- Team working skills
- Problem solving skills.

6. 3 Cause of skill gaps

The causes of the five establishments' skill gap are:

- The lack of experience by recently recruited employees (answered by 2 establishments)
- The failure to train and develop the employees
- Rapid pace of change in industry
- Recruitment problems

6.4 Implications and responses to skill gaps

The implications to the skill gaps are of the above mentioned five establishments have been:

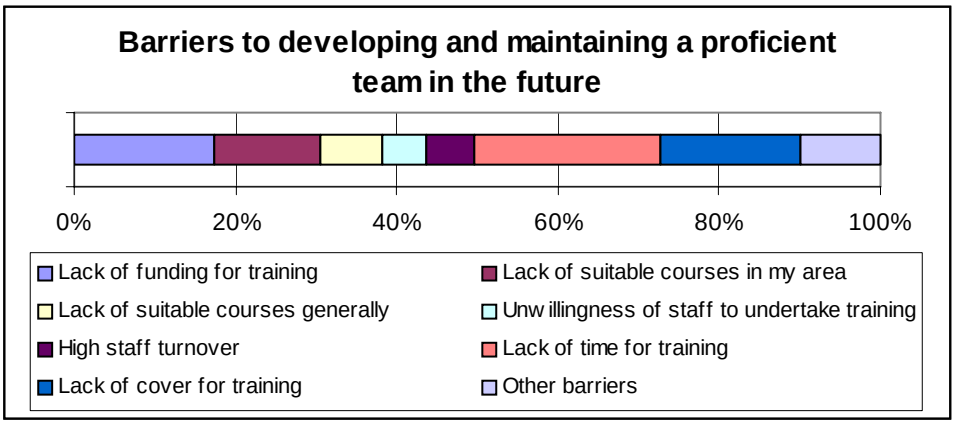
- The establishments lose business or orders (answered by 3 establishments)
- Face difficulties introducing new working practices (3)
- Face difficulties meeting customer service objectives (2)
- Increasing operating costs (2)
- Increased workload on the rest of the employees (2)
- Delay developing new products and services (2)
- Difficulties meeting required quality standards (1)

Two establishments have provided further training as a measure to remedy the problems. Others have not taken any action.

6.5 Future prospects

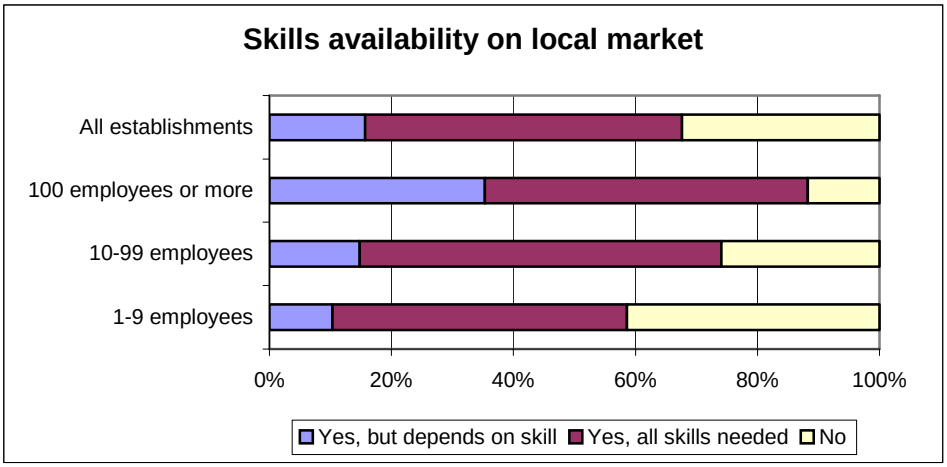
The establishments with and without skill gaps experience different barriers to developing and maintaining a proficient team in the future, which is shown in Figure 45.

Figure 45



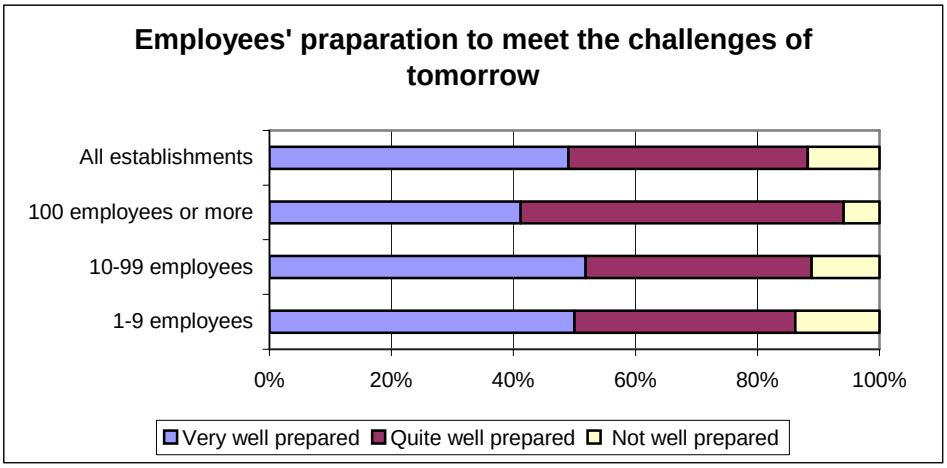
About one third of the establishments are not able to obtain the required skills on the local labour market, and a larger part of the small establishments (9 employees or less) have difficulties obtaining the required skills. The problem is generally due to the lack of specialization and the low number of employees with the required special qualifications.

Figure 46



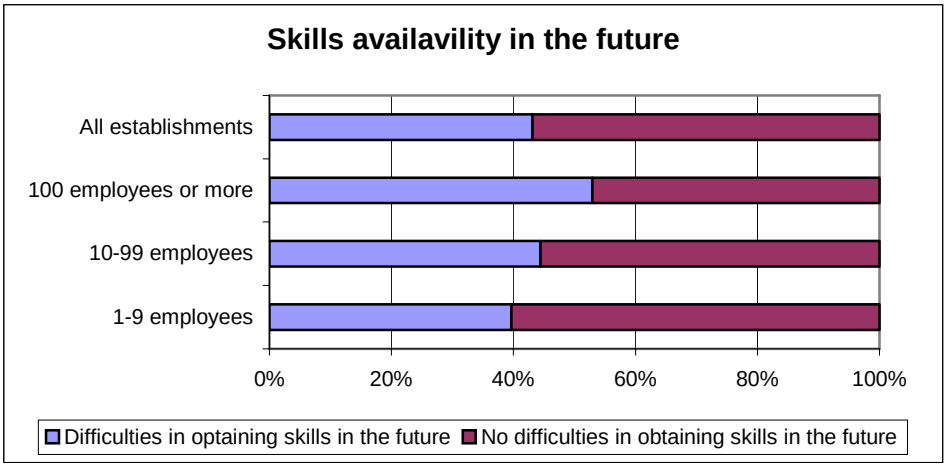
More than 90% of the establishments consider themselves prepared to meet the product market challenges of the future, and about half of the establishment claim to be very well prepared for the future. Fifteen percent of the small establishments feel that they are not well prepared to meet the challenges of tomorrow.

Figure 47



About 45% of the participating establishments expect difficulties in obtaining skills in the future, and large establishments expects to find it more difficult to obtain the required skills than smaller establishments, which is shown in Figure 48.

Figure 48



Most participating establishments claim to have proficient employees, and only 5 establishments tell that some of their employees are not proficient. The implications of skills gaps are for instance the loss of business or orders to competitors and difficulties in introducing new working practices. One out of three are not able to obtain the required skills on the local market, and almost half of the establishments expect to have difficulties in obtaining skills in the future. The participating establishments mention different barriers to maintain proficient teams in the future, but most of the establishments consider themselves prepared to meet the product market challenges of tomorrow.

Case study, Medicon Valley: Bandageriet

Bandageriet is a small producer of prosthetics for the local area in the northern part of Zeeland, Denmark. The company employs very specialized staff and offer a high degree of flexibility to its customers. The market is highly regulated in the sense that sales depend on regular tenders at county level, and if this is lost, the foundation of the company may be considerably reduced overnight.

About the company

Bandageriet, Ltd. was founded in 1980 in Hillerød north of Copenhagen, and has been located here ever since. Bandageriet currently employs 12 people, including two surgical appliance makers, five orthopaedic engineers (in the production) and five administrative personnel (including receptionists).

Bandageriet only produces medical products, namely prosthetics (mainly for arms and legs) for the public health sector in the county of Frederiksborg and a number of local public institutions and authorities.

The overall goal of the company is to provide premium service to its customers (patients), especially regarding the development of products matching the needs of the individual patient. Furthermore, Bandageriet find it important that the patients in the county see the company as highly service minded. This is also the main reason behind the company's decision on the opening of a local clinic in Helsingør.

Bandageriet won in 2001 a tender submitted by the county of Frederiksborg, giving the company permission to service all hospitals in the county, which resulted in the largest turnover ever in 2002 (approx. 12 million Dkr.). The company is currently at full capacity, but expects to continue to grow slowly over the next 2 to 3 years.

Products and market

About 75 pct. of the activities of Bandageriet are related to prosthetics for arms and legs. Bandageriet serves patients within the county of Frederiskborg. The patients contact the surgical appliance makers on recommendation from their private doctors. In cooperation with the orthopaedic engineers, they find an individual solution for the patient, who subsequently need an approval from the local municipality.

Because of the need to individually design and adapt prosthetics, the production is often quite complex, and needs to be carried out with a high level of cooperation between the surgical appliance makers and the orthopaedic engineers.

The sale of prosthetics is highly depending on the approval of the local municipalities. At the same time, it has recently been decided that all surgical appliance makers need an authorisation for providing services to the public sector. The company expects that the need for authorisation will reduce the number of surgical appliance makers in Denmark.

According to Danish law, the companies within this sub-sector, are not allowed to market their products to individuals by advertising. However, the law allows companies to inform

the general public of their ability to produce prosthetics – e.g. through broader campaigns. Consequently, the company is not very active in terms of marketing, but tries to improve the quality of their information campaigns.

The company does not have any in-house product development and there are no Danish suppliers in the field. Therefore, the company uses Swedish and American suppliers, providing the basic prosthetics (models), which are adapted to the individual patient by the surgical appliance makers in cooperation with the orthopaedic engineers and the patients.

Strategies and cooperation

Bandagisten sees no competence related bottlenecks or barriers for the continued development of the company. The surgical appliance makers have all the necessary competences.

The company is considering plans for an increase of their activities and products to cover the market for breast prostheses, but they are still in a preliminary phase and therefore not very concrete. In any case, this will require an expansion of the staff. No efforts have yet been made to analyse the availability of the needed staff.

The company foresees a large potential within the area of breast prostheses and believes that it will be possible to make use of their current competences and be able to produce individually adapted products to this new market.

As the investments in equipment and product development are quite limited, the company does not need major capital input for its development.

The company cooperates closely with suppliers, who arrange courses and briefings for the surgical appliance makers as well as the orthopaedic engineers. In addition, the company cooperates at a more informal level with other smaller Danish companies within the same industry with the aim of sharing experience. The largest Danish company in the area (Sahva) does not participate in this cooperation.

Bandagisten is a member of the relevant sector organisation (Danske Bandagister), which works to promote the interests of the industry within the areas of education, the broader information on the industry and the recognition of the importance of a professional, proper and qualified treatment within the area of prosthetics. One of the two surgical appliance makers of Bandageriet is a member of the educational council of Danske Bandagister. Through this role, the company has a certain influence on the development of the sector.

Competition

During the last few years, the competition has intensified because of industry consolidation. The competition from the largest Danish company in the area of prosthetics, Sahva, is considered very hard, because of its ability to adapt their products to individual clients and at the same time to gain economies of scale from mass production. Furthermore, Sahva is not dependent on the strategic developments of suppliers.

The smaller Danish companies in the area typically cover a certain geographic area, and they are generally considered to be very service-minded and, to a higher extent, able to adapt their products to the needs of the patients than the larger ones.

The market for prosthetics for arms and legs is currently undergoing a rapid development trying to meet the demands from patients, who increasingly want their prosthetics to be as invisible as possible. The company sees itself as being in a good position to compete with larger companies as e.g. Sahva.

Employment and competences at the company

The staff is regarded as highly competent, especially the surgical appliance makers and managers, who are indispensable in a firm like Bandagisten. The orthopaedic engineers also have the competencies that are necessary to perform their job. With a competent staff, an active product development and with the needed authorizations, Bandagisten is well positioned to compete over the coming years. The orthopaedic engineers are good at keeping up with the recent product developments, and sometimes they act as sparring partners to the surgical appliance makers in connection with the selection and adjustment of the prostheses.

Only one employee has left the company within the last year. An orthopaedic engineer switched to Sahva, but a newly qualified trainee quickly filled the position. The reason for the employee's switch to the competitor is supposed to be the pay, which is believed to be somewhat higher at Sahva. The switch has not influenced the management of the company, since the position was quickly filled. The employees have no competition clauses in their contract of employment.

The company has not taken any special initiatives to keep their employees, but family-like relationship are encouraged between the employees through for instance common leisure activities. The company does not hold formal management - employee development meetings, but tries to achieve the same through the daily routines.

The management, i.e. the surgical appliance makers is good at involving the orthopaedic engineers in the routines, e.g. regarding the selection of the prostheses. Therefore, it is believed to be of great importance that the orthopaedic engineers often participate in courses and information briefings (arranged by the suppliers).

Employment and competences in the area

It is important to keep both surgical appliance makers and orthopaedic engineers informed about the recent developments of new products. Therefore, the surgical appliance makers and the orthopaedic engineers frequently participate in courses and briefings (held and arranged by suppliers).

The company find the current composition and number of orthopaedic engineers in the company to be sufficient and the cooperation with suppliers is working satisfactorily. However, there is a shortage of qualified surgical appliance makers and orthopaedic engineers in the region and the country. Only 1 or 2 orthopaedic engineers graduate per

year, and the competition for the graduates is tough. Therefore, it is important for the companies to inform potential trainees about the education and the job. The students that complete the education are regarded as highly competent, and the contents of the education is regarded as reasonable. The basic educational elements are taught at Vitus Bering Education Centre in Horsens (Jutland), while the orthopaedic education is placed in Sweden. Therefore, the cooperation between Vitus Bering, Horsens and Hälsohögskolan, Jönköping is very important, and the company has continuous contact to both education institutions.

In the future the company expect difficulties in recruiting orthopaedic engineers, since the knowledge about the company is limited among potential trainees. Therefore, it is important to increase the use of marketing in order to promote the company. The small companies usually do not recruit subcontracting companies within the area as Sahva does, which often recruit from other companies in the area.

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The strengths of the company

The strength of the company is mainly the ability to adjust to the needs of the single patient, and to quickly switch the production to new products. The company has a good image in the local area, and since it is important to be present and visible in the local market, the company has opened a clinic in the neighbouring Elsinore.

The weaknesses of the company

The greatest threat to the company is the uncertainty regarding the outcome of the coming tenders. In case it does not win the tender in Frederiksborg County, the company will loose the foundation for its existence. Also the problems in recruiting staff in competition with the larger competitors may be seen as a risk factor.

Furthermore, the coming municipal reform in Denmark might result in larger counties and thereby larger areas to service, which will create a new and uncertain situation.

Expectations for the future

In the short term no large development is expected. In the long run the uncertainty is large as to the municipal reform and the larger area to service.

The greatest competition parameter is the ability to adjust to the customers' needs and switch over the production. The quality and price of the products and are also important parameters.

Case study, Medicon Valley: Dansac, Fredensborg

Danpac is among the market leaders in stoma care products, and it is a relatively large company with 350 staff. Danpac was taken over in 1991 by an American company with a somewhat broader range of products. The production of Dansac and the product development require a highly skilled and competent staff. It is not difficult for the company to get the engineers and other educated staff they need, but sometimes it is difficult to get production workers with the desired background and experience.

The company puts much effort into increasing competencies and skills through continued education and improving efficiency by up-to-date organizational means. As a result of this, Dansac has become an attractive working place with a low staff turnover. The company considers the possible movement of activities to low cost countries.

About the company

A small group of people, who had just left Coloplast, founded Dansac in 1971 in Fredensborg, near Coloplast. During the 1970's and 1980's Dansac grew to a size of approx. 150 by the end of the 1990's. In 2001, the American mother company bought Dansac. The American owner had a similar, but broader product portfolio. The take-over was followed by an expansion of Dansac by approx. 100 employees. Dansac currently employs over 350 people in Denmark, which include approx 10 managers, 8 engineers, 70 fully apprenticed manual employees, 80 semi-skilled production workers. The mother company employs around 2.800 people worldwide.

Last year (2003) the revenue of Dansac amounted to approx. 375 million Dkr, which was an increase of approx. 10 percent.

Products and market

Dansac develops, manufactures and markets high quality, unique stoma care products that solve specific problems and aim at improving quality of life for people with a stoma – and for people who work with stoma care.

The main customers are the public health service organizations. Over 90 percent of the total sales are exported, mainly for the European market, but the mother company also sells the products directly to the US market. At the moment the company expansion goes east. The products are not particularly price sensitive.

The development of new products is carried out in cooperation with nurses and is based on the needs of the individual patients. Only few of the products require approval from regulatory authority of the respective markets.

The product development and the strategic management are mainly carried out in the US (The mother company), but some product development is carried out in Dansac. Dansac employs 5 engineers, who are in charge of the internal product development. This is sufficient for the current product development activities.

Dansac's production process is highly automated.

Strategies and cooperation

Producing only stoma care products places Dansac in a unique position to dedicate all energy and resources to stoma care. The modern and innovative products reflect this dedication. Products are characterized by high quality and distinct product advantages, which add quality to the lives of ostomates, regardless of their type of stoma.

Dansac believes in an open dialogue as a basis for the creation of better products and greater knowledge to improve the health and happiness of people who must live with a stoma.

Dansac is considering moving parts of the production to Eastern Europe in order to gain from the lower salary levels. No decision has yet been taken, but the establishment is closely watching the development by Coloplast, which recently moved the production to Eastern Europe. Dansac is mainly worried about the quality of the products, since a decrease of quality would be a disaster for the firm. If it turns out that it is possible to maintain the existing product quality as in Denmark, the company will probably move part of the production to Eastern Europe.

The access to capital is not particularly important to Dansac, since most of the product development is carried out in the US (Mother company) – leaving the capital need with the mother company.

According to the Quality Manager, It is vital for a company like Dansac to be ISO 9001 certified. In some countries, the customers need the certificate to get a permission to sell the products.

Competition

The competition on the stoma care product market has intensified during recent years. This development should be seen in connection with the development towards a higher concentration of the industry (The mother company bought Dansac in year 2001). The competition from Coloplast is tough, whereas the competition from smaller competitors is considered insignificant.

Coloplast and Dansac are market leaders in Europe, and the companies compete on the same markets and use the same competition parameters. Therefore, it is of high importance to Dansac that the production matches the needs of the patients and that Dansac has a close cooperation with the nurses, who are in (daily) contact with the patients.

Employment and competences at the establishment

The employees of Dansac are regarded as highly competent, especially the 5 engineers, who are in control of the internal product development.

Dansac has spent great efforts to improve the competence level among the production staff, for example by offering supplementary training. The workers in the production are

offered specific fields of responsibility and given the relevant supplementary training. Furthermore, the establishment has decided to subdivide the production staff into smaller teams, making it possible for the leaders of the teams to better control the work of the team members, while at the same time give the workers a better feeling of being more responsible for the production.

During the past years only one engineer left Dansac. The engineer switched to Coloplast, but the wages are at the same level in both companies. Dansac and Coloplast have an informal agreement about not actively recruiting each other's engineers. It is not regarded difficult to recruit new engineers. Dansac received 200 job applications (one open position) from engineers in medical companies in the area.

Some production workers have switched from Coloplast to Dansac during the past year, because of the uncertainty among the workers regarding the transfer of activities to Eastern Europe.

Dansac has not made any special efforts to keep the employees in the company. However more indirectly this is done by having regular manager-employee development meetings with the individual staff members, and the company promotes a family-like relationship between the employees e.g. through common leisure activities.

Employment and competences in the area

The supply of engineers is regarded as satisfactory, whereas the supply of qualified production workers is below the desired level. Dansac has tried to cope with this problem for instance by cooperating with The Tourist and Commercial Association of Elsinore about promoting the companies' use of supplementary training. Dansac is, as mentioned before, watching Coloplast succeess in moving the production to Eastern Europe. If the production workers there have a satisfactory level of expertise, then Danpac may also move parts of its production activities.

The competence level of engineers is quite satisfactory, which is caused by the high concentration of medical companies in the area, and Dansac believes that there is a good chance that the establishment can continue to attract engineers from other medical companies.

A few other medical device companies try to be more attractive for new staff by offering higher salaries.

The strengths of the establishment

Dansac's strengths, especially in comparison to Coloplast, include the ability of Dansac to adjust the product development to the needs of the patients and to change the production relatively fast.

Dansac is continually developing new and better product solutions based on the needs and requirements of ostomates and nurses. To encourage dialogue and break down taboos, Dansac compiles new information and educational material for ostomates and

their families, in close cooperation with stoma professionals around the world. In addition, Dansac cooperates with the nurses in the local areas, in order to know their experience and assessments of the products and their varieties of application.

Dansac also regards the internal control as a comparative strength in the competition with Coloplast, since the quality of the stoma care products is a vital competition parameter.

The weaknesses of the establishment

In the short run, the primary weakness of Danpac is the risk that they are late in taking advantage of the Eastern European market. Coloplast may have a huge success with the relocation to Eastern Europe, and this will enable them to maintain the lead for some time. The connection to the mother company has some limitations too, since the mother company decides, how much Dansac is allowed to adjust the products.

Expectations for the future

Dansac expects to increase a little during the next years. In the short term, the potential success of Coloplast's relocation can result in Dansac also being forced to move to Eastern Europe. The greatest competition parameter is still believed to be the quality of the products and Dansac's ability to promptly adjust and switch over the production to the needs and wants of the customers.

Case study, Medicon Valley: ProstaLund (Lund, Sweden)

The company is a small but ambitious enterprise heading for a key global position based on a unique technology that has been developed in-house. It develops equipment for a microwave treatment of patients with prostaic hyperplasia.

The company gives high priority to the development of human resources and development of competencies. It offers attractive employment packages, in particular for the well-educated staff. Difficulties in recruiting educated staff for R&D in the specialized field has further made the company cooperate with universities and students in the area, but new staff, and in particular new marketing staff, are mainly recruited from other firms within the medical device sector.

About the company

ProstaLund Operations AB was established in 1989 by Associated Professor Magnus Bolmsjö, who had developed an instrument, capable of treating Benign Prostate Hyperplasia, BPH, which is an enlargement of the prostate, minimal invasively (the use of catheter with microwaves). Prior to this the generally accepted treatments had been conducted with surgery and medicine. The traditional ways of treatment was often followed by numerous side-effects and a risk, or with a low efficacy which is not the case with the minimally invasive treatment.

In line with the development of the method, the company grew to the present size of 35 employees. The product development is carried out in Lund (Sweden), whereas the production of equipment and catheters are outsourced. During the past years the company only increased moderately in size. The company currently employs about 4 production personnel, 4 administration personnel, 11 developers (including 3 quality controllers), 16 sales and marketing personnel (including clinical trials and service). The net-turnover in 2003 was about DKK 24 million, which was an increase of almost 100 pct. from the previous year.

The business idea of ProstaLund has been formulated as follows: *ProstaLund shall offer patients with benign prostate enlargement an individually adapted, non-surgical treatment that is potent, safe and cost effective.*

Products and market

ProstaLund develops and produces equipment, which treats patients with benign prostatic hyperplasia ("BPH"), including a device marketed under the name CoreTherm(TM). ProstaLund’s devices treat BPH on the basis of a unique, computer programmed microwave treatment that constantly measures the internal temperature of the prostate gland during treatment to provide feedback on the progress of the treatment to the physician. The feedback feature of ProstaLund's devices, in conjunction with other temperature sensors, produces a safe, individualized treatment with proven efficacy. In scientific studies, the method has shown comparable treatment results to TURP (Transurethral Resection of the Prostate). The Company's operations are carried out in

close collaboration with leading universities and hospitals around the world. ProstaLund's equipment is FDA approved and CE marked. The company considers themselves highly restricted by Government regulation of medical products or services.

ProstaLund’s customers are hospitals and urology clinics. Marketing is focused on urologists but also on groups which have an influence on the decision making process, such as general practitioners, patients, politicians and insurance companies. The products are state of the art, and considered of premium quality by the company. According to the company, its products are restricted by Government regulations to a high extent.

The main markets are the Scandinavian countries, United States, Italy, the Netherlands and Germany. At the same time the company tries to develop markets of the rest of Europe and Asia. ProstaLund is the market leader in Europe, but not on the American and Japanese market, where the competition is harder (especially from Urologix in Minneapolis).

In early 2004 ProstaLund received an order to the North American market worth just over USD 3 million for equipment for microwave treatment of BPH. The equipment will be delivered during spring and summer 2004. The increased interest in ProstaLund's treatment method in the United States is partly due to a recent decision by the American reimbursement system about increasing the reimbursement for invasive treatments to clinics by 150%.

Strategies and cooperation

ProstaLund’s long-range goal is to reach a market leading position through becoming the gold standard in treatment of medium severe to severe BPH. In the short term, ProstaLund aims at increasing the use of the existing systems, especially in Scandinavia, and at the same time to increase sales in the US, Italy, Holland and Germany. In the medium term, ProstaLund aims at intensifying sales in the rest of Europe and at receiving approval for sales in major Asian countries.

The access to capital is important to the company as a result of high innovation and product development activities that are undertaken in-house. At the moment the possibilities of attracting investors are fine, as the company has proved its worth to its investors.

Competition

The competition is hard, especially in the American and Asian markets. The European market is considered under control by the company, and the European competitors are still new-comers and have not yet been in the market sufficiently long to be a serious competitor. However the future is uncertain, especially if the American producers (primarily Urologix) decide to intensify their efforts in the European market.

Employment and competences

The company is well satisfied with its present staff, and especially with the developers, who have the responsibility for the development of new products and improvements of existing products.

The company has development plans for all its employees, in order to keep and increase the qualification of especially the production workers and salesmen. Skilled workers participate frequently in supplementary training, whereas the unskilled workers participate in more fundamental courses.

The company has a flexible time-schedule, where the employees choose their own working hours. The company offer attractive pension schemes, but the salary level is not particularly high, except for the remuneration of managers, middle managers, salespeople, and scientists.

The company had a number of job recruitments during the last year, where a few employees left the company.

Employment and competences in the area

The CFO regards the number of qualified managers and salesmen as satisfactory. However, it is relatively difficult to recruit new developers and scientists. Therefore, the company cooperates closely with students and scientists at the regional universities, including both Swedish and Danish University. They also cooperate with Swedish vocational training centres, from which most of the production workers are recruited. ProstaLund also recruits staff from Swedish and Danish companies in the Öresund region. Salesmen are most often recruited from Swedish companies.

The strengths of the company

ProstaLund's strength is its effective and high quality products, its highly skilled employees, product development and marketing in close cooperation with the market and highly respected clinical results.

ProstaLund is market leader on the European market, and at the moment no European competitors are able to develop products of the same quality and with the same high level of technology as ProstaLund. The main strength of ProstaLund’s lies in the product, which offers an alternative to medical treatment and surgery. ProstaLund’s products are at front with the technological development, and offer large effects and no side-effects.

The competition is tenser on the American and Japanese markets, since more competitors offer products of the same quality and with the same efficiency. ProstaLund has a good image on the European market, and the firm expects that the American customers are increasingly becoming aware of European quality, which might be part of the reason for ProstaLund’s recent, great American order.

The weaknesses of the company

Since ProstaLund is not yet generating a profit, it has an unstable financial situation, which may affect its decision-making negatively. The marketing of the products of ProstaLund is a long term process, and ProstaLund has not yet the financial strength that might be needed.

Expectations for the future

The potential market for ProstaLund is one treatment per 1.000 inhabitants per year (Based on experience from Sweden). In North America, Japan and Western Europe this amounts to approximately 785.000 treatments per year.

During the coming 10-20 years the market is expected to grow significantly due to several growth factors, such as the growth of the number of people in the age groups above 50 years of age and because of the increasing focus on quality of life. ProstaLund's development over the coming years will primarily depend on the development of the American market.

Case study, Medicon Valley: Nordic Composites AB

Nordic Composites is a small company manufacturing medical device products developed by the manager of the company on the basis of knowledge and experience from composites based on glass fibre, carbon fibre and aramid fibres. The products must be categorized as very advanced, but the production process is simple and requires primarily craftsman skills. These are increasingly difficult to find for the company, but might be just as difficult to find in low cost countries. In addition, the close integration of innovation and production makes it less likely that the firm might consider to move abroad.

It is concluded that Nordic Composites has certain strengths as compared to larger competitors because of the high flexibility in production and development of products. However it lacks a clear strategy and direction beyond its objective of producing medical device on the basis of composite material. Accidental factors have been decisive for the success of the company over the last two years. Unforeseen strengths of a new product made it possible to sell the product in the European market when an American customer didn't keep its promises to buy the product. The failure to penetrate the American market just before the fall of the USD rate, in addition, saved the company from big foreign exchange losses.

About the company

Mr. Karl Engdahl, who came from the aircraft industry, established Malmo Komposit AB in 1980. In 1998 the company changed its name into Nordic Composite AB in connection with the change of ownership to a Danish PhD physicist. This change meant that Nordic Composites primarily concentrated its production within the field of medical equipment. Today the establishment employ 20 people.

The revenue amounted to 25 million SEK. last year a small decrease since the year before, so the average revenue per staff is about one million SEK. The firm had a zero result in 2003 which will only be slightly better in 2004. In 2005 a better result is expected.

The objective of Nordic Composites is to be a 100% medical device company. The main growth factor is the idea generation and the product development. Capital and competencies has never limited the development of the firm.

Nordic Composites has no image. The customers may know the intermediary, but they would hardly know Nordic Composites.

Products and market

The main product line today is within radiation therapy, x-ray and orthopaedic products, and these highly complex medical device products constitute 60-70% of total revenue. Nordic Composites sells to health service, manufacturers, and others and about half of the sales are exported, mainly to the European market. The low USD rate does not affect the company, since the exports to the US are low.

In 1998 the company developed and manufactured its first medical device, a toe-off ortose, which was patented and still constitutes the main product of the firm. It is manufactured mainly as a standard product but some customers need a special individual adaptation. The product is slightly developed by changing details of the design to make it more convenient for the users, and also the colours are being varied. This product is sold all over the world. The price is approximately USD 5,000. An Icelandic firm makes a similar product. Nordic Composites has hired a local patent bureau to keep an eye on the possible patent violations.

A second product group is the X-ray tabletop. Nordic Composites spent all R&D efforts in 2002 on the development of an X-ray tabletop system with changeable inserts in glass fibre / carbon fibre / aramid fibres in cooperation with a US company. This product has the advantage of enabling X-ray photos from all angels, as the fibres have a low radiation reduction impact. A framework agreement was made according to which the system was developed, and the American firm was committed to purchasing a certain amounts of the new product. However, the firm did not keep its promises and choose another competing supplier, probably because of the increasing price, which resulted from the falling USD rate. The production had to be halted, but after some time other markets were developed, and the product was sold mainly at the European market through a Danish firm, Planet Medical. Later on, the products were also sold to German customers via a Swedish firm, which is owned by a large German company. The price of one tabletop is about 200,000 USD, but this constitutes only a fraction of the price of the entire product that the tabletop is part of.

A third product group is tools made of thermoplastics and carbon fibre for mounting of head, breast or another part of the body for X-ray. The tool is being precisely adapted to the individual patient and ensures that the position is exactly the same from time to time, and that the X-ray pictures are directly comparable.

Product approvals are not a problem for Nordic Composites. The CE marking class 1 is required with documentation of the material contents. In the USA, the importer takes the responsibility for the product.

The product development is highly integrated in the production process. The Director spends most of his time developing new products and in addition to this, there is one person, who currently develops the toe-off ortose, makes tests etc.

When the X-ray tabletop was developed, the idea was to make a product, which was slightly better than existing products. But it turned out that it was better in other ways, since, among other things, it was more stable, which is a big advantage for the user, as instability had been a big problem before. Nordic Composites did not know this problem during the product development process.

The development of the tabletop was very expensive, because of the bureaucratic approach that was pursued by the American firm. When something went wrong, the American company made a detailed description of the needed adjustments, and afterwards, Nordic Composites had to make a detailed documentation for the changes.

Sometimes the sales partners pick up ideas from customers and ask Nordic Composites to develop a product.

The marketing is done mainly via two firms. A Swedish company, owned by a large German company, and a Danish firm with sales offices all over Europe. In addition 6 – 7 agents are selling their products in various European countries on their own account. Currently, negotiations are held with potential new agents.

Strategies and cooperation

The access to capital is not particularly important to Nordic Composites, since capital never has limited the development of the firm.

The way in which the X-ray tabletop was developed and marketed indicates a lack of strategy. The main directions lie in the objective of development and manufacturing of medical device products on the basis of the composite material. Occasionally, after a very expensive development process, the product happened to have an unforeseen strength which saved the product when the development partner did not keep its promises (that were apparently not formalized in a contract).

Nordic Composites is not a member of the Medicon Valley and does not see any interest in being involved with other medical device firms. They are members of the small business community in the local area.

Competition

As mentioned before, an Icelandic firm makes a similar a toe-off ortose, and therefore, Nordic Composites has hired a local patent bureau to keep an eye on the possible patent violations.

In the markets of the other products, the competition is tough, and Nordic Composites is working hard to improve and adapt the products to the customers' specific needs.

Employment and competences at the establishment

Nordic Composites has now 20 people employed. A year ago the number was 26, and the establishment has not recruited any staff during the past year. Some staff was laid off when the tabletop product didn't have the expected break-through. Nordic Composites has one manager for the production and 3 product managers, 2 professional scientists and engineers, and the rest are apprenticed manual employees.

The company needs staff with a sort of craft background. Only one, the director, is an academic, a PhD in Physics. All others have either a craft education or they have been trained on the job in the firm. Nordic Composites does not use external training, and according to the firm, they need no specific health sector knowledge to be on the market.

The recruitment channel is the labour office, which is the normal practice in Sweden, and which has given good results in most cases. In case of recruitment of managers, advertisements in newspapers would be made use of. Last year some staff was made redundant, as the sales of the tabletop did not achieve the expectations. This led to the internal recruitment of staff from another department, but the firm still had to lay off some of its staff.

It happens that new staff is not able to pick up the craftsman skills necessary for the job, but in Sweden it is difficult to lay off staff, because of insufficient skills The principle of First In First Out shall be followed as a main rule, when a person has become permanently hired after a 3-6 months test period. In some cases it is possible to deviate from this main rule. This requires the approval of the trade union.

Employment and competences in the area

The craftsman skills that the establishment needs are not in good supply in the local labour market, and Nordic Composites find it therefore difficult to recruit new staff.

The relatively high concentration of medical device firms in the region is not relevant, because of the variation among these. It is not relevant for Nordic Composites to recruit people from companies that specialize in medical device products made from plastic or electronic devices.

The strengths of the establishment

The main strength of Nordic Composites is its patent and its unique products that are very competitive. The market is expected to be there in the future, and no competitors will seriously threat Nordic Composites. In addition, the integration of the product development makes the small firm extremely flexible which is a big advantage in comparison to the larger competitors.

Today a special advantage for the company is that it has focused so much on the European market and therefore not been hit by the low USD rate. This might otherwise have become a serious problem.

The weaknesses of the establishment

The main weakness is the manually based production technology, which is very expensive. This is to some extent necessary for the individually adapted products but makes the firm more vulnerable for future competition from low cost countries.

The administrative burdens in Sweden are another disadvantage of the firm vis-à-vis foreign competitors.

The problems that were experienced in connection with the cooperation with an American partner was the result of two the meeting of two very different business cultures, the organized and well documenting American firm collided with the flexible firm that were able

to do whatever was desired with a short notice, but which found the required documentation very burdensome. In the end, the lack of documentation (of promises from the American firm) made the flexible Nordic Composites loose.

Finally the lack of clear strategy and direction seem to be a serious weakness that could have killed the firm over the last two years, but it was saved by accidentally achieving unforeseen product strengths.

Expectations for the future

During the coming years Nordic Composites expects the market for medical products or services to grow slowly, and the employment of the company is expected to increase a little during the next 2 to 3 years.

Case study, Medicon Valley: Oticon

Oticon A/S is the number 2 manufacturer of high-quality hearing aids, worldwide. Its head office with a staff of 150 engineers and 200 other staff is based in Copenhagen, and the 650 production staff are located in Thisted, Jutland. In a very competitive market, the company focuses on digitalization and putting people first in designing quality hearing care solutions. The company has established an independent research centre that focuses on hearing in the broader context, and it holds international conferences for leading researchers, educators and hearing care professionals from around the world.

Oticon pursues an active HR policy to encourage communication and knowledge sharing among its staff and became known worldwide for the development and introduction of the spaghetti organization. Jobs in Oticon are considered very attractive and the company has no problems in attracting competent personnel in a competitive environment, with head offices of hearing aid manufacturing companies, representing 43% world market for hearing aids. However, the company has called for the establishment of a targeted, high-level education in audiology, but this demand has not yet been met.

About the company

Oticon is a subsidiary to William Demant Holding, which develops, manufactures and sells products and equipment designed to aid the hearing and communication of individuals. The Group focuses on three business areas: hearing aids, diagnostic instruments and personal communication. The development and production of hearing aids in Oticon and Bernafon makes up the core business of the Group.

The group was founded in 1904 as an importer of American hearing aids. During the Second World War it started a local production of hearing aids because of the embargo, and after the war it continued this along with the import activity. The name Oticon was taken after Second World War. Oticon is now the oldest, and one of the largest, manufacturers of hearing aids in the world.

The group consists of a global network of sister companies and agencies to ensure the distribution of hearing aids in over 100 countries. The development and production of hearing aids in Oticon and Bernafon is the core business of the Group, which employs a total of 2000 in over 20 countries. In Denmark, Oticon currently employs about 1.000 people and had a revenue of approx. DKK1.6 billion in 2003. 350 of the staff are employed in the Copenhagen head office and the remaining 650 are employed in the production department in Thisted, Jutland.

Products and market

The William Demant Group develops, manufactures and sells products and equipment designed to aid the hearing and communication of individuals. The Group focuses on three business areas: hearing aids, diagnostic instruments and personal communication.

Oticon provides quality, state-of-the-art hearing instruments to people worldwide. In addition to the simple functionality as hearing aids, intelligence and design are increasingly important for hearing aids. As a pioneer in the use of digital technology, Oticon continues to develop and manufacture technologically advanced hearing instruments to help people with hearing loss. The company's commitment to 'Put People First' in designing quality hearing care solutions is made stronger through partnership with dedicated and caring hearing care professionals in countries around the world.

Strategies

In 1977, Oticon established the independent research centre Eriksholm, which focuses on hearing rather than technology alone. To maintain this focus, Eriksholm now encourages hearing-impaired people to play a vital role in its research activities. Since its inception, about 1200 people have participated in experiments, both in the field and in the laboratory.

Currently the Research Centre employs 15 people, specialized in subjects from physics to acoustics, physiology, audiology and engineering. The research revolves around two main themes: psychophysics and technology. Topics include the individual aspects of hearing, the environment, and the lifestyle, personality and listening preferences of people with hearing loss. Research results are shared internationally on a regular basis.

While the broader research on the individual aspects of hearing etc. is conducted at Eriksholm Research Centre, the actual development of new products and services within the area of hearing aids is conducted within Oticon's R&D function. However, the work within the development function is often inspired by the studies and research conducted at Eriksholm, especially when these studies show a clear market potential.

In the short term, the studies and research at Eriksholm is not seen as a primary driving force for the development of new products. In a long-term perspective, the research at Eriksholm is however seen by Oticon as very important for the improvement of life for people with hearing loss but also for the actual improvement of hearing aid solutions and the future development of Oticon.

International knowledge sharing plays a very important role in the challenge to design the hearing solution that will best serve the individual requirements of each unique patient. This requires a mix of knowledge, technology and professional experience. Oticon's International Conference, therefore brings together leading researchers, educators and hearing care professionals from around the world to participate in a global forum to share and discuss knowledge collected in a wide range of academic, technological and practice settings. The conference is structured to include formal presentations, workshops and discussion groups. In addition it allows time for more informal knowledge sharing among conference participants.

Competition

The competition among the largest producers of hearing aids in World has intensified during recent years. This should be seen in connection with the development towards an increasing concentration within the industry.

The Worlds largest producers of hearing aids:

Producer:	*Market share:*
Siemens, Germany	22%
William Demant, Denmark	18%
Phonak, Switzerland	16%
GN Resound, Denmark	16%
Starkey, United States	11%
Widex, Denmark	9%
Sonic, United States	5%
Rion, Japan	1%
Others	2%

The competition between the three largest producers of hearing aids in the world (Siemens, William Demant, Phonak/GN Resound) are considered to be very tough. These companies compete on the same markets, and therefore, it is of high importance for Oticon that the development and production of hearing aids matches the needs of the users, and that Oticon has a close cooperation with users and hearing care professionals (dispensers of hearing aids).

It is seen from the list of producers of hearing aid that three of the largest suppliers of hearing aids are located in Denmark. These three have a combined market share of 43%.

Employment and competences at the establishment

Oticon has a total staff of around 1000, of which 350 are employed in the Copenhagen head office. 150 of these are engineers, mainly in electronics, and the remaining 200 are in sales and marketing and in administration. The remaining 650 are employed in the production department in Thisted, Jutland, where there are about 50 production managers and 600 production staff.

The employees of Oticon are generally regarded as highly competent. Ongoing development and variety in the working environment is a fundamental part of Oticon's business mission for its employees. Jobs in Oticon are considered very attractive, and it is not difficult for Oticon to get engineers and other staff.

Oticon is well known among management researchers and students around the world for its experimental internal organization. After a major cost reduction and product line rationalization program, which lead to a dramatic turnaround in the mid 1980s Oticon regained profitability, and immediately after this, the manager introduced the spaghetti organization. It was so named because of its relative lack of structure.

The aim of the new organization was to encourage the sharing and development of knowledge and creativity among the staff. It implied the introduction of offices without fixed places for the individual staff members, soft chairs in dedicated discussion rooms, and even lifts were locked off to encourage discussions in the stair case. Shortly after implementation of these measures, the company suffered financial losses, but after addressing the financial dynamics Oticon again became a profitable business.

There are a number of clearly formulated written assumptions on how employees function optimally and develop within their roles. These assumptions range from employees

wishing to accept responsibility and take on challenging tasks, to them desiring as much freedom as possible and wanting to be treated as equals in the company. Oticon has styled the entire organization according to these assumptions and both efforts and decisions made by the management team are based on these values.

Employment and competences in the area

The general supply of qualified employees within the area is in general regarded as satisfactory. This is especially the case among engineers in electronics and other technicians that are often recruited from other companies within the medical device sector and from the local universities and technical colleges.

The fact that companies representing 43% of the world production of hearing aids are based in Copenhagen establishes a good basis for recruitment of the specialized experts, provided that the necessary candidates are produced by the universities. However, the current range of educations within the area of hearing is not seen by Oticon as satisfactory. In Denmark, there exist a number of educations closely related to the hearing aid industry, but the company is calling for the establishment of more targeted educations. This is especially the case within the area of audiology, for which a specific high-level education does not exist in Denmark.

Case study, Medicon Valley: B-K Medical A/S

B-K Medical is a subsidiary of Analogic Corporation, a U.S. Boston based firm that specializes in precision signal acquisition and medical imaging. B-K Medical has a staff of 214 in Denmark and 300 worldwide. It is the global leader in urological and surgical ultrasound and supplies diagnostic ultrasound systems for a large range of other medical applications. B-K Medicals is an example of an enterprise being established on the basis of local competencies and developing into a considerable actor on the world market, which is then taken over by a large foreign company. The take-over has not at all been a disadvantage for the enterprise, its staff or the local society in which it operates.

About the company

The origins of B-K Medical lie within the respected Danish firm of Brüel and Kjær, specialists in sound and vibration technology, who established a specialized Medical Ultrasound division in 1976. B-K Medical A/S is a leading developer and manufacturer of specialized diagnostic ultrasound equipment. As pioneers in medical ultrasound, the company steadily built up a reputation for technical innovation, especially in relation to surgery and urology, where the company is acknowledged worldwide as one of the industry leaders.

In 1992, B-K Medical was established as a separate company and 49% of shares were bought by Analogic Corporation, an innovative U.S. firm with a strong track record in precision signal acquisition and processing components and subsystems, and a leader in medical imaging. Three years later, Analogic took over the remaining part of the shares. As part of Analogic Corporation, B-K Medical has enjoyed strong technological and financial support.

B-K Medical, with its new headquarters in Herlev, west of Copenhagen, has demonstrated sustained growth and currently employs about 300 people worldwide of which about two-thirds, 214, are located in Denmark.

Products and market

B-K Medical develops, produces and markets ultrasound systems for medical diagnostic imaging. The systems are sold throughout the world with the major markets being Europe, USA and Asia.

B-K Medical is the global leader in urological and surgical ultrasound and supplies diagnostic ultrasound systems for a large range of other medical applications. The company offers the market's largest selection of specially designed, application-specific transducers.

In the fields of prostate scanning and brachytherapy (radioactive seed implantation and high dose rate therapy), B-K Medical systems offers features like the ability to image the entire prostate in a single view, or to view a lesion or biopsy needle in both the transverse and longitudinal planes.

B-K Medical pioneered the use of ultrasound in surgery and has devoted many resources to the development of scanners and transducers specifically for surgical applications. Ultrasound is becoming increasingly recognized as an excellent supplemental modality for breast examination, and B-K Medical offers breast transducers that are user-friendly and ergonomically designed.

B-K Medical is represented in 60 countries, and has subsidiary sales companies in the U.S., Belgium, the Netherlands, Germany, Italy, Norway, Sweden, the U.K. and Thailand. An extensive network of distributors connects B-K Medical with Eastern Europe, the Middle East, Asia and the rest of the world.

For more than 25 years, B-K Medical has enjoyed a reputation as an innovative leader in medical ultrasound. The company specializes in urological and surgical applications and are strong in general ultrasound, ob/gyn, vascular, musculoskeletal and other applications (The term ob/gyn stands for obstetrics and gynecology. This is the branch of medicine that deals with pregnancy, childbirth, and women's health problems.

More than 12% of the turnover is reinvested in research and development. The development department consists of 60 employees where 20 are involved in software development

B-K Medical not only excels at solving the specific needs of medical practitioners, but prides itself on supplying solutions of top quality. The products are highly complex and the sales of it is relatively insensitive to price changes.

B-K Medical is ISO 9001 certified and most of the products have FDA market clearance and are CE-Medical Device certified. Therefore external audits are performed accordingly. All of B-K Medical products require approval from regulatory authority.

Strategies and cooperation

By working closely with their customers in the medical ultrasound community, B-K Medical attempts to foresee and fulfill their coming needs. The company’s goal is to create products that will help drive the development of medical ultrasound applications. Building on the ideas and experience of surgeons around the world, the company produces innovative imaging systems and accessories that fulfill the need for flexibility, mobility and ergonomics in the operating room.

B-K Medical is not particularly active in the medical device community in ‘Medicon Valley’ nor in regional development in general.

Competition

B-K Medical is the only company in Denmark manufacturing Ultrasound scanning systems. The main competitors are Siemens, GE and Phillips, but they are not in direct competition as they have different profiles and product characteristics. The company is not in direct competition with companies from low cost countries, but as an assembling company it makes use of many parts that may over time, increasingly be manufactured in low cost countries.

Employment and competences at the company

The staff has been relatively stable over the last year. The company employs 25 managers at various levels, 55 engineers and technicians, 35 fully apprenticed manual employees and 35 semi skilled workers. The remaining staff are in marketing, sales and administration.

The engineers and technicians are recruited mainly from software firms but B-K Medical also feels a social obligation to employ a certain number of newly educated engineers. There are no other firm in the region or in the country that are dealing with ultra sound scanning and the recruitment from other medical device firms is therefore not relevant. Still B-K Medical strongly supports the new education of medical engineers in the neighbouring Technical University of Denmark.

Production staff, including electro-mechanical staff, technicians and assembly staff are mainly recruited from firms that are also in electrical engineering, assembly and similar activities. It is not relevant to have a medical device background as new employee in the firm.

All new staff need an introduction to the specific technological field, as they will rarely possess the specific background corresponding to the activities of B-K Medical. In addition, B-K Medical offers the employees the opportunity for personal and professional development through training programs, teamwork and access to the latest development tools. The good working atmosphere is demonstrated by high employee satisfaction and continuity.

Employment and competences in the area

Competent applicants for the vacant positions in the company are in good supply in the local labour market, but it is not easy to find engineers exactly with the necessary experience background. The concentration of medical device and biotechnology firms in the region is not particularly relevant for B-K Medical. However, the high number of technology firms around Copenhagen still provides a good labour supply at both engineering and production staff levels.

The strengths of the company

The strength of B-K Medical is found in the patented, high-quality solutions in all clinical areas for the portable ultrasound scanner market. It offers the world's largest selection of application-specific transducers and has produced many breakthroughs in diagnostic ultrasound. Some examples are:

- The world's first laparoscopic ultrasound probe with a tip adjustable in four directions, plus built-in biopsy facilities.
- The world's first transrectal ultrasound probe that can scan simultaneously in two planes.
- A uniquely designed anorectal probe that scans a 360-degree sector, with a built-in crystal mover for acquiring 3-D image sets.
- A mobile ultrasound scanner that is specially optimized for use in the operating room.

The fact that B-K medical is now a wholly owned subsidiary of Analogic Corporation provides a strong capital base that is important vis-á-vis the competitors in the world market of ultrasound scanning. Finally, the company benefits from its location in an area with a Technical University and with numerous companies in the fields of software and technology.

The weaknesses of the company

No particular weaknesses can be identified.

Expectations for the future

The future depends on the continued innovation in the core field of activities and the success in related fields. For example, B-K Medical is also trying to develop scanners for the veterinary field, which may also have bright perspectives. The company expect employment to remain at the present level during the next few years.