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REGIONS OF KNOWLEDGE 2**

**MIRIAD:
Managing and Infusing Research Investment
And Development**

Project Participants

Partic. Role	Partic. no.	Participant name	Participant short name	Country	Date enter project	Date exit project
CO	1	University of Sheffield Management School	USFD	UK	1	24
CR	2	South East European Research Centre	SEERC	Greece	1	24
CR	3	Chamber of Commerce University Istanbul	ITICU	Turkey	1	24
CR	4	University of National and World Economy Sofia	UNWE	Bulgaria	1	24

Table of Contents

1.0 Introduction.....	4
2.0 SME Benchmarking – Yorkshire and Humberside	5
3.0 SME Benchmarking – Central Macedonia and East Macedonia Thrace.....	30
4.0 SME Benchmarking – Thrace Turkey	55
5.0 SME Benchmarking – South and East Bulgaria	76
6.0 Conclusions.....	90

1.0 Introduction

This report constitutes deliverable 4.2 of the MIRIAD project. The report is comprised of analysis of data obtained from a survey of SMEs in each of the four regions. This survey utilised the SME scorecard developed previously and submitted as D4.1. The reports provide an overview of the data obtained and provides an in depth look at the regions' knowledge assets, methods of obtaining external knowledge and interaction with the business support networks outlined in D2.2. It examines these factors in terms of how they impact on the competitiveness of SMEs. As described in D4.1, knowledge is defined as broadly consisting of research and development, ideas, and other information that is, or potentially can be, used to make the operation of the SME more effective. Furthermore, competitiveness is defined the ability of an SME to maintain or improve its financial position through maintaining or improving the market share for its products and/or services. The D4.1 scorecard also requires SMEs to rate key factors according to both their 'importance' and 'effectiveness'. In this case, importance relates to how necessary a particular factor is to the competitiveness of an SME, while effectiveness relates to how efficient an SME uses a particular factor.

The broad methodology for collecting data consists of administering the SME scorecard to a minimum of 50 SMEs in each of the four regions (the exact number of SMEs and the criteria for their inclusion in each region is discussed in each of the 'regional chapters'. Utilising the same scorecard instrument in each of the four regions meant that it was possible to gather comparative data from these regions. One exception is that of Bulgarian, where due to certain business cultural issues the researchers experienced difficulties in obtaining answers for certain questions, especially in relation to issues concerning knowledge sources and collaboration partners (where SMEs considered divulging such information may compromise any competitive advantage they have acquired). In general, however, the SME scorecard proved a highly successful mechanism for collecting and analysing the empirical data required by the MIRIAD initiative.

This deliverable consists of the following:

- Chapter 2 – SME Benchmarking report Yorkshire and the Humber (UK)
- Chapter 3 – SME Benchmarking report Central Macedonia and East Macedonia-Thrace (Greece)
- Chapter 4 – SME Benchmarking report Thrace (Turkey)
- Chapter 5 – SME Benchmarking report South and East Bulgaria (Bulgaria)
- Chapter 6 – Conclusions.

2.0 SME Benchmarking – Yorkshire and Humberside

This section presents the results for the Yorkshire and Humber region. These results were obtained through surveying 50 SMEs in the region, gathering data on knowledge assets, knowledge flows and interaction with and awareness of support organisations. The targeted firms were primarily within manufacturing sectors, including those sectors traditionally identified as ‘advanced’ or ‘knowledge-based’, as well as covering knowledge based service industries.

The data analysis in this chapter is divided into four sections. The first section examines data on the knowledge stock within the firms and their competitiveness, in order to benchmark the importance and effectiveness of various factors. The second section analyses data on knowledge creation and acquisition, in order to assess how knowledge is created within the SMEs, whom it is created by, sources of external knowledge, and the role of social capital in obtaining knowledge. The third section examines the extent of collaboration with other firms, the location of the partners, the influence of social capital on collaboration and the membership of business associations. The fourth section examines data on business support policy, and awareness and interaction of business support organisations. Finally, the fifth section presents a summary and conclusions.

2.1 Knowledge Stock and Competitiveness

This section presents data on the knowledge stock of the SMEs and their importance and effectiveness for the overall competitiveness of the SME. The data are divided into five broad groups: Human resources; Intellectual Assets; Practices and Routines; Physical Resources; and External Relations.

In terms of Human Resources, Table 2.1 shows that the commitment of employees, the skills possessed by employees and management commitment are the most important factors affecting competitiveness of the SMEs in Yorkshire and Humberside. This result appears to be intuitive, as a skilled and committed workforce as well as a committed manager or management team appears to be a sound footing on which to operate a firm. The skills of both employees and management are rated as being of higher importance than the qualifications they possess; possibly meaning that tacit knowledge is valued more highly than codified knowledge.

Table 2.1 – Human Resources and Competitiveness

Human Resources	Importance	Effectiveness	Percentage Difference
Employee skills	8.70	7.98	8.28
Employee qualifications	5.85	6.17	-5.47
Employee competences	8.44	8.05	4.62
Employees' problem solving capacity	7.83	7.34	6.26
Employees commitment	8.68	8.10	6.68
Employee loyalty	7.61	7.66	-0.66
Management skills	8.59	7.85	8.61
Management qualifications	5.66	6.00	-6.01
Management competences	8.56	7.68	10.28
Management commitment	8.78	8.32	5.24
Management loyalty	8.44	8.07	4.38

Table 2.1 also highlights a general pattern of an asset being of more importance than it is effective, i.e. these factors are all highly necessary for the competitiveness of the business, but are currently not utilised as efficiently as possible. Therefore the firms are, generally, not utilising their assets to the optimum level. The exception to this is with respect to employee and management qualifications, which are used more effectively than is necessary to improve or maintain the competitiveness of the firm..

Table 2.2 presents data on the firms' intellectual assets in relation to competitiveness. Market knowledge and IT facilities are rated as the most important, scoring 8.54 and 8.37 respectively. Interestingly, typical intellectual assets such as patents, copyrights, trademarks and trade secrets rank lowest in terms of importance. The firms instead rely on internal training programmes, process manuals and websites to generate competitive advantage.

Table 2.2 – Intellectual Assets

	Importance	Effectiveness	Percentage difference
Patents filed	2.82	3.49	-23.76
Copyrights held	3.18	3.54	-11.32
Trademarks registered	4.03	4.50	-11.66
Trade secrets	5.05	4.98	1.39
Market knowledge	8.54	7.27	14.87
Process manuals	6.08	5.95	2.14
Internal training programmes	6.98	6.68	4.30
Website	7.51	6.63	11.72
IT facilities	8.37	7.51	10.27

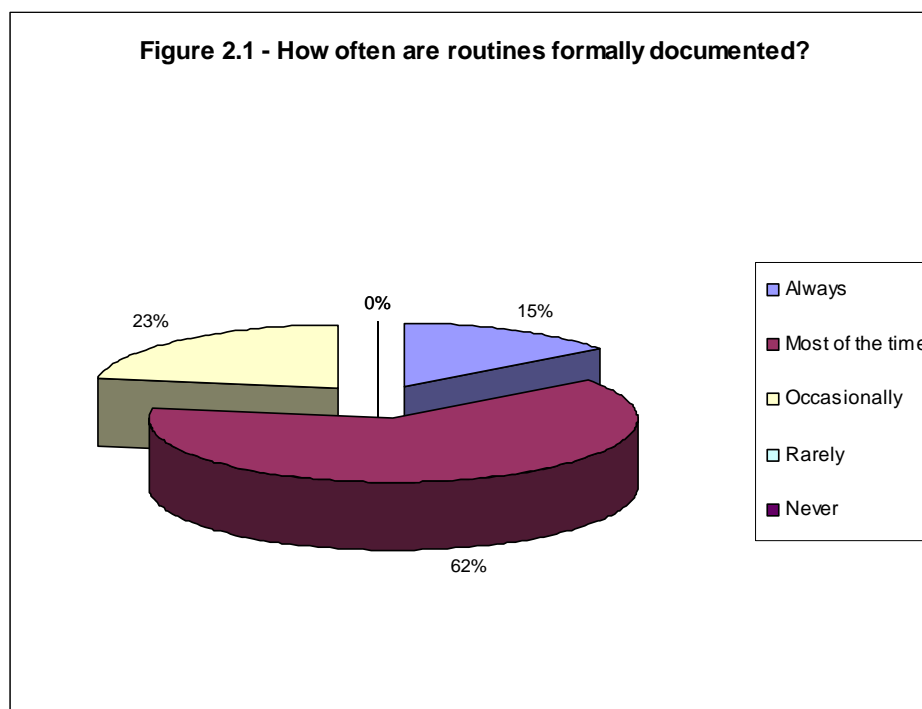
Table 2.2 shows that 6 of the 9 assets are rated as more important than they are effective, indicating a gap in the ability of SME to effectively deploy these assets as a means of sustaining or improving their competitiveness. The intellectual assets of patents, copyrights and trademarks are all more effective than important, i.e. they are not deemed crucial to the firms' competitiveness but are used in an efficient way to maximise their value.

Table 2.3 shows that communication with customers is the most important practice or routine, with an average score of 9.39, followed by communication with suppliers and on-the-job training. Interestingly, on the job, or internal, training appears to be of much higher importance to the firms than external training, highlighting the fact that SMEs are inward looking in terms of training and may be less likely to look for sources external to the firm when training their workforce.

Table 2.3 – Practices and Routines

	Importance	Effectiveness	Percentage Difference
Process manuals	6.51	5.97	8.29
On the job training	8.17	7.63	6.61
External training	5.76	5.78	-0.35
Management style	7.83	7.02	10.34
Forums for solving problems	6.70	6.25	6.72
Communication with customers	9.39	8.10	13.74
Communication with suppliers	8.22	7.59	7.66

With the exception of external training, the importance of all the ‘process and routines’ factors are all higher than their effectiveness, i.e. the SMEs are not able to use them as efficiently as is necessary to remain competitive, and are not maximising them. In terms of recording and documenting these practices and routines, Figure 2.1 shows that generally these firms record a their practices and routines, with no firm reporting that they never undertake this practice. Indeed, two-thirds of the sample firms document their routines most of the time, and a quarter of firms at least occasionally document their processes and routines, with the remainder documenting all their processes and routines.



Physical resources are generally the least important factors for the competitiveness of SMEs, as the average scores in Table 2.4 are lower than the scores for the factors presented in Tables 2.1-2.3, and 2.5. Road links and the plant equipment owned by the firms are the most important physical resources. Interestingly the firms’ proximity to their suppliers and customers does not appear to be very important, suggesting that the sampled firms may be trading more outside the region.

Table 2.4 – Physical Resources

	Importance	Effectiveness	Percentage Difference
Industrial buildings	6.17	6.00	2.76
Retail premises	2.22	2.68	-20.72
Land	4.13	4.45	-7.75
Plant equipment (owned)	6.56	6.70	-2.13
Plant equipment (leased)	4.33	5.03	-16.17
Road links	6.17	6.40	-3.73
Rail links	3.72	4.02	-8.06
Proximity to customers	4.24	4.45	-4.95
Proximity to suppliers	4.46	5.00	-12.11

Table 2.4 highlights the fact that, with the exception of industrial buildings, the effectiveness of all the physical resources is higher than their importance to competitiveness. Thus, the firms are using them more efficiently than they are necessary.

Table 2.5 suggests that the most important factors in terms of external relations are customer satisfaction (average score of 9.44), customer relations (9.24), customer loyalty (9.10), as well as the firm's reputation (9.10) and responsiveness to customers needs (8.93). The data also shows that relationships with customers are rated as more important than relationships with suppliers. The licensing of the firm's products or obtaining licences for other firm's products does not appear to be important for competitiveness, suggesting that the firms focus internally on developing their own products and services.

Table 2.5 – External Relations

	Importance	Effectiveness	Percentage Difference
Distribution arrangements for your company's products and services	6.95	6.71	3.45
Customer loyalty	9.10	7.66	15.82
Brand image of your products/services	8.66	7.90	8.78
Reputation of your company	9.10	8.37	8.02
Customer satisfaction	9.44	8.27	12.39
Responsiveness to customer demands	8.93	7.98	10.64
Relationships with your customers	9.24	8.20	11.26
Relationships with your suppliers	8.12	7.39	8.99
Licence agreements with other firms (for your products)	4.03	3.97	1.49
Licence agreements with other firms (for their products)	3.63	3.92	-7.99

With the exception of licence agreements for other firm's products, the importance of these factors is higher than the effectiveness, thus the firms are not utilising the resources they possess as efficiently as they need to be in order to maximise competitiveness.

2.1.1 Summary

The data suggests that the most important factors for the competitiveness of the firms are their human resources, followed by their external relations, internal practices and routines, intellectual assets and physical assets. The relatively low importance of intellectual assets in terms of competitiveness suggests that these firms are not competing with respect to the codified knowledge they possess but rely on the more tacit knowledge of their human resources, contacts with other firms and their practices and routines.

In general, there is a gap between the level of importance and the level of effectiveness of all the factors. The fact that this difference is generally positive suggests that the firms are not able to use their resources as efficiently as they would like to.

2.2 Knowledge Creation and Acquisition

This section examines data on knowledge creation and acquisition activities of the SMEs in the Yorkshire and Humberside region. In terms of who actually creates the knowledge within the firms, Table 2.6 shows that the most important and effective source of knowledge creation is the firm's management, with an average score of 8.46. Interestingly, R&D workers, R&D teams and R&D departments are not rated as highly as either management or shop floor workers, suggesting that it is the workforce in general that are the source of innovation rather than specific R&D workers.

Table 2.6 – Knowledge Creation

	Importance	Effectiveness	Percentage Difference
Management	8.46	7.49	11.47
Shop floor workers	6.78	6.18	8.85
Specific workers employed to undertake R&D	6.21	5.51	11.27
Specific teams created to undertake R&D as required	6.08	5.30	12.83
A specific department (e.g. an R&D department)	5.23	4.67	10.71

On average, 44.33% of the firms' workforce had the required skills and expertise for creating relevant knowledge. While this figure appears to be low, as fewer than half the workforce have the skills to create knowledge, it has to be qualified in terms of the fact that not all employees will be involved in knowledge creation activities. Figure 2.2 shows that over half the firms (54%) report that the proportion of the workforce is adequate for their needs. Also, the data shows that the majority of firms (61%) report that the workforce has either adequate or more than adequate skills.

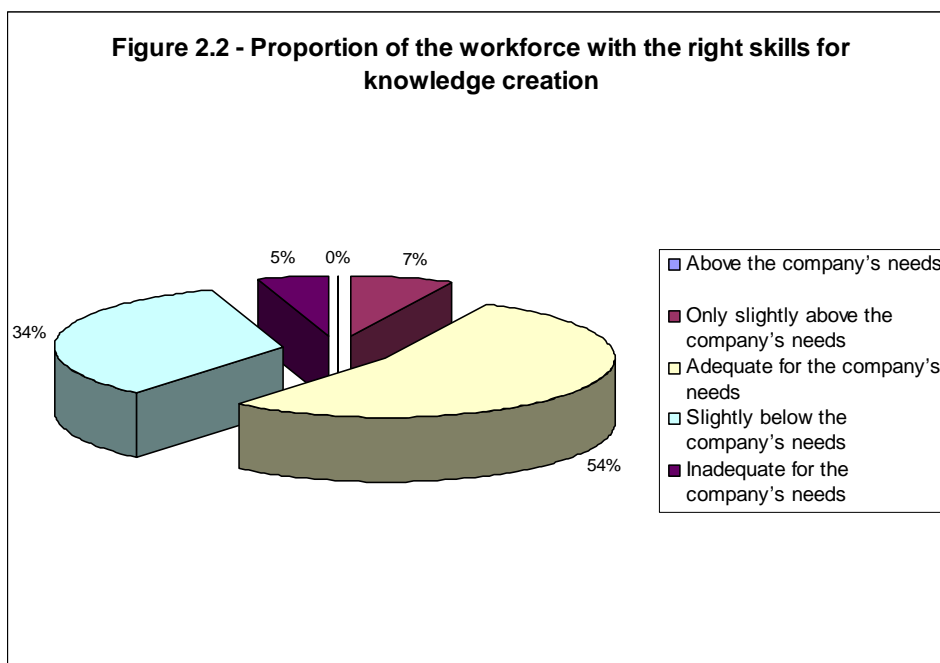


Table 2.7 shows that the most important sources of knowledge for SMEs in Yorkshire and Humberside are in fact located outside the region. The top two sources are customers and suppliers located outside the region, although the average score for suppliers (5.98) does not suggest they are very important. The data shows that for non-firm sources of knowledge, i.e. public and private sector organisations and universities, as well as professional networks, local sources are rated as more important, although the low scores suggest that they are not significant sources of knowledge for the SMEs.

Table 2.7 – Sources of Knowledge

	Within the Region	Outside the Region
Customers	5.18	7.20
Suppliers	4.85	5.98
Rival firms	2.07	4.20
Public sector organisations, such as government business support agencies	2.88	2.62
Private sector organisations, such as private training or research providers, and consultants	3.23	3.00
Universities or other higher education institutes	3.47	2.38
Professional networks (e.g. chambers of commerce, trade or business associations, business clubs or other professional networks).	3.43	2.62
International Organisations/Donors	1.56	2.08
Other (please state)	1.33	4.50

The locations of the customers and suppliers from outside the Yorkshire and Humberside region were diverse. Customers were mainly located in the UK with cities such as London, Birmingham and Manchester being specifically mentioned. International locations mentioned included Europe, USA and Asia. In terms of suppliers, these display a similar pattern, although there are a higher proportion of international locations mentioned. These locations include Europe, USA, Japan, China, Israel and Spain, as well as UK locations such as London, Birmingham and Manchester.

For the majority of SMEs, their sources of knowledge appear to change infrequently. Figure 2.3 shows that for 64% of firms their knowledge sources occasionally change, suggesting a level of stability. Around a quarter of the sample (22%) report that their sources of knowledge change quite frequently, indicating that among some of the firms there is a pattern of changing interactions with respect to obtaining external knowledge.

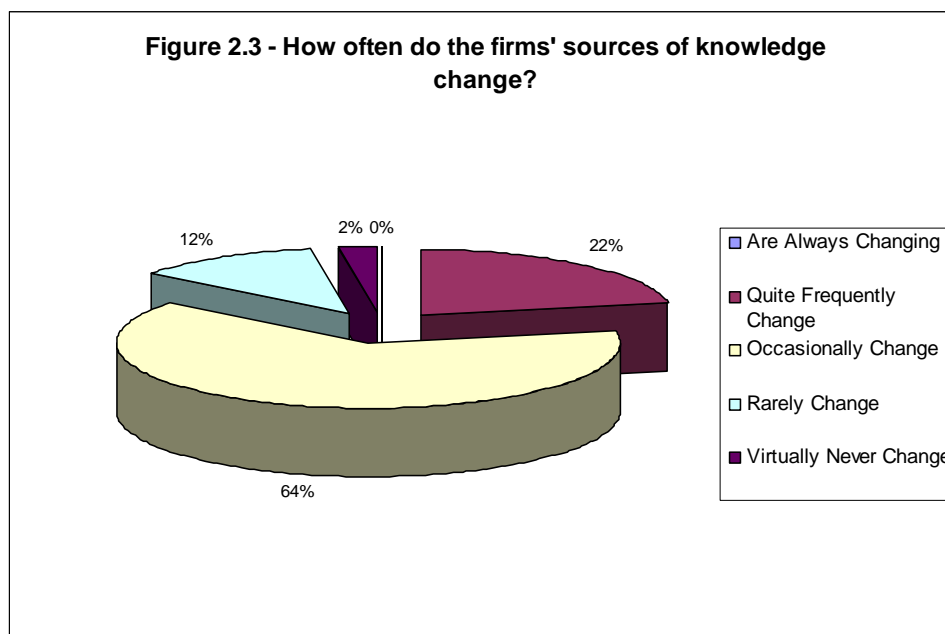


Figure 2.4 suggests there is some evidence of social interaction among individuals from the SMEs and the other organisations from which they source knowledge. Around two-thirds of the sample report that they are occasionally engaging in social activities with individuals from organisations, which are sources of external knowledge.

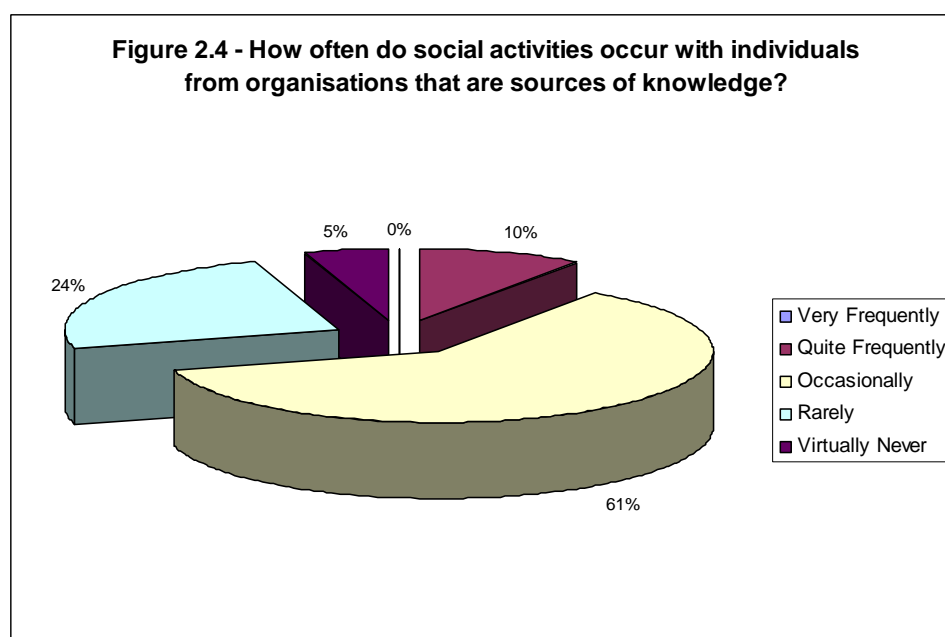


Figure 2.5 highlights that knowledge acquisition is a key motivation behind this interaction, since 8% of firms reported that the social activities would continue as before if knowledge was not sourced from these firms. For the rest of the sample, interaction would decrease at least slightly and, for 13% of firms, would cease altogether.

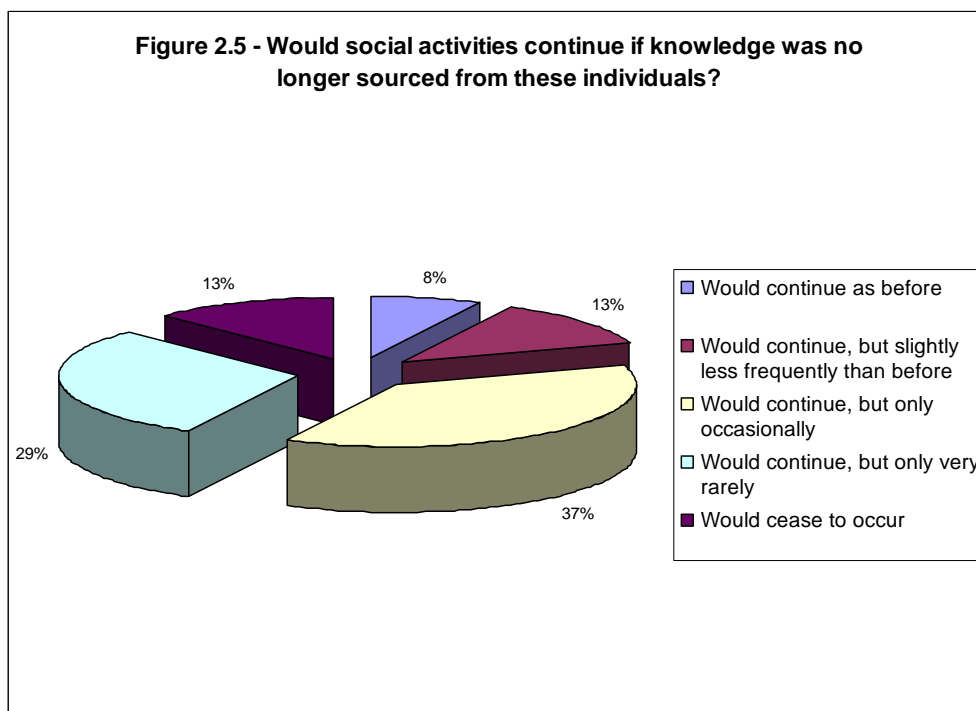
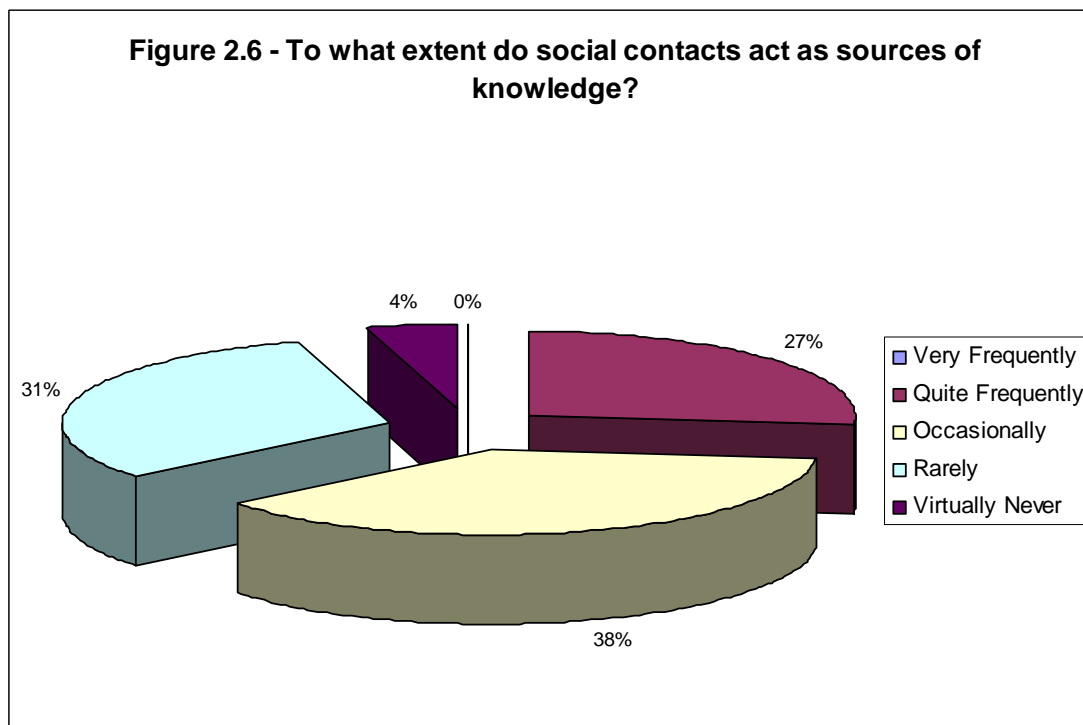


Figure 2.6 shows that social contacts do act as sources of knowledge, with over two-thirds of the sample reporting that social contacts act as sources of knowledge either occasionally or quite frequently, suggesting that social interaction is an important mechanism for obtaining external knowledge.



In terms of the types of knowledge the SMEs obtain from external sources, Table 2.8 highlights the fact that the firms obtain a diverse range of knowledge. employment law and health and safety advice are the knowledge types most frequently obtained

from external sources. Knowledge on finance, accounting and auditing, recruitment, training and IT development and support appear to be obtained from external sources either 'very often' or 'quite often'. In terms of the development of new products, processes or services, it appears that these are mostly developed in-house, as around 60% or more of the sample report that these types of knowledge are either not often or never obtained from external sources. Therefore it would appear that it is knowledge of operating a business, rather than developing products, which is most often obtained from external sources.

Table 2.8 – Types of knowledge obtained from external sources

	Very often obtained	Quite often obtained	Not often obtained	Never obtained
Employment law	17.1	61.0	22.0	0
Health and safety advice	17.1	53.7	29.3	0
Finance, accounting and auditing	14.6	46.3	36.2	2.4
New Product development	15.0	25.0	47.5	12.5
New Process development	5.0	37.5	42.5	15.0
New Service development	0	25.0	57.5	17.5
New Technology	9.8	46.3	39.0	4.9
Recruitment	9.8	46.3	34.1	9.8
Training	14.6	41.5	39.0	4.9
Procurement of inputs	0	20.0	60.0	20.0
IT development/support	14.6	51.2	31.7	2.4
General business support	4.9	31.7	58.5	4.9

Table 2.9 highlights that each knowledge discipline is not rated highly in terms of importance, with computer science and information systems being rated the most important with an average score of 5.51. It would appear that these categories of academic knowledge are not the types of knowledge that the firms are seeking, which suggests that it may be more business specific knowledge that the firms seek from external sources.

Table 2.9 – Importance of external knowledge obtained by discipline

	Importance
Biological sciences	1.39
Medicine and dentistry	1.49
Computer science and information systems	5.51
Engineering technology	4.71
Mathematical sciences	1.76
Business and administrative (e.g. logistics)	3.93
Physical sciences	2.54
Agriculture	1.80
Architecture, building & planning	2.90
Other	2.29

It was found that firms introduced an average of 62.52 new products or services or adaptations to new products and services over previous three-year period. In terms of the innovation environment, Table 2.10 indicates that two of the most important factors are the core values of the firm and the innovative culture within the firm, which suggests that the firm will be innovative if the management team values the contribution of innovation to competitiveness, and among the workforce there is a culture which promotes innovation.

Table 2.10 – Innovation Culture

	Importance	Effectiveness	Percentage Difference
Core values of firm	8.12	7.53	7.27
Innovative culture	7.51	6.54	12.92
Development of new markets	7.63	6.27	17.82
Development of networking opportunities within the company	5.00	4.71	5.80
Development of networking opportunities outside the company	6.05	5.17	14.55
Development of new products	6.40	5.38	15.94
Development of new services	5.68	4.76	16.20
Development of new processes	5.10	4.90	3.92
Development of new materials	3.55	3.70	-4.23
Adoption of new inputs and materials	4.69	4.49	4.26
Monitoring competitors' products and processes	6.38	5.13	19.59

Table 2.10 highlights the fact that every factor comprising the innovation culture is rated as more important than effective. This suggests that the firms are not using these factors as efficiently as they need to in order to be competitive.

2.2.1 Summary

In terms of knowledge creation, the factor rated as most important within the firm was the management team. On average, 44.33% of the firms' workforce possesses the skills and expertise required for creating knowledge relevant to the firm, and 61% of firms reported that skills were adequate or more than adequate for the firm's needs. With respect to external knowledge the most important factor, in fact the only factor to be rated as important overall, were customers located outside the region.

The data suggests that while the sources of external knowledge do change they are fairly stable, with 64% of firms reporting that they occasionally change. Social interaction with knowledge sources appears to be fairly important, with 61% of firms reporting that they occasionally socialise with these individuals. There is also evidence that this interaction is influenced by knowledge acquisition as only 8% of firms reported that social contact would continue as before if they could no longer source knowledge from these individuals.

The average number of innovations introduced in the previous three-year period was 65, equating to over 20 per year. The most important factor behind the innovative culture of the firm appears to be the core values, suggesting that a firm is innovative if innovation is held to be important within the firm. Finally, academic knowledge does not appear to be rated very highly in terms of importance to these firms, and it appears that the types of knowledge sourced externally are general business advice such as accounting, health and safety and employment law.

2.3 Collaboration

This section examines data on SME collaboration focussing on the following factors: with whom they collaborate; the importance of various sources of collaboration; the changing nature of the relationships; the impact of social interaction on collaboration; and membership of business organisations such as chambers of commerce.

Table 2.11 presents data on collaboration and the importance of various partners to the firms. The most striking result is that in general collaborators outside the region are rated as more important, mirroring the result obtained with sources of external knowledge in Section 2.2. The most important source of collaboration are customers located outside the region with no others scoring higher than 6.

Table 2.11 – Importance of Collaborators

	Within the Region	Outside the Region
Customers	4.06	6.64
Suppliers	3.22	5.51
Rival firms	1.86	3.17
Public sector organisations, such as government business support agencies	2.43	2.36
Private sector organisations, such as private training or research providers, and consultants	2.94	2.85
Universities or other higher education institutes	3.59	2.79
Members of your professional networks (e.g. chambers of commerce, trade or business associations, business clubs or other professional networks).	3.13	2.37
International Organisations/Donors	1.18	1.94
Other	1.00	1.00

The locations of the customers outside of the region were divided between the UK, specifically London and Manchester and international locations such as Europe, USA and Japan. The location of the suppliers displayed the same patterns, with the addition of Taiwan and China.

The data also appears to show a low level of turnover with respect to the collaboration partners. Figure 2.7 shows that around two-thirds of the SMEs report that their collaborative partners change occasionally, with 15% reporting that they change quite frequently. However, just 2% of firms report that their partners in collaboration are always changing. Thus, changing partners appears to be a gradual process, which, while it does occur, is not a frequent process.

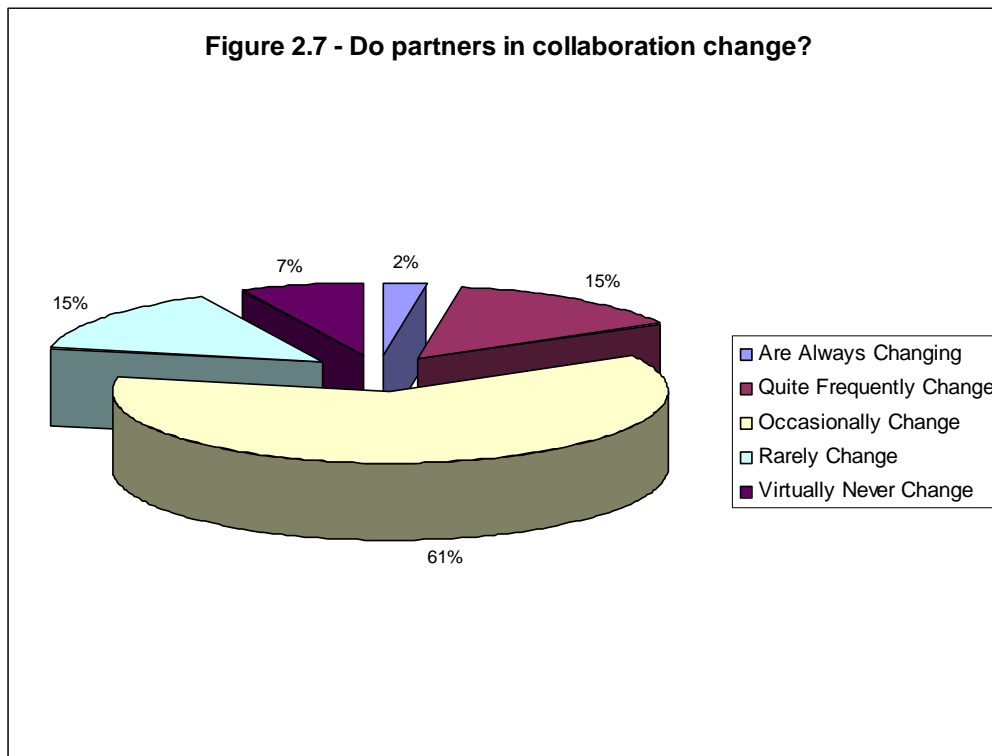


Figure 2.8 suggests that social contact with collaborative partners is relatively common as over half the SMEs report either occasionally or quite frequently engaging socially with their partners. However, this means just under half of the sample engages in this behaviour either rarely or never. Thus, while social interaction with collaborators does occur, it is not a particularly frequent occurrence.

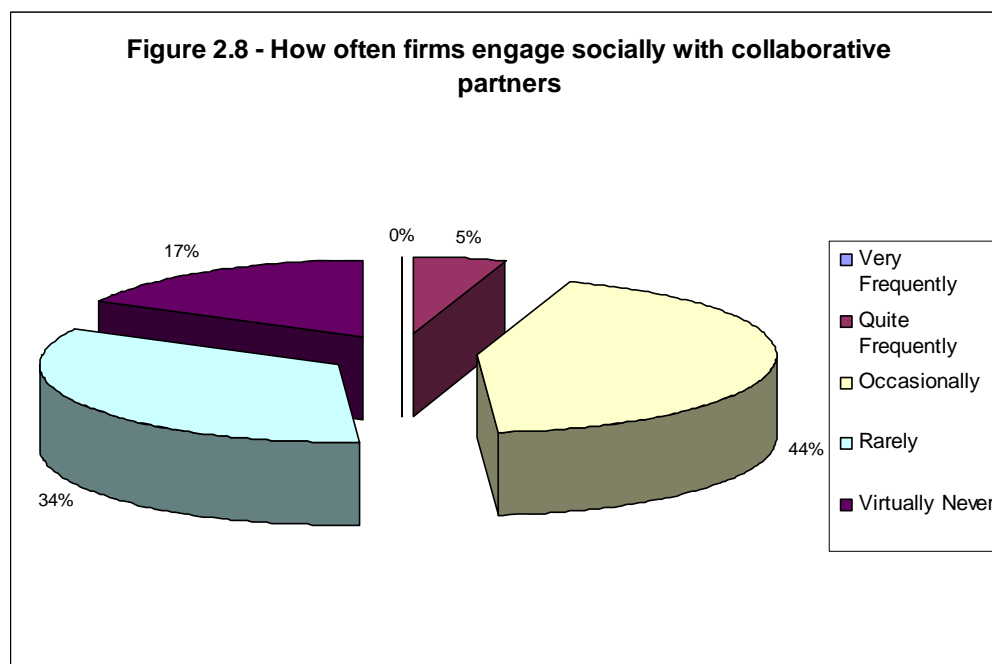
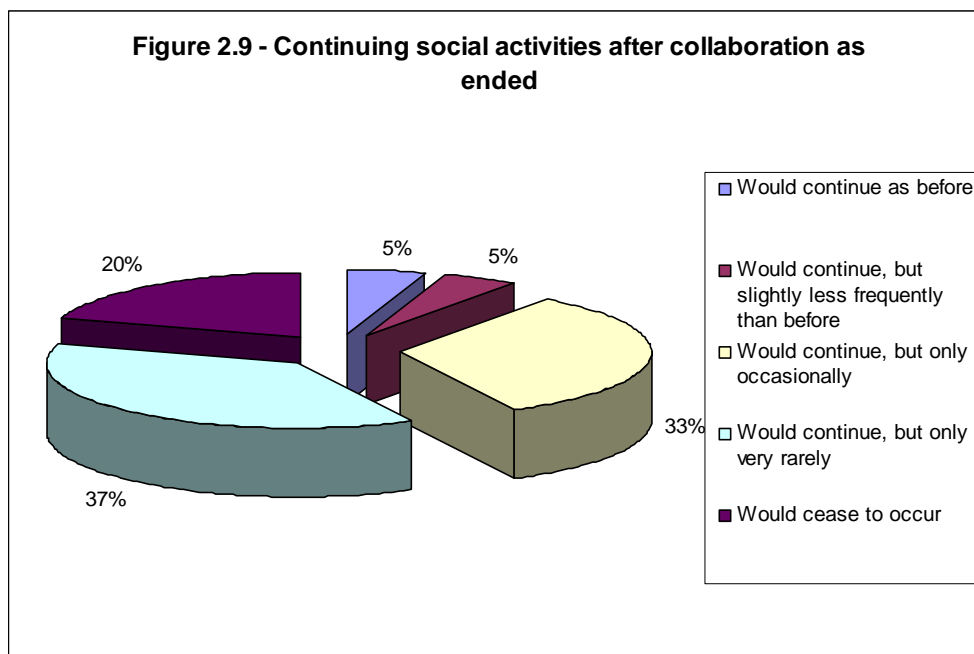


Figure 2.9 shows that only 5% of firms would continue to engage socially with their partners if the collaboration with them ended. In general, social interaction with

collaborators would be reduced or cease completely if the collaboration ended. Thus, the social interactions observed would appear to be linked to collaboration. This pattern is similar to that of social interaction with knowledge sources, in that once the contact is no longer a source of knowledge then interaction levels will fall or cease altogether.



Overall, the sample firms appear to be well connected. Over three quarters report membership of a trade or business association, and two-thirds are members or other professional networks. Over half of the firms report membership of local chambers of commerce.

Table 2.12 – Percentage of firms in membership organisations

	Member	Non-member
Chamber of Commerce	58.5	41.5
Trade or Business Association	75.6	24.4
Business Club	24.4	75.6
Other professional networks	68.3	31.7

Table 2.13 shows that obtaining and sharing knowledge are the most important factors with respect to the membership of networks. While these advantages do not score highly, i.e. scores of 5.73 and 5.19, suggesting that they are only rated as fairly important. However, they also indicate that the transfer of knowledge may be the most important factor influencing involvement and membership of network organisations.

Table 2.13 – Importance of Membership of Networks

Developing customer contacts	4.19
Developing supplier contacts	3.95
Obtaining knowledge from other parties	5.73
Creating solidarity within your industry	4.50
A means of representing views	4.44
Sharing knowledge with member	5.19
Developing trust within the industry	4.53

2.3.1 Summary

The data in this section has highlighted that the most important partners for collaboration are customers located outside Yorkshire and Humberside. The collaboration partners do change but not very frequently and socialising with partners is a common occurrence. However, the social interaction appears to be dependent on the collaboration continuing, as most firms report that social interaction would decrease if the collaboration ended. The data also shows that the firms are well connected in terms of membership of networking organisations.

2.4 Barriers and Business Support

This section examines data on the barriers to innovation faced by the firms and the policy actions the firms would like to see implemented across the region. Also, awareness of the regional business support network is examined, along with the interaction between the SMEs and the support organisations.

Table 2.14 highlights that, in general, the various barriers to business support are not rated as important as none of them score higher than 5 on average. The most important barrier faced is the inability to recruit skilled labour, which suggests there may be the beginnings of a skills shortage in the region, although the average score of 4.95 suggests that this is not a large problem at present. These results suggest that firms consider they are able to access relevant networks, collaborators, finance, premises, training and labour, the knowledge created in the region is relevant and the business support is of suitable quality.

Table 2.14 – Barriers to knowledge creation

Barriers	Importance
Unable to access relevant networks	2.67
Unable to access relevant collaborators	3.35
Inapplicability of knowledge created by others in region (e.g. universities, other companies or existing networks)	3.25
Quality or applicability of available business support or advice	3.15
Unable to access suitable finance	2.78
Unable to access skilled labour	4.95
Unable to access suitable training	3.78
Unable to access suitable equipment or plant	2.53

In terms of future policy directions, it appears that the SMEs believe that supply chain development is not important, as 45.0% of respondents suggested it does not need to be addressed further and just 5% thought it should form a core policy. The priority for future policy appears to be making finance available for firms to expand R&D and knowledge related activities, which 45% of respondents suggested should form the core of policy. This is followed by support for companies entering new markets, which 40% of firms considered should form the core policy, and creating better networks between firms and universities and other R&D organisations, which 37.5% suggested should form the core of policy.

Table 2.15 – Future policy directions

	Does not need to be addressed further	Needs addressing but is not the core issue	Should form the core policy
Creating an improved system of business support and advice	37.5	40.0	22.5
Making more finance available to companies enabling them to become involved further in R&D and knowledge related activities	12.2	42.5	45.0
Creating more access to training and workforce development opportunities	20.0	50.0	30.0
Support companies in entering and accessing new markets	15.0	45.0	40.0
Create better networks that link companies with universities and other R&D performing organisations	10.0	52.5	37.5
Make improvements to the physical infrastructure allowing companies to locate in better equipped premises	43.6	38.5	17.9
Provide more support to companies to improve their supply-chains and logistical needs	45.0	50.0	5.0
Stimulate better supply and demand for knowledge through the attraction of high value foreign investment	40.0	50.0	10.0
Stimulate the creation of new start-up companies	37.5	45.0	17.5

The following three tables present data on interaction between the sample firms and support organisations. This data is broken down into three groups, the first examines awareness and interaction with general business support and policymaking organisations; the second examines awareness and interaction with higher education institutions (HEIs); and the third table examines awareness and interaction with knowledge generation organisations.

Table 2.16 outlines SME awareness of, and interaction with, policymaking and business support organisations. These organisations are mainly chambers of commerce in the region, as well as Business Link, which as outlined in D2.2 is a national business support organisation that diagnoses problems and provides advice and solutions to SMEs. Yorkshire Forward, the regional development agency for Yorkshire and Humberside is also included in this category. With respect to the region's chambers of commerce there appears to be very little contact which has been beneficial to the firms, with the highest number of firms reporting this being 7.3%. There has been a higher level of beneficial contact with Business Link and Yorkshire Forward with 20% and 17% of firms reporting a beneficial contact, with only a very

small proportion of the firms report not being aware of these two organisations (2.5% and 2.4% respectively), which suggests their visibility to firms is high.

With respect to the chambers of commerce, the firms' awareness of these organisations is generally lower, although one-quarter to one-third of the firms are unaware of each one. This may, however, reflect the geographic location of each organisation, i.e. the fact that each chamber of commerce is only likely to be engaged with local firms. The firms are generally aware of the existence of the chambers of commerce and their role, although beneficial contact appears to be less common.

Table 2.16 – Awareness and interaction with policymakers and business support organisations

	Never heard of	Have heard of but not sure what they do	Have heard and know what they do	Know what they do and have had contact with	Have had contact with them which has been beneficial to the company
Business Link	2.5	22.5	22.5	32.5	20.0
Yorkshire Forward	2.4	17.1	22.0	41.5	17.1
Barnsley Chamber of Commerce	36.6	4.9	53.7	4.9	0.0
Bradford Chamber of Commerce	26.8	9.8	51.2	9.8	2.4
Doncaster Chamber of Commerce	29.3	7.3	56.1	7.3	0.0
Hull and Humber Chamber of Commerce	31.7	4.9	53.7	9.8	0.0
Leeds Chamber of Commerce	24.4	12.2	48.8	14.6	0.0
Mid Yorkshire Chamber of Commerce (MYCCI)	39.0	7.3	31.7	14.6	7.3
Rotherham Chamber of Commerce	31.7	4.9	56.1	4.9	2.4
Sheffield Chamber of Commerce	26.8	4.9	56.1	7.3	4.9
York and North Yorkshire Chamber of Commerce	36.6	4.9	51.2	7.3	0.0

Table 2.17 presents data on the firms' awareness and interaction with higher education institutions (HEIs) plus the Association for University Research and Industrial Links (AURIL), which is an umbrella organisation, designed to facilitate links between HEIs and firms. The data shows that in general the firms are aware of the HEIs, although newer or smaller institutions such as York St John University College and Leeds Trinity & All Saints (as well as those HEIs less likely to undertake teaching and research relevant to firms, such as the Northern School of Contemporary

Dance) do not score as highly. Most firms are aware of the HEIs and there is some contact between the two, with some of this contact being beneficial to the firm. The umbrella organisation, AURIL, appears to be relatively unknown.

Table 2.17 – Awareness and interaction with higher education institutions

	Never heard of	Have heard of but not sure what they do	Have heard of and know what they do	Know what they do and have had contact with	Have had contact with them which has been beneficial to the company
University of Bradford	7.3	29.3	46.3	9.8	7.3
University of Huddersfield	7.3	24.4	41.5	14.6	12.2
University of Hull	7.3	29.3	53.7	4.9	4.9
University of Leeds	4.9	26.8	53.7	12.2	2.4
Leeds College of Music	26.8	24.4	48.8	0.0	0.0
Leeds Metropolitan University	7.3	29.3	41.5	14.6	7.3
Leeds Trinity & All Saints	39.0	36.6	24.4	0.0	0.0
University of Lincoln	24.4	39.0	29.3	7.3	0.0
Northern School of Contemporary Dance	43.9	22.0	31.7	2.4	0.0
Open University	4.9	9.8	73.2	7.3	4.9
University of Sheffield	7.3	14.6	46.3	22.0	9.8
Sheffield Hallam University	4.9	14.6	48.8	19.5	12.2
University of York	17.1	22.0	46.3	9.8	4.9
York St John University College	36.6	26.8	31.7	2.4	2.4
Association for University Research and Industrial Links (AURIL)	85.4	14.6	0.0	0.0	0.0

Table 2.18 presents data on the firms' awareness and interaction with knowledge creating organisations. The data generally shows a lack of both awareness and interaction with these organisations. In fact, the firms have only had contact beneficial to the company with Connect Yorkshire, which also appears to be the most well known of the knowledge creating organisations. The low levels of awareness among the centres of industrial collaboration (CIC) may reflect the fact that their specialisms do not match those of the firms in the sample, as well as them being relatively newly inaugurated organisations.

Table 2.18 – Awareness and interaction with knowledge creating organisations

	Never heard of	Have heard of but not sure what they do	Have heard of and know what they do	Know what they do and have had contact with	Have had contact with them which has been beneficial to the company
Knowledge RICH	92.7	7.3	0.0	0.0	0.0
Connect Yorkshire	48.8	34.1	12.2	2.4	2.4
West Yorkshire Knowledge Exchange	87.5	12.5	0.0	0.0	0.0
Yorkshire and Humber Regional Technology Network	68.3	17.1	9.8	4.9	0.0
Biomaterials & Tissue Engineering CIC*	90.2	7.3	2.4	0.0	0.0
Design Futures CIC*	85.4	9.8	2.4	2.4	0.0
Engineering Design CIC*	90.0	7.5	2.5	0.0	0.0
Environmental Technologies CIC*	87.8	7.3	4.9	0.0	0.0
Food Chain CIC*	90.2	7.3	2.4	0.0	0.0
Greenchemistry CIC*	92.7	4.9	2.4	0.0	0.0
Materials Analysis & Research Services CIC*	87.8	7.3	4.9	0.0	0.0
Particle Science & Engineering CIC*	92.7	4.9	2.4	0.0	0.0
Pharmaceutical Innovation CIC*	92.7	4.9	2.4	0.0	0.0
Polymer CIC*	92.5	5.0	2.5	0.0	0.0
Stem Cell Biology CIC*	87.8	9.8	2.4	0.0	0.0
Digital Printing CIC*	90.2	4.9	4.9	0.0	0.0
Precision Technologies CIC*	87.5	7.5	5.0	0.0	0.0
Wireless Technologies CIC*	92.7	2.4	4.9	0.0	0.0

2.4.1 Summary

The data in this section suggests that the priorities for future policy appear to be making finance available for firms to expand R&D and knowledge related activities, supporting companies entering new markets, and creating better networks between firms and universities and other R&D organisations. This last point is particularly

important as the data has shown a lack of awareness and interaction with knowledge creating organisations.

2.5 Conclusions

The main conclusions drawn from this work are the fact that for most variables the average score for importance is higher than the average score for effectiveness. Thus the firms are not utilising these resources as efficiently as they should for maintaining or improving competitiveness. Interestingly, in terms of generating knowledge and facilitating innovation, human resources are regarded as more important than traditional knowledge assets such as patents. Therefore, within these firms the workforce is the key to innovation.

The sources of knowledge that are important to the firms appear to be located outside the region. This pattern is repeated with respect to collaboration, in that the sources of collaboration rated as important are outside the region. The data also shows that social interaction with partners for sharing knowledge and collaboration are important, as there is evidence that social interaction with these individuals does occur. Also, this interaction appears to be based on the fact that there are benefits from such interaction through positive outcomes from knowledge sharing and collaboration, with only a small proportion of the firms reported that this interaction would continue if knowledge sharing or collaboration ended.

There is limited interaction between the firms and regional business support and knowledge creating organisations. Therefore, the firms are not engaging with and utilising the regional knowledge base, resulting impacts on innovation being minimal.

Clear policy goals have emerged from this analysis. It appears that there is a need to assist firms in utilising their resources more efficiently in order to boost competitiveness. As well as this, there is a need to encourage knowledge sharing and collaboration among firms within the region; while this behaviour does occur it appears to be more with firms from outside the region. Finally, there is a need to improve the firms' awareness of support organisations in order to facilitate greater levels of interaction, enabling access to the knowledge and expertise they possess.

3.0 SME Benchmarking – Central Macedonia and East Macedonia Thrace

This section presents the results for the Central Macedonia and East Macedonia-Thrace region in Greece. The SME scorecard was administered to 50 SMEs in the region, gathering data on knowledge assets, knowledge flows and interaction with support organisations. The firms were primarily from the manufacturing and services sectors, including sectors that are commonly identified as ‘knowledge-based’.

The data analysis is divided into four sections. The first section examines data on knowledge stock within the firms and their competitiveness in order to benchmark the importance and effectiveness of various factors. The second section analyses data on knowledge creation and acquisition in order to assess how knowledge is created within the SMEs, whom it is created by, the sources of external knowledge and the role of social capital in obtaining knowledge. The third section examines the extent of collaboration with other firms, the location of the partners, the influence of social capital on collaboration and the membership of business associations. The fourth section examines data on business support policy and awareness and interaction of business support organisations. Finally, the fifth section presents a summary and conclusions.

3.1 Knowledge Stock and Competitiveness

This section presents data on the knowledge stock of the SMEs and its importance, as well as effective use for overall competitiveness. The data are divided into five broad groups: Human resources; Intellectual Assets; Practices and Routines; Physical Resources; and External Relations.

In terms of Human Resources, Table 3.1 shows that all human resource factors are of great importance for a firm’s competitiveness. Although all factors rated very high, ‘Employee competences’ rated the highest with an average importance of 9,06 while the factor ‘Management competences’ are the lowest (8,14). In addition, most employee factors rated higher than those of management. This demonstrates the significance of lower hierarchy level employees in meeting company targets.

The general rating on factor “effectiveness” is lower compared to factor ‘importance’ with a percentage difference range of 2.45-9.69. Hence, although the importance human resource factors might be very high, companies do not seem to be able to utilise them with an equal degree of effectiveness. This is particularly so for the case of employee “competences” and “problem solving capacity”. However, management factors generally seem to be used relatively more effectively compared to those for employees, except for management skills, which seem to be lagging to a relatively higher degree.

Table 3.1 – Human Resources and Competitiveness

	Importance	Effectiveness	Percentage Difference
Employee skills	8,84	8,3	6.11
Employee qualifications	8,44	7,96	5.67
Employee competences	9,06	8,26	9.69
Employees' problem solving capacity	8,55	7,83	8.42
Employees commitment	8,9	8,36	6.06
Employee loyalty	8,77	8,24	6.04
Management skills	8,22	7,64	7.06
Management qualifications	8,24	7,87	4.49
Management competences	8,14	7,94	2.45
Management commitment	8,69	8,30	4.49
Management loyalty	8,51	8,18	3.88

Table 3.2 presents data on the firms' intellectual assets in relation to competitiveness. 'Market knowledge', 'Management experience', 'Website' and 'IT facilities' are rated as the most important, scoring from 9,4 to 8,22. Intellectual assets such as patents and copyrights rank lowest in terms of importance, reflecting the low generation of such intellectual assets confirmed by national data. Furthermore, firms rely more on 'Management experience' and 'Market knowledge' to generate competitive advantages and seem to be relatively effective in implementing this strategy, particularly regarding management experience.

Table 3.2 – Intellectual Assets

	Importance	Effectiveness	Percentage difference
Patents filed	6,23	5,95	4.51
Copyrights held	6,76	6,51	3.70
Trademarks registered	7,37	6,81	7.60
Trade secrets	7,98	7,46	5.51
Management experience	8,88	8,50	4.28

	Importance	Effectiveness	Percentage difference
Market knowledge	9,40	8,80	6.38
Process manuals	7,72	7,24	6.22
Internal training programmes	7,58	6,96	8.18
Website	8,22	7,48	9.00
IT facilities	8,22	7,75	5.72

Interestingly, the large gap between the importance and effectiveness of “Website” reflects the surprisingly low rate of internet penetration in Greece in relation to other EU members. A large gap is also present regarding the implementation of internal training programmes.

Table 3.3 shows that ‘Communication with customers’ is the most important practice or routine with an average score of 9,51, followed by ‘Communication with suppliers’ (9) and ‘On the job training’ with 8,85. On the job training appears to be of much higher importance than external training, highlighting that SMEs might be inward looking in terms of personnel training. However, it might also reflect an inability to access suitable external training given the low level of effectiveness scored for this factor. Practices and Routines are generally the least important factors for the competitiveness of SMEs, as the average scores in Table 3.3 are lower than the scores for the factors presented in Tables 3.1, 3.2, 3.4 and 3.5.

Table 3.3 – Practices and Routines

	Importance	Effectiveness	Percentage Difference
Process manuals	7,32	6,77	7.51
On the job training	8,85	8,46	4.41
External training	7,79	7,06	9.38
Management style	7,75	7,28	6.06
Forums for solving problems	7,61	6,98	8.28
Communication with customers	9,51	8,89	6.52
Communication with suppliers	9.00	8,53	5.22

Again all ‘process and routines’ factors rank with higher importance than effectiveness, i.e. the SMEs are not able to use them as efficiently as is necessary in order to boost competitiveness.

In terms of recording and documenting, Figure 3.1 shows that 43% of firms document their routines most of the time, 33% at least occasionally and 20% rarely document them. However, the fact that only 4% of firms have reported to 'always' undertake this practice combined with only 43% doing it most of the time implies the presence of an *ad hoc* aspect in the running and management of regional SMEs. Note that the sum of these 2 figures adds to 77% for Yorkshire (UK) compared to 47% in the Greek regions.

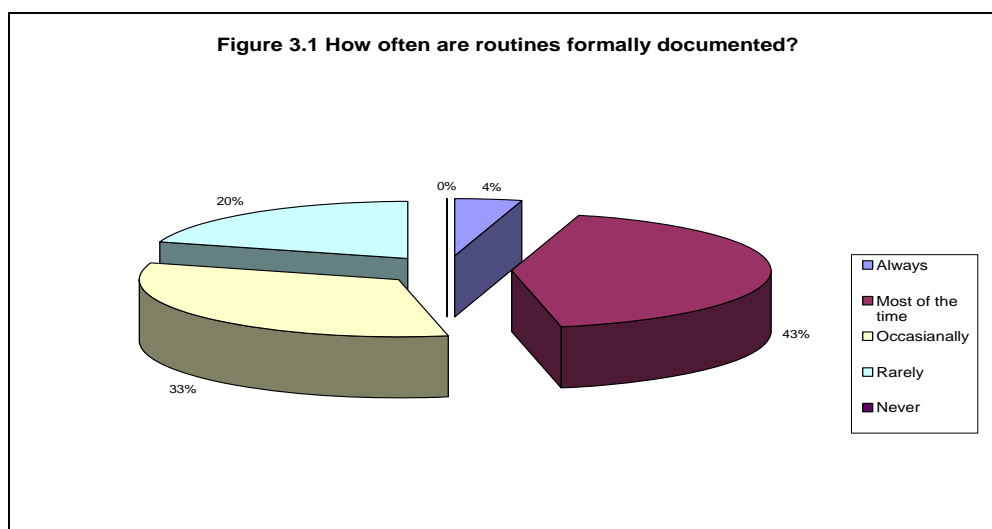


Table 3.4 – Physical Resources

	Importance	Effectiveness	Percentage Difference
Industrial buildings	7,56	7,15	4.42
Retail premises	6,69	6,34	5.23
Land	6,47	6,07	6.19
Plant equipment (owned)	9,02	8,5	5.76
Plant equipment (leased)	7,65	7,38	3.53
Physical location	7,98	7,49	6.14
Road links	8,08	7,70	4.70
Rail links	5,7	4,93	13.51
Proximity to customers	8,30	7,66	7.71
Proximity to suppliers	7,98	7,44	6.77

Table 3.4 highlights the fact that the importance of all the physical resources is higher than their effectiveness implying that firms are not using them to an optimal level.

‘Plant equipment’ is the most important physical resource (9,02) followed by the ‘Proximity to customers’ with 8,30. The fact that ‘Rail links’ do not appear to be as important partly reflects the high significance of trade within the region, which allows for a higher dependence on ‘road links’ due to proximity. However, the high gap between importance and efficiency in this factor reflects the inadequate railway network, and its role as a potential infrastructure barrier to competitiveness and external links.

Table 3.5 suggests that the vast majority of the factors in terms of external relations are very important to the firm’s competitiveness. Although with a small difference (9,6 - 8,94) the data shows that ‘Relationships with customers’ are rated as more important than ‘Relationships with suppliers’. The ‘Licensing of the firm’s products’ (8,04) or ‘Obtaining licences for other firm’s products’ (7,93) and ‘Brand image of your products/services’ (8,19) appear highly important for competitiveness. This could reflect the high dependence of firms on imported know-how and relatively lower value added.

Table 3.5 – External Relations

	Importance	Effectiveness	Percentage Difference
Distribution arrangements for your company’s products and services	8,49	7,85	7.54
Customer loyalty	9,30	8,75	5.91
Brand image of your products/services	8,19	7,62	6.96
Reputation of your company	9,34	8,67	7.17
Customer satisfaction	9,60	8,90	7.30
Responsiveness to customer demands	9,68	8,98	7.23
Relationships with your customers	9,60	8,78	8.54
Relationships with your suppliers	8,94	8,16	8.72
Licence agreements with other firms (for your products)	8,04	7,18	10.70
Licence agreements with other firms (for their products)	7,93	7,18	9.46

Again, as with previous factors, the importance scores are higher than effectiveness implying that firms are not utilising the resources they possess as efficiently as they should in order to be as competitive as possible.

3.1.1 Summary

It is quite striking that in all cases the importance of each factor to the firms' competitiveness is higher than the effectiveness in its use. This reflects the fact that firms are not utilising their resources as efficiently as possible.

Regarding human resources, the relatively high importance of lower hierarchy employees combined with the weak importance of patents and related intellectual assets seems to point towards the low sophistication of the productive structure. The low level of internet penetration that has been recorded for the population as a whole (from national/regional data) is reflected amongst the regions' firms that report a pronounced inefficiency regarding Web usage. These factors are reflected by the results on 'external relations' in terms of a high dependence on imported know-how primarily through licenses. These findings highlight the position of regional SMEs in the supply chain as intermediary producers of low value added goods with limited use of state-of-the-art technologies.

The above findings are in line with the fact that practices and routines rank quite low in terms of relative importance. This, in conjunction with the fact that there is a low level of documentation by corporations, suggests the presence of a strongly ad hoc aspect to the management of SMEs. Similarly, the high significance of on-the-job training, the elevated significance of lower level employees and weak management skills are more likely a symptom of weak sophistication rather than intense endogenous growth.

Finally, the high importance of physical resources combined with low effectiveness contrasts strikingly with the lower importance and the high effectiveness that these same factors have for Yorkshire companies. This shows the significant gaps in infrastructure for the region, even when compared to a lagging region of the UK.

On a more positive note, the fact that effectiveness is well below importance for most factors shows the significant potential for increasing the efficiency of existing resources. Also, the fact that SMEs are focusing their resources on management experience and market knowledge coupled with increased effectiveness in both areas, shows that corporations are moving in the right direction from a strategic point of view in the utilisation of knowledge assets.

3.2 Knowledge Creation and Acquisition

This section examines data on knowledge creation and acquisition activities of the SMEs in the region of Central Macedonia & East Macedonia/Thrace (Greece).

Table 3.6 – Knowledge Creation

	Importance	Effectiveness	Percentage Difference
Management	9,06	8,15	10.05
Shop floor workers	7,58	6,58	13.19
Specific workers employed to undertake R&D	7,61	6,73	11.56
Specific teams created to undertake R&D as required	7,61	6,83	10.25
A specific department (e.g. an R&D department)	7,26	6,54	9.92

In terms of who actually creates knowledge within the firms, Table 3.6 shows that the most important and effective source are the firms' 'Management', with an average score of 9.06. Interestingly, R&D workers/teams/departments and Shop floor workers are rated significantly below management. This reflects the low level of sophistication of R&D per se and possibly its relatively lower importance in the production process. This is reinforced by the fact that R&D personnel ranks almost equal to shop floor workers. The above coupled with the high importance of management reflect the dominance of traditional hierarchically structured companies, rather than the modern heterarchical or matrix-type structures typical of more sophisticated corporations.

The result obtained from the question 'Approximately, what proportion of your company's workforce has the skills necessary for creating the type of knowledge the company requires', was an average rate of 74%. Moreover, the vast majority (81%) of the firms consider that their workforce is 'Adequate for their company's needs' for creating relevant knowledge. Figure 3.2 also shows that for only 11% of firms the workforce is 'Only slightly above the company's needs'. Finally, the answers 'Slightly below the company's needs', 'Inadequate for the company's needs' and 'Above the company's needs' accounted for 8% of companies. These results point towards the conclusion that overall firms are generally happy with the skill level of their employees.

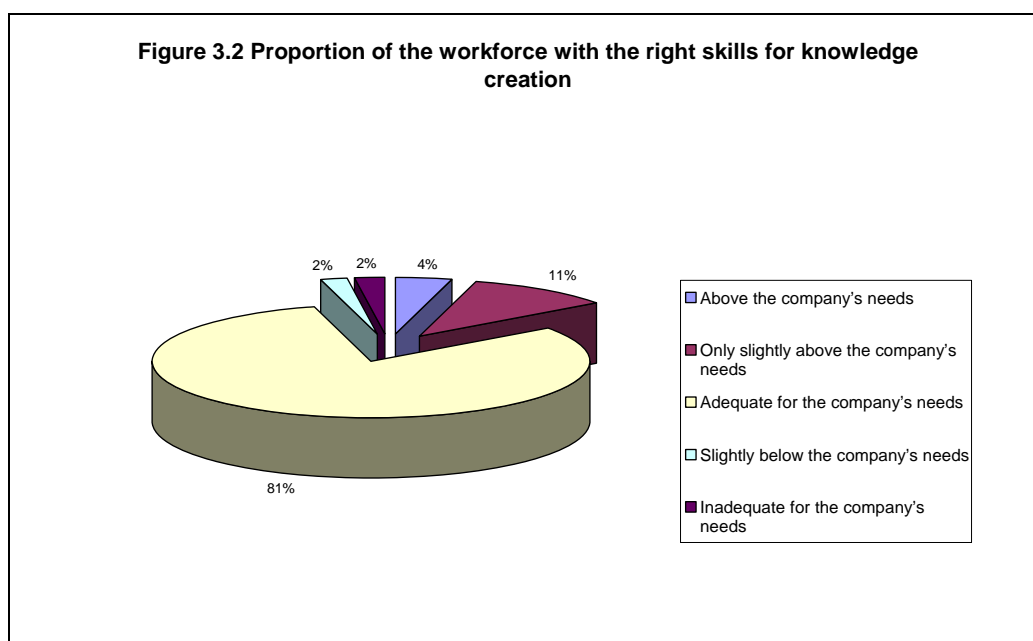


Table 3.7 shows that the most important sources of knowledge for SMEs in Central Macedonia & East Macedonia/Thrace are located both inside and outside the region. However, regarding the key sources of knowledge (customers, suppliers, rivals) the importance of external sources is more pronounced. It is only for the less important sources of knowledge (non-corporate sources of knowledge, i.e. organisations, universities, professional networks) that the local sources rate higher.

Table 3.7 – Sources of Knowledge

	Within the Region	Outside the Region
Customers	7,98	8,00
Suppliers	8,00	8,29
Rival firms	6,95	7,53
Public sector organisations, such as government business support agencies	4,31	4,11
Private sector organisations, such as private training or research providers, and consultants	4,32	4,04
Universities or other higher education institutes	4,46	3,73
Professional networks (e.g. chambers of commerce, trade or business associations, business clubs or other professional networks).	4,84	2,76
International Organisations/Donors	3,15	2,44
Other (please state)	2,75	2,18

As for the locations of sources of knowledge from outside the region, the capital city of Athens dominates together with EU countries and to a lesser extent the USA and the broader Balkan region.

In the question ‘How often does your company utilise the following sources to obtain knowledge’, ‘Customers’, ‘Suppliers’ and ‘Rival firms’ overwhelmingly predominate. The score of other organisations as sources of knowledge is quite low, and it is also significantly low when it comes to universities and other higher education institutions. Regarding the latter, almost a third of SMEs have never used them while about 80% have either never used them or not often.

Table 3.8 - Frequency of obtaining knowledge
Inside the region **Outside the region**

	Very often	Quite often	Not often	Never	Very often	Quite often	Not often	Never
Customers	50%	26%	24%	0%	38%	33%	24%	5%
Suppliers	49%	33%	18%	0%	32%	33%	26%	9%
Rival firms	41%	24%	31%	4%	28%	33%	32%	7%
Public sector organisations such as government business support agencies	14%	12%	30%	44%	12%	12%	34%	42%
Private sector organisations such as private training or research providers, and consultants	11%	11%	49%	29%	20%	15%	28%	37%
Universities or other higher education institutes (out of 39)	0%	18%	52%	30%	10%	15%	42%	33%
Professional networks (e.g. chambers of commerce, trade or business associations, business clubs or other professional networks). (out of 38)	9%	21%	40%	30%	13%	3%	39%	45%
International Organisations/Donors (out of 37)	7%	5%	31%	57%	14%	5%	1%	62%
Other (please state) (out of 21)	19%	0%	19%	62%	10%	5%	19%	66%

For the majority of SMEs, their sources of knowledge appear to change infrequently. Figure 3.3 shows that for 40% of firms their knowledge sources occasionally change while for a further, 26% of firms sources of knowledge rarely change. Although this displays a certain level of stability, about a third of the sample (34%) report that sources of knowledge change quite frequently, suggesting that there is also a pattern of changing interactions.

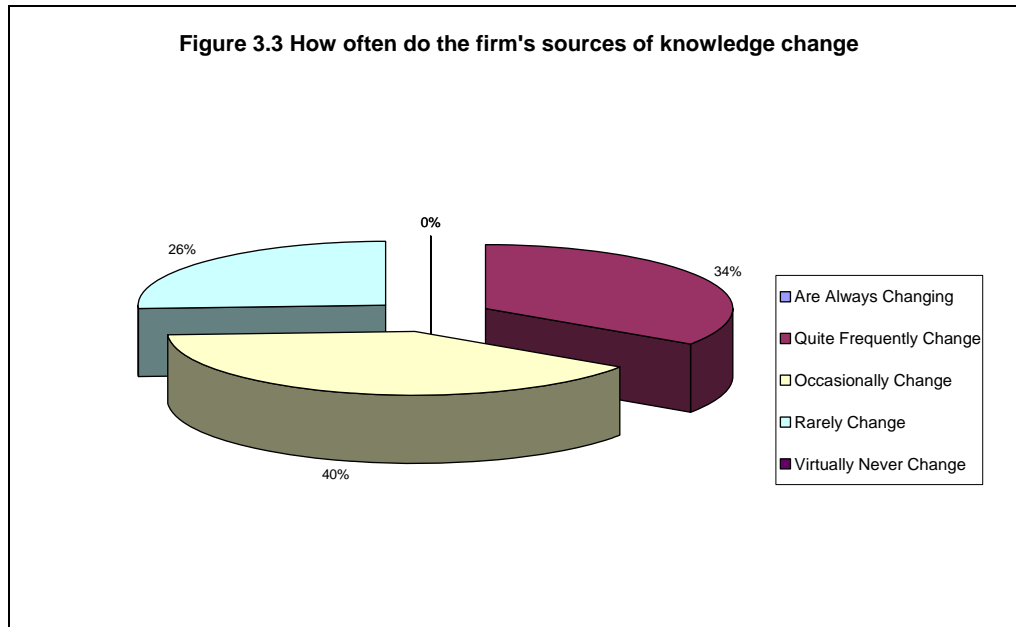


Figure 3.4 suggests there is evidence of social interaction of SMEs with other organisations from which they source knowledge. About 47% of the sample report that they are occasionally engaging in social activities with individuals from such organisations while 36% claimed that they quite frequently engage in such social activities.

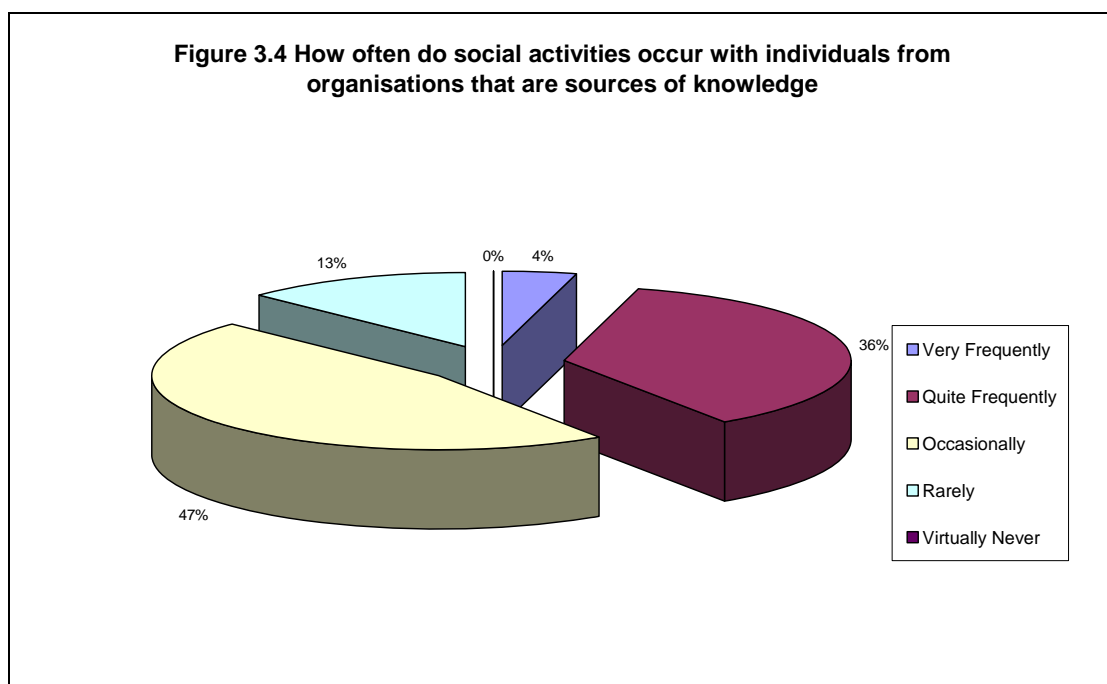


Figure 3.5 suggests that knowledge acquisition is a key motivation behind this interaction, as only 13% of firms reported that the social activities would continue as before, while 44% reported that they would continue only occasionally if knowledge were not sourced. For the rest, interaction would decrease.

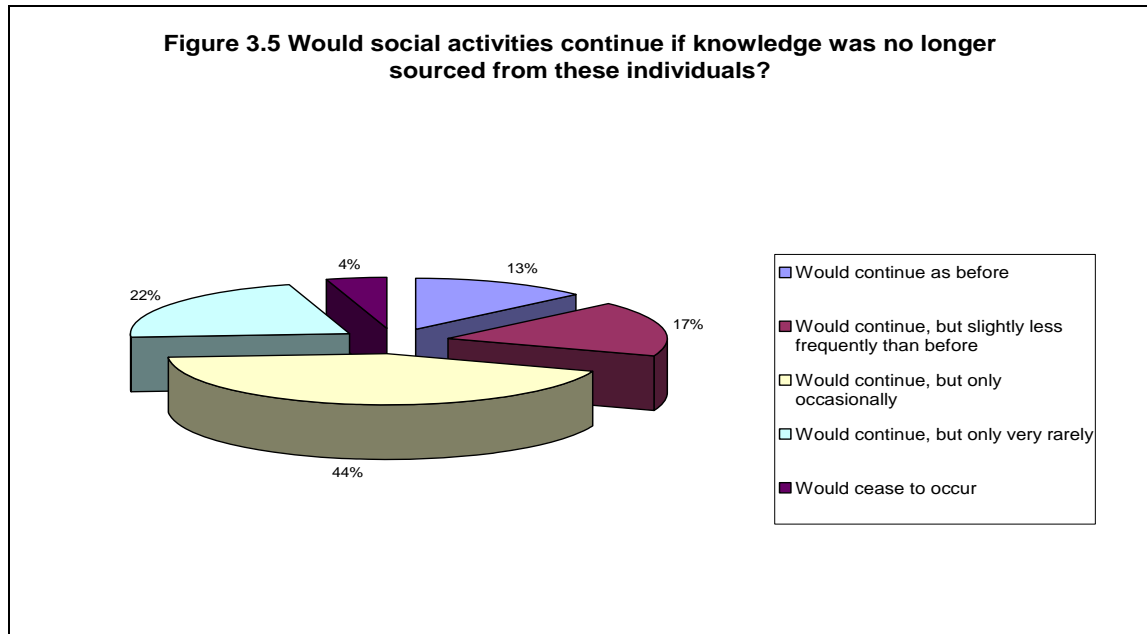
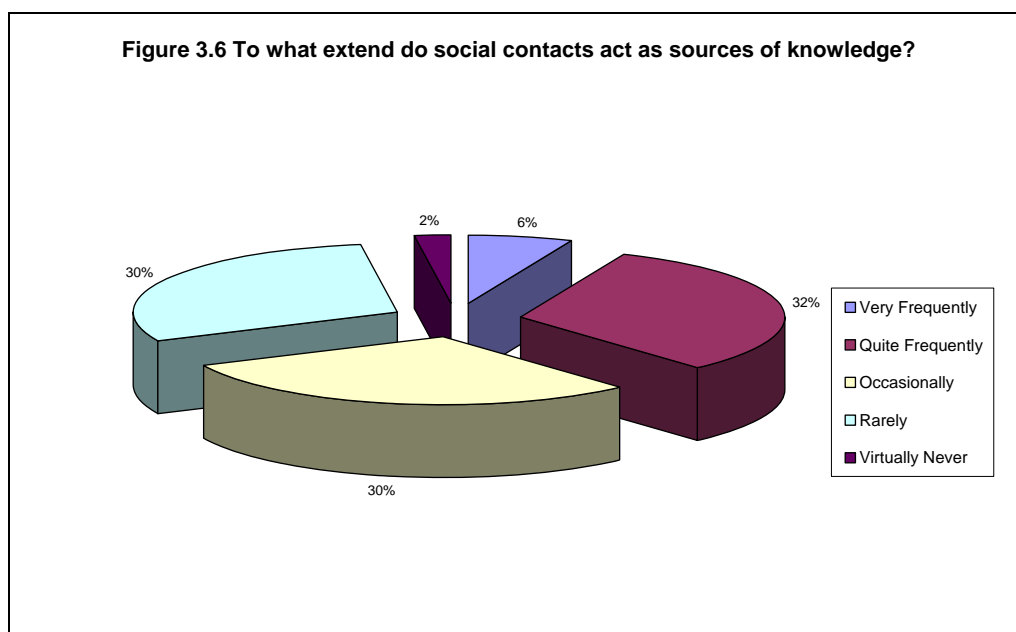


Figure 3.6 shows that social contacts do act as sources of knowledge due to the fact that only 2% of the firms have responded with the answer ‘virtually never.’ About 60% of companies in the sample report that social contacts act as sources of knowledge- either occasionally (30%) or rarely (30%)- suggesting that social interaction is an important mechanism for obtaining external knowledge.



As expected the types of knowledge SMEs obtain from external sources are quite diverse. Table 3.9 shows ‘New product/service development’, ‘New Technology development’ and ‘New process development’ as the knowledge types most frequently obtained from external sources. The next item with similar importance is ‘New Market development’. The other items with an intermediate degree of importance are ‘Knowledge on finance, accounting and auditing’, ‘IT development’ and ‘General business support’. The items with a lesser degree of importance are ‘Employment law’, ‘Health and safety advice’, ‘Recruitment’, ‘Training’ and ‘Procurement’ that appear to be mostly developed in-house. Therefore, it would appear that it is the developing of products/services, technological know-how and Market knowledge rather than knowledge on running a business which is most often obtained from external sources. The exact opposite result was obtained for the UK region.

Table 3.9 – Types of knowledge obtained from external sources

	Very often obtained	Quite often obtained	Not often obtained	Never obtained
Employment law	20%	18%	31%	31%
Health and safety advice	14%	18%	41%	27%
Finance, accounting and auditing	31%	34%	31%	4%
New Market development	46%	44%	6%	4%
New Product development	54%	40%	2%	4%
New Process development	46%	36%	14%	7%
New Service development	54%	34%	10%	2%
New Technology	52%	27%	19%	2%
Recruitment or Skilled Labour	15%	29%	43%	13%
Training	24%	32%	34%	10%
Procurement of inputs	25%	34%	23%	18%
IT development/support	34%	41%	21%	4%
General business	36%	27%	27%	10%

 support

Table 3.10 highlights the fact that ‘Computer science and information systems’, ‘Business and administrative’ and ‘Engineering technology’ are rated as the most important. As expected, all other disciplines scored quite low given their more specialised nature. It should be noted that regional higher education institutes do provide all the above-mentioned types of knowledge. Even so, they recorded a low level of relative importance as ‘sources of knowledge’ (Table 3.8).

Table 3.10 – Importance of external knowledge obtained by discipline

Discipline	Importance
Biological sciences	2.58
Medicine and dentistry	2.07
Computer science and information systems	7.75
Engineering technology	6.14
Mathematical sciences	3.38
Business and administrative (e.g. logistics)	7.52
Physical sciences	3.50
Agriculture	3.40
Architecture, building & planning	3.21

The survey found that the firms introduced an average of 4.53 new products/services or adaptations to new products and services over the previous three-year period.

In terms of innovation environment, Table 3.11 shows that all factors are very important since they were all rated with high scores under ‘importance’ (nine factors rated from 8,14 to 8,83). Only two factors rate under but close to 8, namely ‘Development of new materials’ and ‘Adoption of new inputs and materials’.

Table 3.11 – Innovation Culture

	Importance	Effectiveness	Percentage Difference
Core values of firm	8,72	8,02	8.03
Innovative culture	8,14	7,47	8.23
Development of new markets	8,72	7,54	13.53
Development of networking opportunities within the company	8,39	7,39	8.39
Development of networking opportunities outside the company	8,45	7,48	11.48
Development of new products	8,44	7,64	9.48
Development of new services	8,83	7,85	11.10
Development of new processes	8,75	7,53	13.94
Development of new materials	7,24	6,19	14.50
Adoption of new inputs and materials	7,86	6,88	12.47
Monitoring competitors' products and processes	8,73	7,73	11.45

As was the case for competitiveness factors, every innovation culture factor was rated as more important than it is effective. What is most interesting is that the factors that ranked highest as knowledge types (obtained from external sources) are the factors that are most lagging in terms of effectiveness for innovation. A high gap is also observed for networking opportunities outside the company.

3.2.1 Summary

Most results are in accordance with those obtained under the evaluation of knowledge stock and competitiveness. Again there seems to be significant scope for improvement through the more efficient utilisation of existing resources. Regarding knowledge creation, the relatively lower importance attached to R&D factors and the very high importance attached to management are in accordance with the limited product sophistication, the weak R&D input in production. In addition, it highlights the traditional nature of SMEs in terms of organisational structures, which rely on highly centralised management hierarchies.

The fact that SMEs are generally happy with the available skills at their disposal reflects the previous conclusion regarding product sophistication, but also seems to suggest limited efforts to increase the knowledge input in value added or to modernise in other ways. The small number of new processes introduced over the past three years seems to testify to that.

These aspects are also reflected in the fact that the main sources of external knowledge for firms are 'Suppliers' and 'Customers'. These, coupled with the high significance of those outside the region (especially from abroad), highlight the dependence on imported Know-How, the high incidence of production standardised output made to order for key clients and a large share of SMEs that act as subsidiaries to corporations outside the region.

These conclusions are reinforced by the fact that the most important types of knowledge that firms seek are from external sources relating to the actual production process and particularly new technologies and product/service development. As a result, the weak innovation culture is reflected in the limited effectiveness of firms to develop new processes, materials, technologies and products by themselves.

In light of the above, the high score of 'Rival' firms as sources of knowledge suggests that firms are not highly specialised, and the emphasis is on competition with similar corporations producing similar products with limited product differentiation forming the competitive strategy of SMEs.

As a result, the limited impact of research performers as sources of knowledge is at least partly related to the low level of sophistication of corporations. However, the possibility of a limited orientation of research performers to the real needs of corporations should also be considered.

In any case, corporations seem to be trying to at least make-up for the lagging relations with research performers and other organisations by focusing on informal networks of social relations. However, the high importance assigned to the development of 'networking outside the company' combined with its low effectiveness seems to suggest that both official and informal links need to be enhanced.

3.3 Collaboration

This section examines data on SME collaboration including with whom they collaborate and their importance, the changing nature of the relationships, the impact of social interaction on collaboration and membership of business organisations such as chambers of commerce.

Table 3.12 presents data on collaboration and the importance of various partners to the firms. The results regarding the degree of importance tend to mirror the results obtained under sources of knowledge. The most important collaborators are 'Customers', 'Suppliers' and 'Rivals' with the latter two predominating for 'outside the region'. The importance of 'Suppliers' outside the region testifies to the high degree of dependence on imported know-how, while the high importance of

‘Customers’ inside the region reflects an inward looking trend amongst SMEs producing for the regional market. The important role of government agencies from outside the region reflects the role of central government’s direct and indirect subsidisation to regional enterprises.

Table 3.12 – Importance of Collaborators

	Within the Region	Outside the Region
Customers	8,15	4,41
Suppliers	8,15	8,64
Rival firms	6,79	8,12
Public sector organisations, such as government business support agencies	4,11	6,72
Private sector organisations, such as private training or research providers, and consultants	4,50	4,38
Universities or other higher education institutes	4,73	3,96
Members of your professional networks (e.g. chambers of commerce, trade or business associations, business clubs or other professional networks).	4,12	5,17
International Organisations/Donors	4,41	3,68
Other	0,0	0,0

Again, the role of higher education institutes appears limited in terms of collaboration and scores lower than private research providers in the case of external collaborations. With reference to the various locations of collaborators from outside the region, the main locations relate to the capital city of Athens, other EU countries and to a lesser extend the broader Balkan area (including Turkey) and the USA.

There appears to be a low level of turnover with respect to partners in collaboration. Over two-thirds of the SMEs report that their collaborative partners change either occasionally or quite frequently (Figure 3.7).

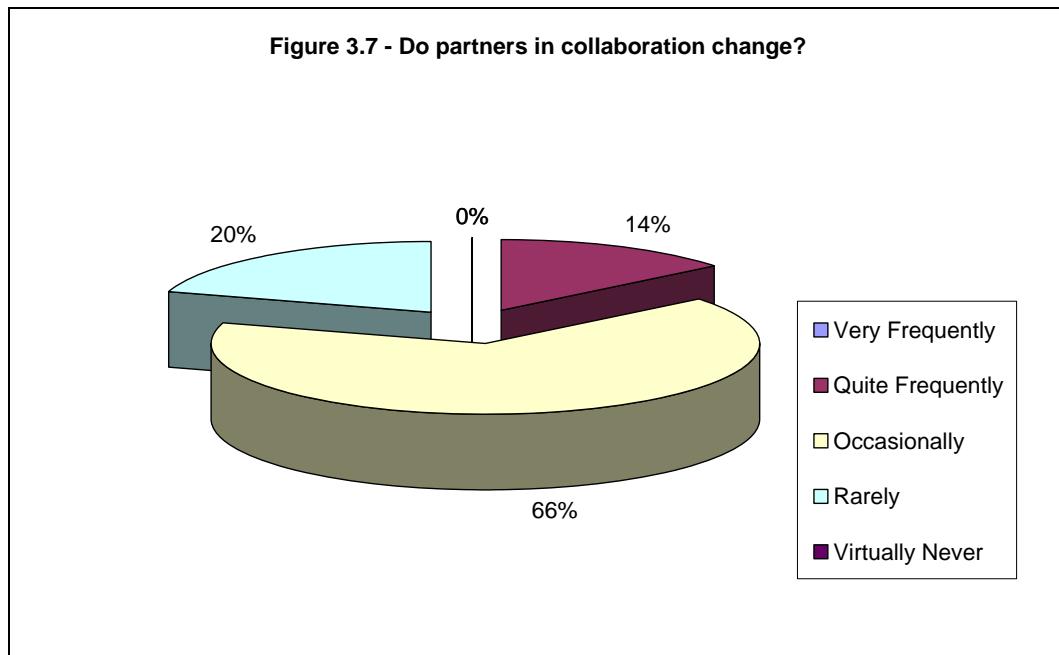
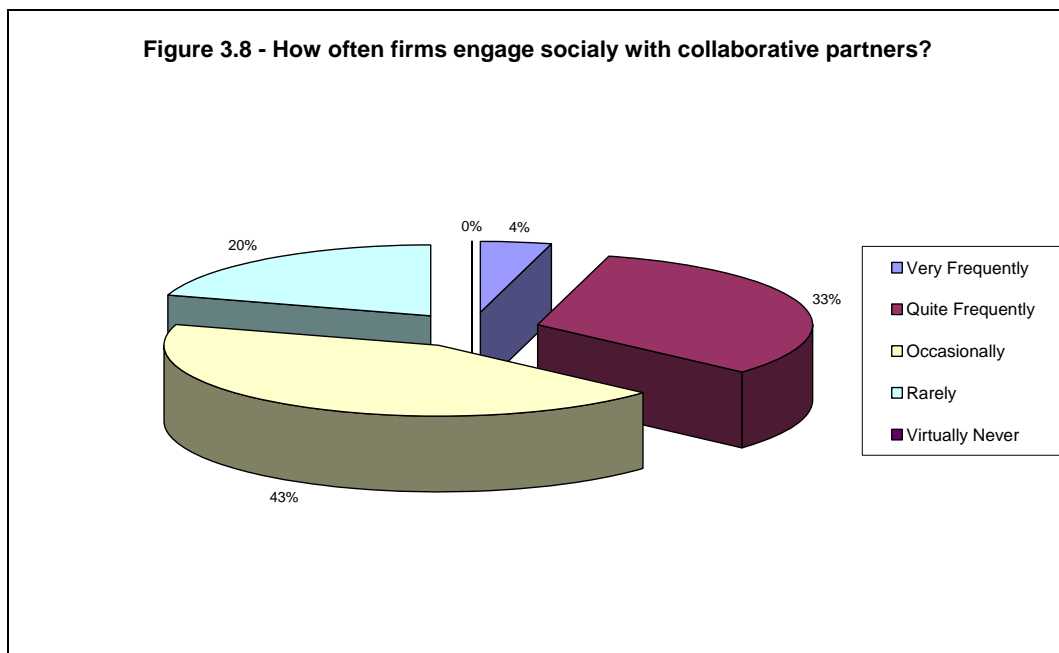
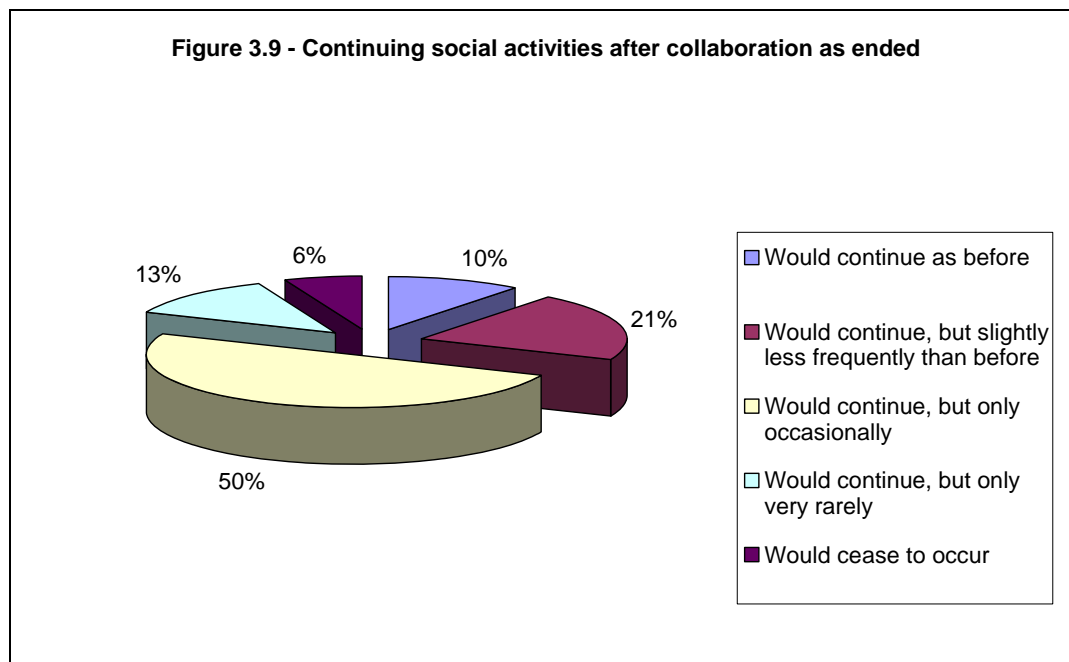


Figure 3.8 suggests that social contact with collaborative partners is relatively common, as most of the SMEs report engaging with their partners either occasionally or quite frequently.



The observed social interaction is influenced by collaboration as Figure 3.9 shows that only 10% of the firms would continue as before if the collaboration ended. Thus, the social interactions observed would appear to be linked to collaboration.



Generally firms do not appear to be highly connected to membership organisations, with the Chambers of Commerce represent the predominant organisation for membership. As far as the percentage of membership in organisations is concerned, most of the firms are members of a chamber of commerce, and less of a trade or business association. In the case of being member of a business club or other professional networks, the results are very low, ranging from only 9-14% (Table 3.13). This implies that firms are unlikely to be regular members of corporate networks despite the fact that ‘development of networking opportunities-outside the company’ ranked quite high in their list in terms of importance for innovation culture (Table 3.10).

Table 3.13 – Percentage of firms in membership organisations

	Member	Non-member
Chamber of Commerce	48.8%	51.2%
Trade or Business Association	27.9%	72.1%
Business Club	9.3%	90.7%
Other professional networks	14.0%	86.0%

Table 3.14 shows that the highest importance regarding ‘membership of networks’ is attached to ‘Creating solidarity within your industry’ and ‘A means of representing views’, rather than ‘Sharing Knowledge’ and ‘Developing trust’. In fact, it is particularly noteworthy that the transfer of knowledge seems to be of quite a lesser significance. This is in accordance with the our previous observation that firms seem to be more likely to buy this knowledge ready-made rather than being engaged in either producing it or developing it themselves.

Table 3.14 – Importance of Membership of Networks

Developing customer contacts	6,13
Developing supplier contacts	6,13
Obtaining knowledge from other parties	5,93
Creating solidarity within your industry	6,30
A means of representing views	6,23
Sharing knowledge with member	6,08
Developing trust within the industry	5,89

3.3.1 Summary

The results obtained in this section regarding collaboration are in line with the conclusions obtained in earlier sections. The fact that the most important source of collaboration are suppliers whose origin is outside the region reflects the low level of sophistication of regional SMEs and their dependence primarily on suppliers for the transfer of know how.

The fact that companies do not seem to be particularly well or broadly connected, and more significantly the fact that membership in networks is not guided by knowledge transfer and absorption, point towards the conclusion that regional SMEs are not regular members in networks of corporations. This is partly compensated for through regular social contacts with collaborators for the exchange of information and also via official collaboration with government agencies given the regions' position as a net recipient of structural funds and subsidies from the central government.

3.4 Barriers and Business Support

This section examines data on the barriers to innovation faced by firms and the policy actions the firms would like to see implemented across the region. Also, awareness of the regional business support network is examined along with the interaction between the SMEs and the support organisations.

Table 3.15 suggests that the most important barrier faced is the inability to access suitable finance as well as suitable labour and knowledge (generated within the region), while the less important is the inability to access suitable equipment or plant. However, it is also noteworthy that the degree of importance attached to barriers is generally lower in comparison to factors analysed under previous sections.

Table 3.15 – Barriers to knowledge creation

Barriers	Importance
Unable to access relevant networks	5,91
Unable to access relevant collaborators	6,27
Inapplicability of knowledge created by others in region (e.g. universities, other companies or existing networks)	6,52
Quality or applicability of available business support or advice	6,20
Unable to access suitable finance	6,80
Unable to access skilled labour	6,52
Unable to access suitable training	6,02
Unable to access suitable equipment or plant	5,44

In terms of future policy directions (Table 3.16) it appears that the SMEs believe that all the areas that have been presented to them are highly important. In fact 50-69% believe that they should all form a core policy, except the area of logistics support. Hence, no clear policy direction emerge directly from these findings. However, the issue of finance ranks the highest, which is in accordance with the results obtained under barriers to knowledge creation. The other important issues are the stimulation of start-up companies and the issue of infrastructure, especially from the point of view of suitable company location. It is interesting to note that although the issue of R&D has generally been given less importance in most other sections, the issue of linking companies to R&D performers ranks relatively high as far as policy direction is concerned.

Table 3.16– Future policy directions

	Does not need to be addressed further	Needs addressing but is not the core issue	Should form the core policy
Creating an improved system of business support and advice	4%	29%	67%
Making more finance available to companies enabling them to become involved further in R&D and knowledge related activities	2%	29%	69%
Creating more access to training and workforce development opportunities	2%	48%	50%
Support companies in entering and accessing new markets	10%	40%	50%
Create better networks that link companies with universities and other R&D performing organisations	2%	37%	61%
Make improvements to the physical infrastructure allowing companies to locate in better equipped premises	0%	37%	63%
Provide more support to companies to improve their supply-chains and logistical needs	10%	53%	37%
Stimulate better supply and demand for knowledge through the attraction of high value foreign investment	8%	39%	53%
Stimulate the creation of new start-up companies	10%	24%	66%

The following three tables present data on interaction between the sample firms and support organisations. This data is broken down into three groups, the first examines awareness and interaction with general business support and policymaking organisations; the second examines awareness and interaction with higher education institutions (HEIs); and the third table examines awareness and interaction with knowledge generation organisations.

Table 3.17 outlines the SMEs' awareness of, and interaction with, policymaking and business support organisations. These organisations are mainly chambers of commerce in the region as well as business support organisations with presence throughout the region. The Regional Authorities of Central Macedonia and East Macedonia Thrace as the key policy makers are also included.

With respect to most organisations, although firms are aware of their presence there has generally been little contact which has been beneficial to the firms. The highest benefit has been provided by the Association of IT Companies of Northern Greece (SEPVE). The limited role of intermediaries like KEDY, KEPAs, DESMOS is

possibly related to the relatively recent establishment of these organisations and the limited resources and experience on their behalf.

Table 3.17 – Awareness and interaction with policymakers and business support organisations

	Never heard of	Have heard of but not sure what they do	Have heard of and know what they do	Know what they do and have had contact with	Have had contact with them which has been beneficial to the company
Regional Authority of Central Macedonia	0	28,9	51.6	16.3	3,2
Regional Authority of East Macedonia-Thrace	0	27.1	55.0	15.1	2.8
Thessaloniki Chamber of Commerce	0	5.4	53.3	36,4	4.9
Serres Chamber of Commerce	0	6.8	56.5	36.7	0.0
Kavala Chamber of Commerce	0	7.3	52.3	37.3	3.1
Xanthi Chamber of Commerce	0	4.9	55.3	39.8	0.0
Alexandroupolis Chamber of Commerce	0	7.2	58.2	34.6	0.0
Association of IT companies for Northern Greece (SEPVE)	22.7	28.3	25.7	14.0	9.3
Technological Park of Thessaloniki	23.3	30.2	34.1	6.9	5.5
KEPA-DESMOS (SME development intermediaries)	35.3	39.8	21.4	3.5	0
KEDY: Centres of Business and Technological Development	34.3	36.7	23.6	5.4	0

Table 3.18 presents data on the firms' awareness and interaction with higher education institutions (HEIs). The data shows that firms are aware of the presence of HEIs, but seem to have limited contact with them and little benefit has been derived from interaction between them. On the one hand the limited R&D sophistication of corporations and their reliance on imported know-how implies a weak demand from R&D performers, while on the other hand HEIs, as has been analysed under D2, are not geared towards interacting with corporations.

Table 3.18 – Awareness and interaction with higher education institutions

	Never heard of	Have heard of but not sure what they do	Have heard of and know what they do	Know what they do and have had contact with	Have had contact with them which has been beneficial to the company
University of Aristotle	0.0	0.0	79.4	12.1	6.5
University of Macedonia	1.4	13.8	76,8	6.5	1.5
Technological Education Institute (TEI) of Thessaloniki	7.1	10.3	69,5	8.2	4.9
University of Democritus	1.3	4.8	78,8	11.5	4.4
TEI of Kavala	10.5	14.6	68,7	4,5	1.7
TEI of Serres	8.3	15.3	71,3	3.6	1.5

Table 3.19 presents data on the firms' awareness and interaction with knowledge creating organisations. The data generally shows a lack of both awareness and interaction with these organisations. One should, however, note that the low levels of awareness regarding research centres is chiefly due to their specialised nature

Table 3.19 – Awareness and interaction with knowledge creating organisations

	Never heard of	Have heard of but not sure what they do	Have heard of and know what they do	Know what they do and have had contact with	Have had contact with them which has been beneficial to the company
Chemical technologies and processes - "ITXHA"	54.0	32.2	12.3	1.5	0.0
Informatics and telecommunications – "IITHA"	49.5	30.3	14.4	4.3	1.5
Agro-biotechnology – "INA"	61.2	34.3	4.5	0.0	0.0
Transport – "IMET"	52.1	38.2	9.7	0.0	0.0
Solid fuels technology – "ITΣK"	63.7	34.2	2.1	0.0	0.0

URENIO	46.5	38.4	6.7	5.9	2.5
SEERC	59.9	25.7	7.8	4.9	1.7
Fisheries Research Institute – FRI	72.9	20.9	6.2	0.0	0.0
Centre of International and European Economic Law (CIEEL)	80.8	17.0	2.2	0.0	0.0
Euroconsultants	28.3	21.2	24.3	16.3	9.9

3.4.1 Summary

The issue of access to finance is the greatest barrier to knowledge creation, and firms want to see the issue of finance to form the core policy direction together with the related issue of government financed improvements in infrastructure focused towards company location. The role of financing to boost intermediation organisations, with focus on the financing of new start-up companies also ranks quite high.

Considering other barriers in conjunction with preferences for policy direction, the importance of regionally generated knowledge applicable to corporations, together with the importance of creating links between companies and R&D performers, seems to suggest that this might be the other important policy area that should be considered. The limited degree of interaction between R&D actors (policy makers, research performers, intermediaries and firms) highlighted implies that there is both a need and also a great potential for achieving gains by improving the triple-helix interaction.

3.5 Conclusions

The major weaknesses stem from the high degree of dependence of SMEs on imported know-how coupled with a limited own-capacity to upgrade their R&D input in the production process. This is made harder given their traditional company structures, limited participation in corporate networks, as well as weak links with R&D performers.

The major threat stems from the limited degree of corporate sophistication reflected in the low value added nature of the productive structure particularly regarding its knowledge input. The risk is that firms could remain trapped into technologically inferior structures that will imply a slow speed of progress.

A key positive aspect of the outlook for regional knowledge infusion amongst SMEs is an increasing degree of awareness by regional corporations regarding the need for improving the R&D input in their productive activity. Significant gains can be achieved from the better utilisation of existing resources. The other opportunity lies in the potential to improve the interaction between firms, policy makers and research performers through the triple-helix model.

In terms of policy action, a greater focus on financing corporate R&D programs seems to be called for. The related area seems to be in upgrading the general infrastructure with focus on company location. An effort towards corporate clustering

combined with the upgrading of intermediate organisations and the triple helix interaction of corporations with policy makers and research performers would most likely serve simultaneously all these policy issues, and result in a more productive use of existing resources achieving significant economies of scale.

4.0 SME Benchmarking – Thrace Turkey

This section presents the finding for Thrace Turkey, including Edirne, Istanbul, Kırklareli and Tekirdağ. These results were obtained through consulting 57 SMEs in the region, gathering data on knowledge assets, knowledge flows and interaction with and awareness of support organisations. The targeted firms were primarily within manufacturing sectors, including those sectors traditionally identified as ‘advanced’ or ‘knowledge-based’ and also included knowledge based services industries.

The data analysis is divided into four sections. The first section examines data on knowledge stock within the firms and their competitiveness in order to benchmark the importance and effectiveness of various factors. The second section analyses data on knowledge creation and acquisition in order to assess how knowledge is created within the SMEs, whom it is created by, sources of external knowledge and the role of social factors in obtaining knowledge. The third section examines the extent of collaboration with other firms, the location of the partners, the influence of social factors on collaboration and the membership of business associations. The fourth section examines data on business support policy and awareness and interaction of business support organisations. Finally, the fifth section presents a summary and conclusions.

4.1 Knowledge Stock and Competitiveness

This section presents data on the knowledge stock of the SMEs and their importance and effectiveness for the overall competitiveness of SMEs. The data are divided into five broad groups: Human resources; Intellectual Assets; Practices and Routines; Physical Resources; and External Relations.

In terms of Human Resources, Table 4.1 shows that the management skills, management commitment and management loyalty are the most important factors affecting competitiveness. Since the consultees are of various organisational levels this result shows that management is more important than the employees for competitiveness in the region. Linking this result to the KOSGEB statistics given in D2.1, where the management education level was shown to be mainly high-school graduate, it may be concluded that the management levels need to be improved. On the other hand, the fact that the highest difference of importance and effectiveness are seen in the employee skills, commitment and loyalty also indicates that the management cannot use the existing skills effectively.

Table 4.1 – Human Resources and Competitiveness

	Importance	Effectiveness	Percentage Difference
Employee skills	8.21	7.74	5.72
Employee qualifications	7.77	7.46	3.99
Employee competences	7.74	7.39	4.52
Employees' problem solving capacity	8.04	7.63	5.1
Employees commitment	8.32	7.86	5.53
Employee loyalty	8.28	7.74	6.52
Management skills	8.86	8.61	2.82
Management qualifications	8.26	8.09	2.06
Management competences	8.37	8.09	3.35
Management commitment	8.54	8.30	2.81
Management loyalty	8.52	8.54	-0.23

Table 4.1 also highlights a general pattern of an asset being of more importance than effective, i.e. these factors are all necessary for the competitiveness of the business but are not used as efficiently as possible. Therefore, the firms are, generally, not utilising their assets to the optimum level. The exception to this is with respect to the management loyalty, which is used slightly more efficiently than it is important.

Table 4.2 presents data on the firms' intellectual assets in relation to competitiveness. Market Knowledge and Management Experience are rated with the highest importance of 9.05 and 9.02, which are followed by the Trade Secrets with a rate of 8.67. These three items are also ranked as the highest in effectiveness, with slightly smaller rates. Intellectual assets such as patents, copyrights and trademarks rank almost as lowest in terms of importance. The firms instead rely on management culture, market brochures or websites to generate competitive advantage.

Table 4.2 – Intellectual Assets

	Importance	Effectiveness	Percentage difference
Patents filed	6.89	6.30	8.56
Copyrights held	6.14	5.73	6.68
Trademarks registered	7.91	7.77	1.77
Trade secrets	8.85	8.67	2.03
Management experience	9.02	8.73	3.22
Market knowledge	9.05	8.75	3.31
Process manuals	6.30	6.02	4.44
Internal training programmes	7.61	7.14	6.18
Website	7.27	6.74	7.29
IT facilities	7.79	7.18	7.83

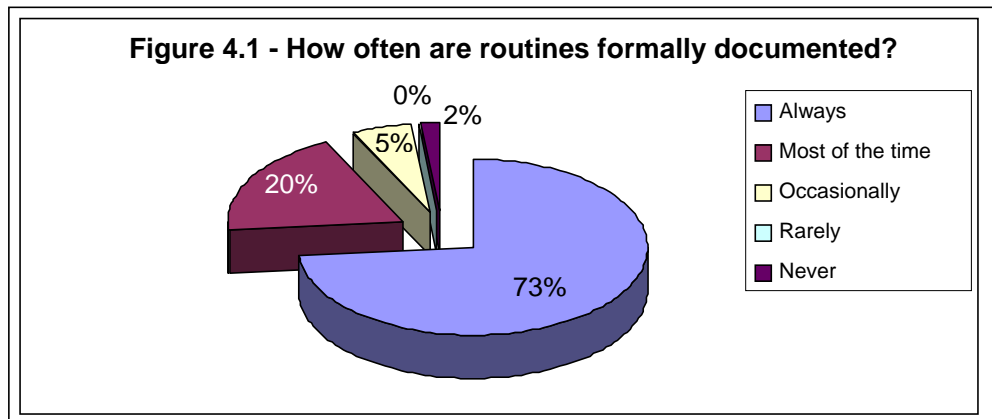
The lowest effectiveness compared with the importance is seen in the patents, which reflects the difficulty and high cost of taking global patents. There is more than 5% difference of effectiveness in most of the assets except the ones with highest importance. This might lead us to the conclusion that if the company believes in the importance of an intellectual asset, they are capable of making it effective.

Table 4.3 shows that communication with customers is the most important practice or routine with an average score of 9.12, followed by communication with suppliers and management style and forums for solving problems. On the job training is of higher importance to the firms than external training. The results highlight the fact that the SMEs are focused, in general, internally.

Table 4.3 – Practices and Routines

	Importance	Effectiveness	Percentage Difference
Process manuals	6.28	5.96	5.10
On the job training	7.86	7.53	4.20
External training	6.63	5.96	10.11
Management style	8.30	8.05	3.01
Forums for solving problems	8.28	7.81	5.68
Communication with customers	9.12	8.79	3.62
Communication with suppliers	8.54	8.30	2.81

'Process and routines' do not appear to be used as effectively as the importance given to them by the company. External training shows the extreme case of being the least effective of all with the highest difference of 10.11%. This stresses the fact that SMEs are not able to use any available external resource as efficiently as is necessary to remain competitive. In terms of recording and documenting these practices and routines, Figure 4.1 shows that generally firms do claim to record and document regularly.



Physical Resources are given similar importance as all the other factors relating to competitiveness, as shown by Table 4.4. The Plant Equipment are chosen to be of the highest importance mainly because SMEs have financial difficulty in investment in the most recent technology. Proximity to customers is of second highest importance showing that most of the trading is in the region, as the peripheries of Istanbul is one of the biggest industrial regions, with the highest consumption base of Turkey located in this metropolitan region. The least importance is given to the Rail Links, as highways are of more importance in Turkey. It is also observed that physical resources are more effectively used than the other assets since the difference of importance and effectiveness is much lower.

Table 4.4 – Physical Resources

	Importance	Effectiveness	Percentage Difference
Industrial buildings	7.61	7.33	3.68
Retail premises	4.81	4.50	6.44
Land	6.09	5.84	4.11
Plant equipment (owned)	8.95	8.56	4.36
Plant equipment (leased)	6.24	5.89	5.61
Physical location	7.74	7.56	2.33
Road links	7.91	7.80	1.39
Rail links	3.96	4.17	-5.30
Proximity to customers	8.05	7.77	3.48
Proximity to suppliers	7.81	7.33	6.15

Table 4.4 highlights the fact that the effectiveness is higher than importance only for the rail links. The results also show that physical resources are given more attention to be used effectively, which may rely on the culture of ownership in the region.

Table 4.5 suggests that the most important factors in terms of external relations are customer satisfaction (average score of 9.28), responsiveness to customer demands (9.25), the company reputation (9.21) and relationship with the customers (9.09). The data also shows that relationships with customers are rated as more important than relationships with suppliers. The licensing of the firm's products or obtaining licences for other firm's products does not appear to be important for competitiveness, suggesting that the firms focus on developing their own products and services.

In Table 4.5 the general pattern of importance being higher than the effectiveness is observed once more. Only for company reputation do SMEs rate effectiveness as almost as high as importance. This reflects the Turkish culture of relations having more importance than products and services.

Table 4.5 – External Relations

	Importance	Effectiveness	Percentage Difference
Distribution arrangements for your company's products and services	8.72	8.23	5.62
Customer loyalty	8.25	7.84	4.97
Brand image of your products/services	8.95	8.79	1.79
Reputation of your company	9.21	9.12	0.98
Customer satisfaction	9.28	8.96	3.45
Responsiveness to customer demands	9.25	8.82	4.65
Relationships with your customers	9.09	8.81	3.08
Relationships with your suppliers	8.70	8.32	4.37
Licence agreements with other firms (for your products)	6.31	5.88	6.81
Licence agreements with other firms (for their products)	6.56	6.09	7.16

4.1.1 Summary

The data suggests that the most important factors for the competitiveness of the firms are the customer satisfaction, company reputation followed by customer communications of the routines and market knowledge and management experience, relations, practices and routines within the firms, intellectual assets and physical assets. Intellectual assets and physical resources are observed to be similar level of importance. Relative higher importance in external relations suggest that, as with the other regions, in terms of competitiveness these firms are not competing with respect to the codified knowledge they possess but rely on the more tacit knowledge or relational knowledge.

In general, there is a gap between the level of importance and the level of effectiveness of all the factors. The fact that this difference is generally positive suggests that the firms are not able to use their resources as efficiently as they would like to.

4.2 Knowledge Creation and Acquisition

This section examines data on knowledge creation and acquisition activities of the SMEs in Thrace-Turkey.

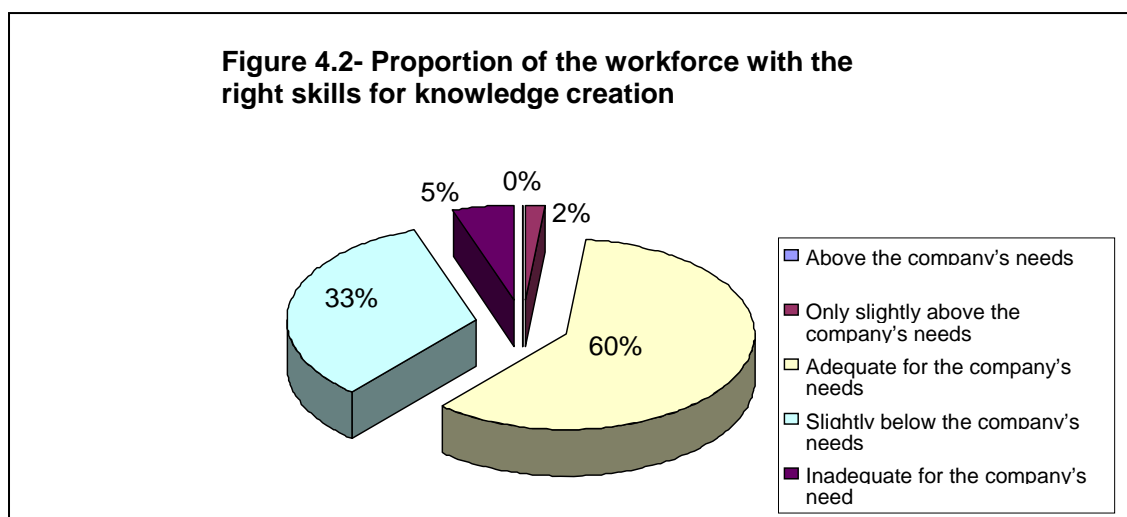
Table 4.6 – Knowledge Creation

	Importance	Effectiveness	Percentage Difference
Management	8.89	8.30	6.64
Shop floor workers	7.50	7.00	6.67
Specific workers employed to undertake R&D	7.89	7.04	10.77
Specific teams created to undertake R&D as required	7.42	6.28	15.36
A specific department (e.g. an R&D department)	7.53	6.29	16.47

In terms of who actually creates the knowledge within the firms, Table 4.6 shows that the most important and effective source is the firm's management, with an average score of 8.89. The fact that R&D workers, R&D teams and R&D departments are not rated as highly as the management stresses the importance of management in the regional company culture. It is striking to see the high differences of importance and effectiveness, which is an evidence of the SMEs considering themselves very low in effectiveness of knowledge creation although they recognise the importance.

It is observed that only 29.2 % of the firms reported that more than 50% of the workforce had the required skills and expertise for creating relevant knowledge. The answers varying in the range of 1% to 90%, suggesting that the industrial companies see the employee mostly as blue collar with the majority the employees not involved in knowledge creation activities. Figure 4.2 shows that 60% of the firms report that the proportion of the workforce with the right skills is adequate for their needs and another 5% find them slightly above their need. Combining the results of the two questions it may be concluded that SMEs do not consider themselves knowledge creators.

Table 4.7 shows that the most important sources of knowledge for SMEs in Thrace-Turkey are the customers, suppliers and rivals both inside and outside the region. This again stresses the fact that knowledge is hidden in the relations. The data shows that public resources are found to be of similar importance mainly because of access to the KOSGEB information network. However, private sector organisations, universities, chambers and or professional networks have low significance. All the resources seem to be slightly more effective within the region. "Other resources outside the region" is not a choice at all..

**Table 4.7 – Sources of Knowledge**

	Within the Region	Outside the Region
Customers	8.39	8.37
Suppliers	7.98	7.58
Rival firms	7.02	6.57
Public sector organisations, such as government business support agencies	7.02	6.53
Private sector organisations, such as private training or research providers, and consultants	5.22	5.44
Universities or other higher education institutes	5.42	5.00
Professional networks (e.g. chambers of commerce, trade or business associations, business clubs or other professional networks).	6.78	4.14
International Organisations/Donors	4.09	4.53
Other (please state)	6.50	NA

The rating for the international organisations is low because SMEs in the region are not into exportation themselves, but supply either the large companies or the marketing organisations located in Istanbul, which provide the international link for them.

For the majority of SMEs, their sources of knowledge appear to change infrequently. Figure 4.3 shows that for 56% of firms their knowledge sources occasionally change, suggesting a level of inertia. More than a quarter of the sample (33%) report that sources of knowledge change rarely and only 7% report frequent changes. These results prove that knowledge resources are built on trust for long-term.

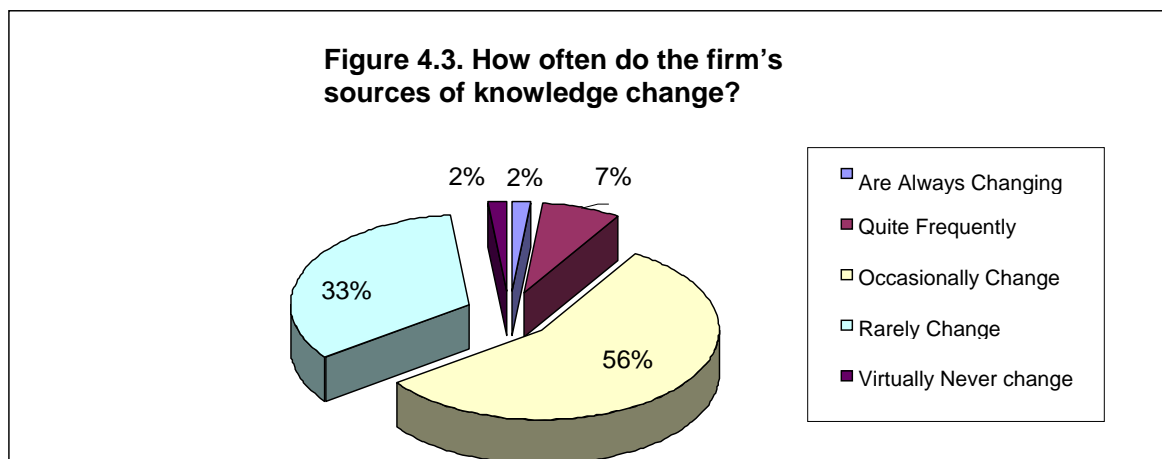


Figure 4.4 suggests that the social interaction is quite frequently among the individuals from the SMEs and the other organisations from which they source knowledge. Only 9% reported rarely and no one answered “virtually never”. Social activities in the region are part of the culture.

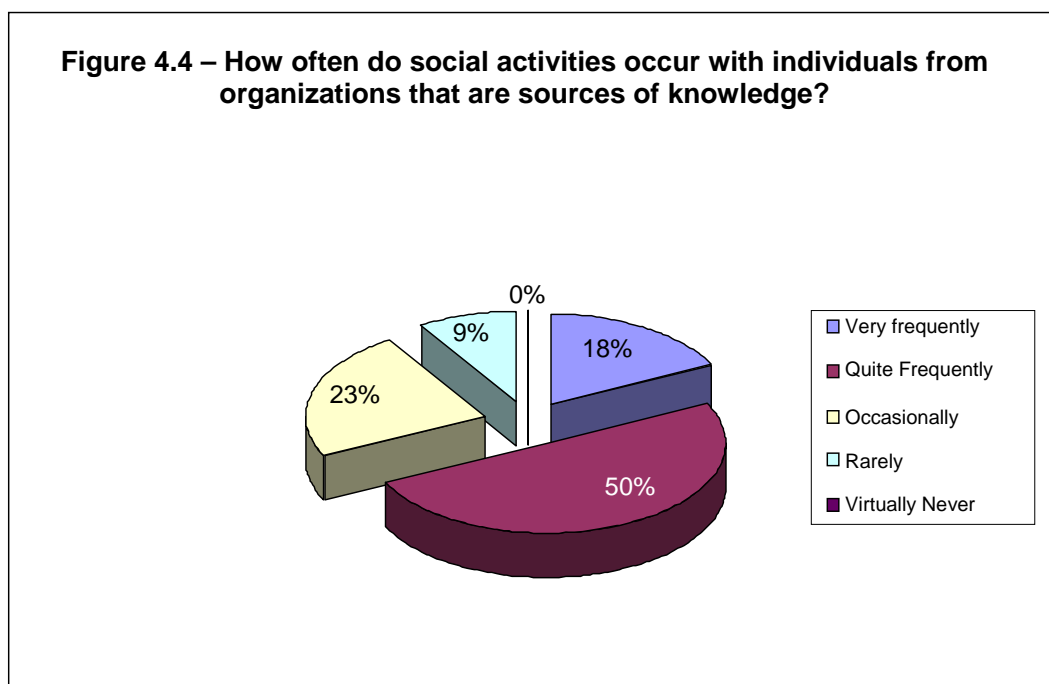


Figure 4.5 suggests that social activity is a key motivation behind this interaction since 93% reported that social activities would continue even if they were not any more knowledge sources.

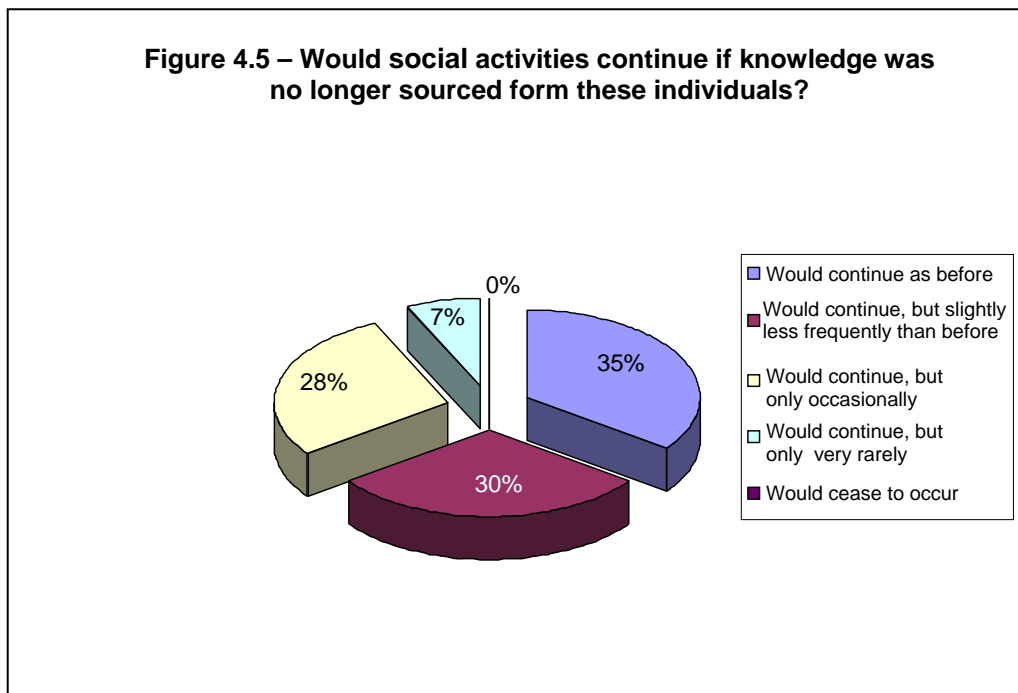
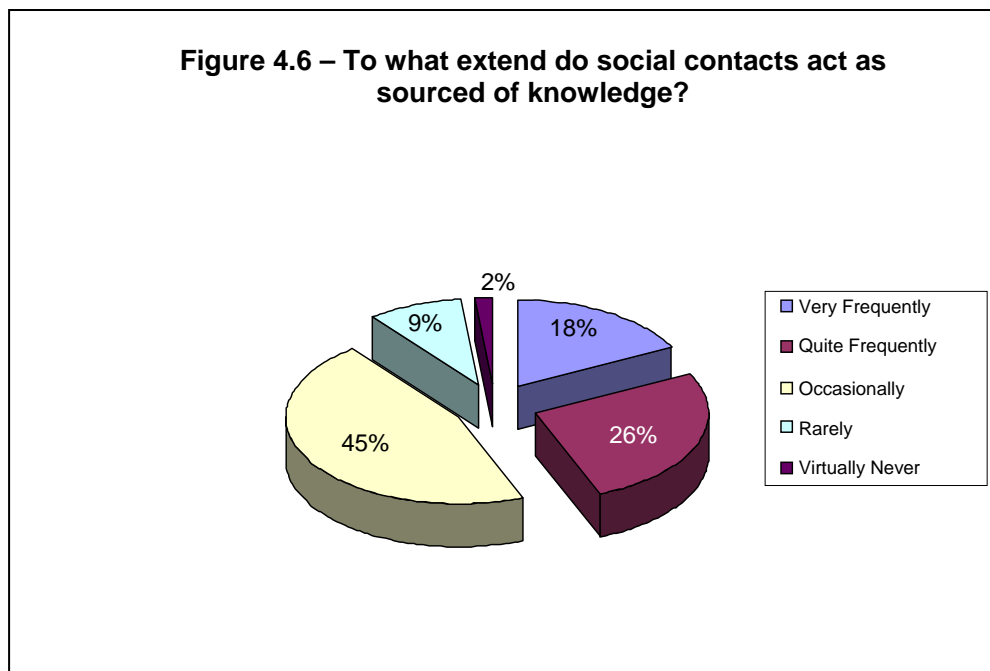


Figure 4.6 shows that social contacts do act as sources of knowledge, with almost 90% of the sample reporting that social contacts act as sources of knowledge very frequently, quite frequently or occasionally, suggesting that social interaction is an important mechanism for obtaining external knowledge.



In terms of the types of knowledge the SMEs obtain from external sources, Table 4.8 highlights the fact that firms obtain a diverse range of knowledge. Training and the procurement of inputs are the knowledge types most frequently obtained ‘very often’ from external sources. Knowledge on IT development and support, and new product development are obtained from external sources quite often. On the other hand, new market research knowledge is not often obtained from external resources. In general, SMEs of Thrace –Turkey seem to obtain knowledge to operate and or develop their business. They seem to be very dependent on the large customers.

Table 4.8 – Types of knowledge obtained from external sources

	Very often obtained	Quite often obtained	Not often obtained	Never obtained
Employment law	21.1	42.1	26.3	1.8
Health and safety advice	26.3	42.1	21.1	0.0
Finance, accounting and auditing	24.6	49.1	21.1	0.0
New marketing research	12.3	47.4	31.6	0.0
New Product development	22.8	49.1	22.8	0.0
New Process development	26.3	42.1	21.1	0.0
New Service development	38.6	31.6	15.8	0.0
New Technology	33.3	36.8	12.3	0.0
Recruitment	33.3	38.6	21.1	0.0
Training	50.9	26.3	10.5	0.0
Procurement of inputs	45.6	36.8	12.3	0.0
IT development/support	7.0	56.1	28.1	0.0
General business support	36.8	47.4	7.0	0.0

Table 4.9 highlights the fact that engineering technologies, business administration and computer technologies are the most important knowledge achieved from the external sources with an average score of 7.50. All the rest are rated very low. It may be concluded that the industries in the region are engineering based rather than medical, biological or scientific based.

Table 4.9 – Importance of external knowledge obtained by discipline

	Importance
Biological sciences	3.48
Medicine and dentistry	1.88
Computer science and information systems	7.15
Engineering technology	7.95
Mathematical sciences	4.92
Business and administrative (e.g. logistics)	7.41
Physical sciences	4.25
Agriculture	4.20
Architecture, building & planning	4.00
Other	1.80

Firms introduced an average of 59.64 new products or services or adaptations to new products and services over previous three-year period.

In terms of innovation environment, Table 4.10 shows that the three most important factors are the core values of the firm, development of new markets and the innovative culture within the firm. New product and service development follow with only a small difference in importance. These responses suggest that the SMEs do not believe they can innovate before the company puts the systems and management in place for innovation.

Table 4.10 – Innovation Culture

	Importance	Effectiveness	Percentage Difference
Core values of firm	8.77	8.42	3.99
Innovative culture	8.24	7.65	7.16
Development of new markets	8.56	7.89	7.83
Development of networking opportunities within the company	7.29	6.73	7.68
Development of networking opportunities outside the company	8.23	7.58	7.90
Development of new products	8.23	7.55	8.26
Development of new services	8.00	7.32	8.50
Development of new processes	7.84	7.17	8.55
Development of new materials	6.92	6.22	10.12
Adoption of new inputs and materials	7.44	6.70	9.95
Monitoring competitors' products and processes	7.16	6.72	6.15

As with the other regions, Table 4.10 highlights that every factor comprising the innovation culture is rated as more important than effective.

4.2.1 Summary

In terms of knowledge creation, the factor rated as most important within the firm was the management team. Almost 62% of the companies reported that the skills were relevant for knowledge creation, though only a quarter of the companies found more than 50% of the employees skilled enough. The customers, suppliers and rivals were seen as the most important knowledge resources both within and outside the region, which rarely change.

Almost 60% of the firms have created new products in the last three years and the innovation environment seems to be dependent on management culture.

4.3 Collaboration

This section examines data on SME collaboration focussing on the following factors: with whom they collaborate, the importance of various sources of collaboration, the changing nature of the relationships, the impact of social interaction on collaboration and membership of business organisations such as chambers of commerce.

Table 4.11 presents data on collaboration and the importance of various partners to the firms. The most striking result is that collaboration with the public sector organisation is the third most important one after customers and suppliers within the region. The collaboration with rivals outside the region seem to be more important than within the region. The most important source of collaboration are customers located outside the region with no others scoring higher than 7.

Table 4.11 – Importance of Collaborators

	Within the Region	Outside the Region
Customers	7.72	7.00
Suppliers	6.72	6.47
Rival firms	4.58	5.16
Public sector organisations, such as government business support agencies	5.54	3.92
Private sector organisations, such as private training or research providers, and consultants	4.47	3.67
Universities or other higher education institutes	4.57	2.91
Members of your professional networks (e.g. chambers of commerce, trade or business associations, business clubs or other professional networks).	5.28	4.08
International Organisations/Donors	3.73	3.08

Istanbul and its peripheries is the region for major customers for those companies that do not export. The data also shows a low level of change with respect to the collaboration partners. Figure 4.7 shows that the SMEs report that their collaborative partners change occasionally or rarely.

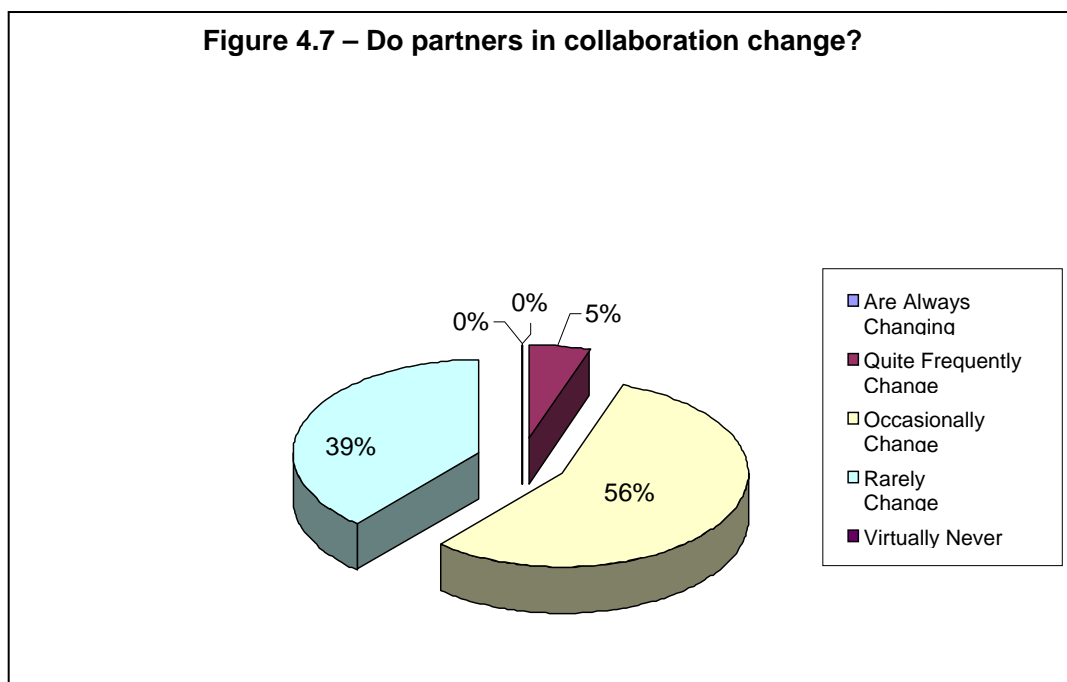


Figure 4.8 shows that social contact with collaborative partners is relatively common as over 70% of SMEs report either occasionally or quite frequently engaging socially with their partners. Only slightly over quarter of the sample engages in this behaviour either rarely or never. Thus, the data suggests that social interaction is a frequent occurrence in the region.

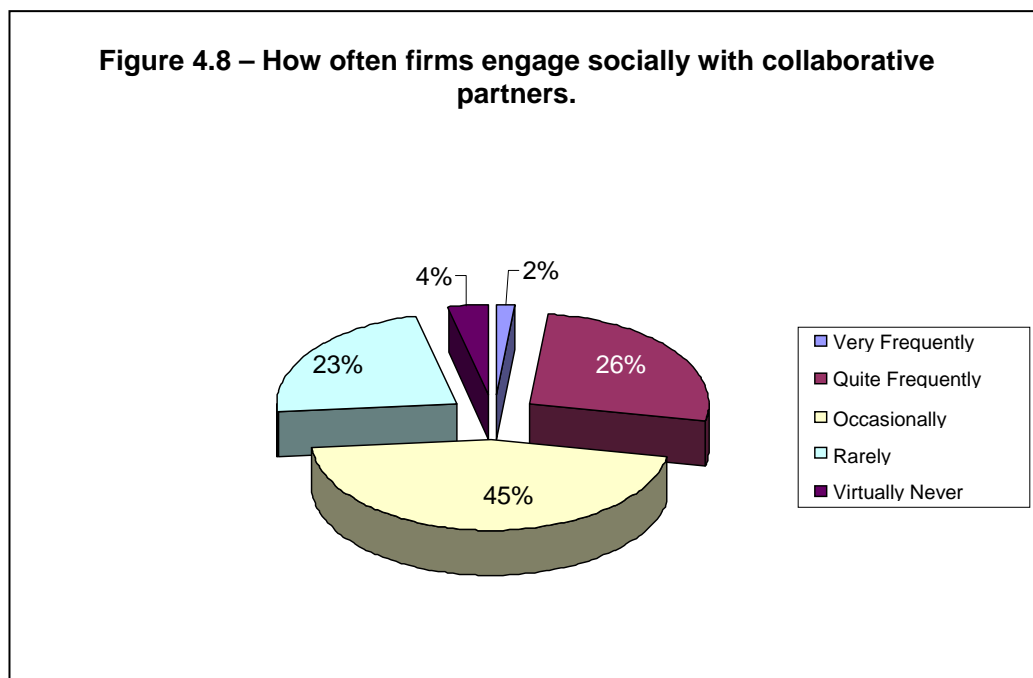
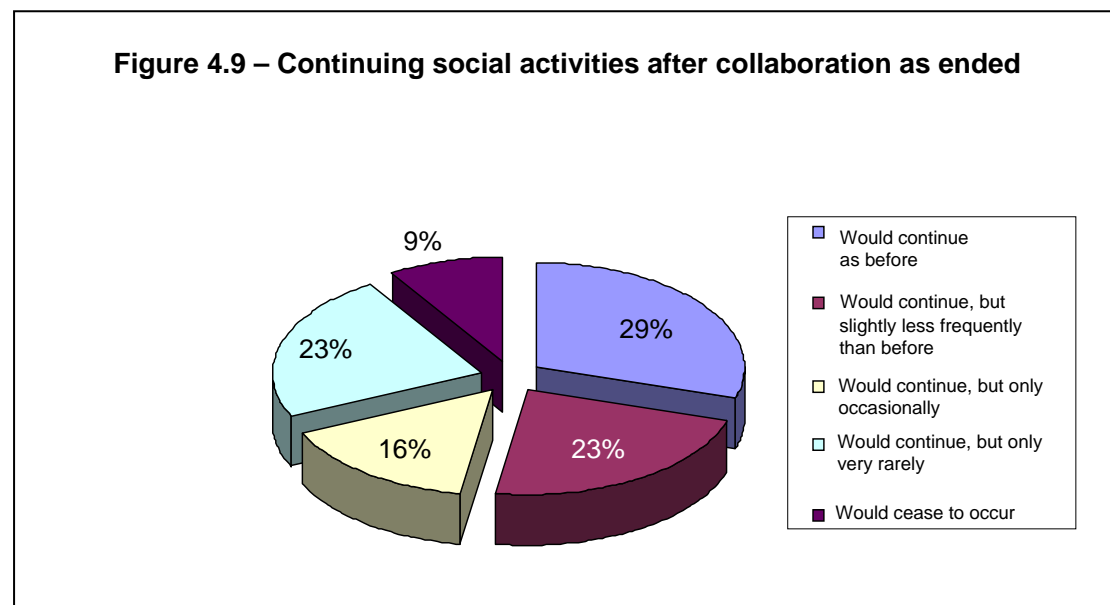


Figure 4.9 shows that more than half of the firms would continue to engage socially with their partners if the collaboration with them ended. Only 9% would cease and 23% would reduce to rare occasions. Thus, the social interactions observed are not

linked to collaboration. This pattern is similar to that of the patterns of social interaction with knowledge sources, in that even if the contact is no longer a source of knowledge interaction continues.



Overall, firms appear to be well connected by being a member of the chamber of commerce and or trade and business organisations which are somewhat legal obligations in Turkey. However, only 15.8% are member of business clubs or professional networks as seen in Table 4.12.

Table 4.12 – Percentage of firms in membership organisations

	Member	Non-member
Chamber of Commerce	100	0
Trade or Business Association	63,2	36,8
Business Club	15,8	84,2
Other professional networks	15,8	84,2

Table 4.13 shows that all the factors for network membership are found to be fairly important with a rating over 7. Developing supplier contacts is the least important aspect of membership, and the only one with an average score of less than 7.

Table 4.13 – Importance of Membership of Networks

Developing customer contacts	7.00
Developing supplier contacts	6.54
Obtaining knowledge from other parties	7.09
Creating solidarity within your industry	7.40
A means of representing views	7.05
Sharing knowledge with member	7.02
Developing trust within the industry	7.64

4.3.1 Summary

The data in this section has highlighted evidence that the most important partners for collaboration are customers, suppliers, and rivals both within and outside the region. Public organisations are also important mainly due to the efforts of KOSGEB. The collaboration partners do not change frequently and socialising with partners is a common occurrence, which does not depend on collaboration. The responses also show that they are well connected to create solidarity with the customers and other parties.

4.4 Barriers and Business Support

This section examines data on the barriers to innovation faced by the firms and the policy actions the firms would like to see implemented across the region. Also, awareness of the regional business support network is examined, along with the interaction between the SMEs and the support organisations.

Table 4.14 suggests that the various barriers to business support are not rated very important as none of them score over 7. The most important barriers faced are the inability to access finance (6.31) and skilled labour (6.21). This may suggest that there is a difficulty to access the national financial support programmes and there is shortage of skills in the region. Although they are not rated very highly, regional solutions might support advances in innovation

Table 4.14 – Barriers to knowledge creation

Barriers	Importance
Unable to access relevant networks	5.36
Unable to access relevant collaborators	5.04
Inapplicability of knowledge created by others in region (e.g. universities, other companies or existing networks)	4.78
Quality or applicability of available business support or advice	5.61
Unable to access suitable finance	6.31
Unable to access skilled labour	6.29
Unable to access suitable training	5.16
Unable to access suitable equipment or plant	5.02

In terms of future policy directions, according to the Table 4.15 more than 50 % of SMEs want the access to finance, knowledge exchange for new markets and attraction for foreign investment to be part of core policies. Improved systems for business advice, more access to training and improvement of supply chains are shown to be in need of addressing further. The priority for future policy appears to include all the suggested factors with a varying level of importance. Creation of business advice systems seems to be the factor with highest attention (70.2%) although it is not considered in the core policies.

Table 4.15 – Future policy directions

	Does not need to be addressed further	Needs addressing but is not the core issue	Should form the core policy
Creating an improved system of business support and advice	5.3	70.2	10.5
Making more finance available to companies enabling them to become involved further in R&D and knowledge related activities	1.8	31.6	54.4
Creating more access to training and workforce development opportunities	3.5	52.6	35.1
Support companies in entering and accessing new markets	5.3	28.1	56.1
Create better networks that link companies with universities and other R&D performing organisations	8.8	40.4	38.6
Make improvements to the physical infrastructure allowing companies to locate in better equipped premises	10.5	33.3	45.6
Provide more support to companies to improve their supply-chains and logistical needs	8.8	52.6	28.1
Stimulate better supply and demand for knowledge through the attraction of high value foreign investment	7.0	22.8	56.1
Stimulate the creation of new start-up companies	3.5	36.8	42.1

The following three tables present data on interaction between the sample firms and support organisations. This data is broken down into three groups, the first examines awareness and interaction with general business support and policymaking organisations; the second examines awareness and interaction with higher education institutions (HEIs); and the third table examines awareness and interaction with knowledge generation organisations.

Table 4.16 outlines the SME awareness of, and interaction with, policymaking and business support organisations. Mainly three public policy makers and three active NGOs are chosen. KOSGEB seems to be the most interacted organisation since they have a regional organisation. TUBITAK, the main national policy maker and strategist for finance allocations is known but never contacted by 84% of the companies. The reason often stated is the bureaucracy applied in TUBITAK, and the regional office being active in R&D only and not open to business support. The rest of the organisations are heard of but not contacted either. It seems that there is a lot to be done in terms of interactions of policy makers and the SMEs.

Table 4.16 – Awareness and interaction with policymakers and business support organisations

	Never heard of	Have heard of but not sure what they do	Have heard of and know what they do	Know what they do and have had contact with	Have had contact with them which has been beneficial to the company
TUBITAK	0.0	3.5	84.2	5.3	7.0
KOSGEB	0.0	1.8	17.5	45.6	22.8
ITKIB	15.8	19.3	31.6	5.3	14.0
KALDER	10.5	29.8	43.9	1.8	1.8
TUSIAD	0.0	10.5	77.2	1.8	0.0
TBV	17.5	36.8	35.1	0.0	0.0

4.4.1 Summary

The data in this section suggests that the priorities for future policy appear to be making finance available for firms to expand R&D and knowledge related activities, supporting companies entering new markets and creating opportunities for foreign investments. It is observed that the future policies are suggested without any interaction or in depth information about the policy makers.

4.5 Conclusions

The main conclusions drawn from this work are the fact that for most variables the average score for importance is higher than the average score for effectiveness. If the firms have clearly understood the difference of importance and effectiveness, then it means that the firms are not utilising these resources as efficiently as they should for competitiveness.

The sources of knowledge, which are important to the firms, appear to be customers, partners, and rivals, both within and outside the region. This pattern is repeated with respect to collaboration.

Social interaction with the stakeholders are considered important not only for knowledge achievement or collaboration, but also for creating solidarity in the region and/or in the industry. This is not necessarily seen as the source of innovation since management and the innovation culture of the company are seen the most important factors for improvement.

There appears to be limited interaction with regional business support and knowledge creating organisations except KOSGEB. Although KOSGEB is a public organisation with national policies, the data shows that the local organisation can be an exemplar for the other policymakers.

The suggestions for the future policies are clear guidelines in terms of building better ways of accessing financial and knowledge resources. It appears that there is a need to assist firms in utilising their resources more efficiently in order to improve competitiveness, encouraging knowledge sharing and collaboration among firms within the region and improving the firms' awareness of support organisations in order to facilitate greater levels of interaction.

5.0 SME Benchmarking – South and East Bulgaria

5.1 Introduction

The ultimate goal of workpackage 4 is to explore the scope and options for establishing policies to support the further development of research-SME community knowledge transfer processes. According to the data from the Bulgarian National Innovation Survey conducted by National Statistical Institute about 16% of all firms operating in the country has innovated in the last three years. The share of innovative firms in the groups of enterprises with 10-49 employees and 50-249 employees is 13.5% and 22.8% respectively. Having in mind the relatively low innovative activity of Bulgarian SMEs compared to the average EU-level, we decided to select only innovative firms for the standardised consultations. Eventually, the information necessary was gathered through a range of interactions with SMEs including consultations with 50 innovative SMEs from a range of sectors in the region and a focus group with 8 managers from non-innovative SMEs.

The interaction with SMEs was aimed at:

- Understanding the barriers SMEs face in identification of the research and knowledge they require and finding out the particular types of knowledge that SMEs consider themselves to be deficient.
- Understanding how (if at all) SMEs transfer and make use of knowledge generated by other SMEs and research actors and identifying the processes best suited to knowledge infusion into SMEs.
- Gaining information about the issues facing the SME community in the area of knowledge transfer and in particular in the absorbing effectively the research and knowledge they know already exists.

During initial meetings with firm managers it became clear that part of the questions as well as some of the alternatives in the list of answers to the close-ended questions in the standardised questionnaire, prepared by the team are not able to be adjusted to the specific characteristics of Bulgarian economic environment and entrepreneurial culture. Therefore we introduced some changes to the scorecard. Fundamentally, a few questions were excluded - in particular those related to the formal documenting of SMEs activities and those related to the role of social contacts in the process of knowledge creation and transfer. The rationale behind is that no one of the interviewed firm managers pointed out that they have not documented formally their activity. As regards to the social contacts, to ask about their role in any field of the professional life is inappropriate because everyone in Bulgaria views social contact as an innate and one of the most important channels for information concerning business and personal activities.

During the pre-test of the scorecard we have revealed that some responses to the particular questions do not conform to the preliminary set of fixed alternatives. Therefore we formulate additional fixed categories for the responses that appear frequently in the initial conversations with managers. A special attention was given to the question phrasing and formatting. While translating the common survey instrument in Bulgarian we have attempted to avoid high technical words or phrases and to keep wording simple, straightforward, and to the point. Some efforts have been

devoted to avoiding ambiguity that occurred from the use of words and phrases that sounded vague after translation in Bulgarian. For example some explanation was necessary to be presented to the respondent about the scope and content of the term “knowledge” that is one of the central themes of this survey.

One problem that arose during the pre-test survey was that the managers felt it was difficult to provide subjective evaluation of the importance of some factors, for example their sources of knowledge and their collaborators with respect to knowledge creation and absorption due to the limit scope of innovative activities and the relatively young age of their companies. We very often received answers like the following:” I cannot generalise who is the most important collaborator in knowledge creation because my firm is new and I have introduced few innovations so far. I may say what I did in the last two to five years”. Therefore, we introduced some time limits to several questions. We asked about the issue in the last three years instead of phrasing the question in general terms without specified period.

It has to be noted that the changes introduced in the scorecard do not influence its general context and logic. That is way the results from the survey among Bulgarian SMEs are comparable to the results obtained for the other 3 regions involved in the MIRIAD project. As can be seen from the analysis below all the issues of relevance to the study have been discussed in the survey among Bulgarian SMEs, while reflecting their specific characteristics.

5.1 Knowledge Stock and Competitiveness

This section presents data on the knowledge stock of the SMEs and their importance and effectiveness for the overall competitiveness of the SMEs. The data are divided into five broad groups: Human resources, Intellectual Assets, Practices and Routines, Physical Resources and External Relations.

Table 5.1 – Human Resources and Competitiveness

	Importance	Effectiveness	Percentage Difference
Employee skills and competences	7.5	7.4	1.4
Employee qualifications	6.4	7.6	-15.8
Employees’ problem solving capacity	7.0	7.2	-2.8
Employees commitment	8.5	7.5	13.3
Employee loyalty	9.3	7.5	24.0
Management skills and competences	8.8	8.4	4.8
Management qualifications	8.7	8.6	1.1
Management commitment	8.6	8.0	7.5
Management loyalty	9.1	8.3	9.6

In terms of Human Resources, Table 5.1 shows that the loyalty of both employees and managers is the most important factor affecting competitiveness. The interviewed

entrepreneurs value more the quality characteristics of managers than those of the employees. They rate both the formal and tacit knowledge of managers as being of high importance for firm competitiveness. In contrast, employees formal qualifications are much less valued than the skills and competences they have accumulated during their work life. It has to be noted here that the competence needs vary among different sectors and firms, especially concerning innovative activities. Therefore the finding stemming from Table 5.1 that formal knowledge is less valued than the tacit one should not be automatically transferred to all kinds of enterprises. For example, some sectors and firms require substantial formal R&D competence, while others may place greater emphasis on the development of prototypes, testing and trial production, and experience a greater need for skilled workers. Type of competence needs depends also on the type of innovation carried out, i.e. radical or incremental. The limited size of the sample does not allow for analysis by sector. Therefore, further efforts are needed in order to analyse the competence requirements of the firms involved in innovative activities. Still, the finding of higher appreciation of tacit than formal knowledge as factor for firm's competitiveness can be a signal of the inadequate mix of skills provided by formal education system.

Table 5.1 also highlights a general pattern of an asset being of more importance than effectiveness, i.e. these factors are necessary for the competitiveness of the business but are not used as efficiently. Therefore the firms are, generally, not utilising their assets to the optimum level. The exception to this is with respect to employee qualifications and problems solving capacity, which are used more efficiently than is necessary.

Table 5.2 presents summarised data on the subjective opinion of respondents about the role the firms' intellectual assets have played in relation to competitiveness as well as the degree of their effective use. Market knowledge and IT facilities are rated as the most important, scoring 8.6 and 8.5 respectively. Intellectual assets such as patents, copyrights, trademarks and trade secrets rank lowest in terms of importance. Some explanation of this finding can be found in the sector composition of the sample. Such assets seem to be more important for production firms than for service and trade ones. Since only one third of the respondents operate in the production sector, it is not a surprise that typical intellectual assets are not considered of higher importance to firms' competitiveness than the other assets. The firms instead rely on internal training programmes, process manuals and websites to generate competitive advantages.

Table 5.2 – Intellectual Assets

	Importance	Effectiveness	Percentage difference
Patents filed	4.0	3.6	11.1
Copyrights held	3.5	3.5	0.0
Trademarks registered	3.9	5.0	-22.0
Trade secrets	4.6	5.6	-17.9
Market knowledge	8.6	7.1	21.1
Process manuals	6.5	5.6	16.1
Internal training programmes	6.7	5.2	28.8
Website	6.8	6.5	4.6
IT facilities	8.5	7.0	21.4

Table 5.2 shows that six of the nine assets are rated as more important than effective, again a factor is more necessary to the firm than they are efficient at using it. The intellectual assets of patents, copyrights and trademarks are all more effective than important, i.e. they are not crucial to the firms' competitiveness but are used in an efficient way to maximise their value. The respondents are most critical towards the efficiency in using intellectual assets with regard to internal training programs, market knowledge and IT facilities.

Table 5.3 shows that communications with both customers and suppliers are the most important practices or routines with scores of 9.5 and 9.4 respectively, followed by management style and on the job training. On-the-job, or internal, training appears to be of much higher importance to the firms than external training, highlighting the fact that the SMEs are inward looking in terms of training and may be less likely to look for sources external to the firm when training their workforce.

Table 5.3 – Practices and Routines

	Importance	Effectiveness	Percentage Difference
Process manuals	6.5	5.6	16.1
On the job training	8.4	7.5	12.0
External training	7.8	6.0	30.0
Management style	9.3	8.7	6.9
Forums for solving problems	7.5	6.0	25.0
Communication with customers	9.5	8.5	11.8
Communication with suppliers	9.4	8.9	5.6

The importance of all the ‘process and routines’ factors is higher than their effectiveness. Physical resources are generally the least important factors for the competitiveness of SMEs as the average scores in Table 5.4 are lower than the scores for the factors presented in Tables 5.1-5.3, and 5.5. Plant equipment owned by the firms, followed by industrial buildings are the most important physical resources. The firms’ proximity to their suppliers and customers together with the road and rail links do not appear to be very important, suggesting that the sampled firms may be trading outside the region.

Table 5.4 – Physical Resources

	Importance	Effectiveness	Percentage Difference
Industrial buildings	6.4	7.4	-13.5
Retail premises	5.4	7.0	-22.9
Land	5.5	6.3	-12.7
Plant equipment (owned)	7.8	7.1	9.9
Plant equipment (leased)	7.1	6.8	4.4
Road links	5.6	6.0	-6.7
Rail links	3.2	3.4	-5.9
Proximity to customers	5.0	6.0	-16.7
Proximity to suppliers	5.1	5.5	-13.5

Compared to the other factors for competitiveness, physical resources appear to be most effectively used. As Table 4 shows 7 of 9 such assets are rated as more effective than important, Thus, the firms are using their physical resources more efficiently than they are necessary and thus efficient use is more important for competitiveness than possessing these resources.

Table 5.5 suggests that the most important factors in terms of external relations are customer satisfaction (average score of 9.6), the firm’s reputation (9.5), responsiveness to customers’ demands (9.1), brand image of products/services (8.8) and customer loyalty (8.6). The data also show that relationships with customers are rated as more important than relationships with suppliers. The licensing of the firm’s products or obtaining licences for other firm’s products does not appear to be important for competitiveness.

With the exception of licence agreements for both other firm’s products for own products, the importance of these factors is higher than the effectiveness, thus the firms are not utilising the resources they possess as efficiently as possible.

Table 5.5 – External Relations

	Importance	Effectiveness	Percentage Difference
Distribution arrangements for your company's products and services	7.5	7.0	7.1
Customer loyalty	8.6	6.0	43.3
Brand image of your products/services	8.8	7.0	25.7
Reputation of your company	9.5	9.0	5.6
Customer satisfaction	9.6	8.5	12.9
Responsiveness to customer demands	9.1	8.2	11.0
Relationships with your customers	8.5	8.2	3.7
Relationships with your suppliers	7.6	7.5	1.3
Licence agreements with other firms (for your products)	4.2	4.5	-6.7
Licence agreements with other firms (for their products)	3.2	4.0	-20.0

5.1.1 Summary

The data suggest that the most important factors for the competitiveness of the firms are the firms' human resources, followed by the firms' external relations, practices and routines within the firms, intellectual assets and physical assets. It seems that firms rely more on the tacit knowledge of their human resources rather than on their formal qualifications (codified knowledge). At the same time during the study we have realised that there is no official statistical data on the formal education qualifications of SMEs employees; therefore a clear picture of the innovation and competitiveness opportunities of different groups of SMEs (sectoral, geographical), based on formal competences alone and the formal qualifications of the workforce is not possible. Since in the coming years the development of competence as a competitive factor in SMEs will be a central challenge it is crucial to analyse further the competence requirements (both codified and tacit) of firms involved in the innovative activities.

Physical resources are generally the least important factors for the competitiveness of SMEs, with the exception of plant equipment. This finding together with the high importance of connections with customers and suppliers indicate that Bulgarian SMEs are facing with problems of survival and business extension and put still less emphasis on the role of knowledge to the firms' competitiveness. This result suggests that one major problem for SMEs and for government in finding the appropriate policy initiatives to solve it, is the incapability of firms to incorporate innovation strategy into the overall business development strategy. One solution maybe found in the greater emphasis on the consulting services in strategy formation and implementation

In general, there is a gap between the level of importance and the level of effectiveness of all the factors. The fact that this difference is generally positive suggests that the firms are not able to use their resources as efficiently as they would like to.

5.2 Knowledge Creation and Acquisition

This section examines data on knowledge creation and acquisition activities of the SMEs in the South-East Bulgaria region. In order to get a clear picture of the knowledge and innovation creation we asked respondents to differentiate the answers according to the type of knowledge and innovation and asked them “How did you create knowledge and innovations in the last three years?”

Table 5.6 – Knowledge and Innovation Creation in the last three years

Source of Innovations	Product Innovations	Process Innovations
Developed by the SME	73.4	69.1
Developed in co-operation with other enterprises or institutions	12.7	20.9
Developed outside the SME	13.8	10.0
TOTAL	100.0	100.0

Table 5.6 shows that the largest proportion of innovations are created inside the SMEs. Only about one tenth of the innovations are taken from external sources. SMEs are more active in collaboration only with regard to process innovations. This finding is not a surprise because such type of knowledge creation and innovations include new or considerably improved production methods, methods for supply and supplementary activities. All of them require more active co-operation with external organisations than the product innovations. The results in Tables 5.6 and 5.9 suggest that the main part of innovation in SMEs is not based on specific research activities but on the use of existing technologies.

One of the most striking findings stemming from the interviews is the extremely low importance of traditional knowledge creators such as universities and private research institutes. Table 5.7 shows that the top two external sources of knowledge for SMEs in South-Eastern Bulgaria are customers and suppliers. This result suggests that innovation and knowledge creation in the region is not supply-driven. According to the data, technological transfer of traditional type – that is transferring research results from R&D performing agencies and knowledge-creating institutions into applications in firms - does not take place in the region. Table 5.7 also indicates very weak relationship between SMEs and intermediary organisations such as professional networks and associations.

Table 5.7 – Sources of Knowledge in the last three years

Sources	Importance
Within the firm	8.22
Suppliers	7.71
Customers or clients	8.22
Rival firms	6.66
Consultants, commercial labs or private R&D institutes	4.98
Universities or other higher education institutes	4.50
Private research institutes	4.10
Professional networks or associations	5.13

In terms of who actually creates the knowledge within the firms, all of the respondents pointed out that their firms have neither R&D teams, nor R&D departments. Since the largest part of the innovation includes the adoption of existing technologies, SMEs stressed the importance and effectiveness of knowledge workers with an average score of 7.5. However, the most important source of knowledge and innovation in the firm is the management. On average, almost of two-thirds of the firms report that the workforce has adequate skills for their needs. During the focus group and interviews however participants stressed that many SMEs, especially traditional ones, are lacking management capacities to implement new ideas and innovative projects.

Table 5.8 – Sources of Knowledge and Innovation by Location in the last three years

Sources	Share
National	49.9%
European	33.5%
US or other countries	16.7%
TOTAL	100.0%

According to the finding, every second SME has co-operated with a national partner in knowledge creation and innovations. There have been indications from other studies that the process of opening SMEs to external – mainly European partners - is going on. However, still little is known about the type of such collaborations. Existing studies point out that in the bulk of the cases the co-operation includes transfer of existing technologies rather than outsourcing. In addition, in terms of innovation environment, the respondents emphasized that the two of the most important factors are the core values of the firm and the innovative culture within the firm, which suggests that the firm will be innovative if the management team values the

contribution of innovation to competitiveness, and among the workforce there is a culture which promotes innovation.

In terms of the types of knowledge the SMEs obtain from external sources, Table 5.9 highlights the fact that the firms obtain a diverse range of knowledge but almost two-thirds of them spent efforts on IT development/support and acquisition of equipment. The group of important types of knowledge includes general business support, licenses, know-how and marketing knowledge, suggesting that it is the knowledge of running a business rather than developing products which is the most often obtained from external sources. R&D both in house and from external sources occupy a very modest shares of the total innovative activities of the SMEs. In fact, as few as 6.9% of the respondents report intramural R&D and 12.2% report extramural R&D in the last three years. This result once again confirms that for SMEs the access to the existing technologies is more important than R&D.

Table 5.9 – Types of knowledge obtained and innovations developed from external sources in the last three years

Types of knowledge obtained and innovations developed	Share of all respondents
New product and service development only	44.0
New process development only	7.0
Both new product and new process development	52.0
Intramural R&D	6.9
Extramural R&D	12.2
IT development/support and Acquisition of Equipment	64.8
Training	24.2
License, know-how	30.0
Marketing	29.5
General business support	36.2

5.2.1 Summary

In terms of knowledge creation, the factor rated as most important within the firm was the management team. Firm will be innovative if the management team values the contribution of innovation to competitiveness, and among the workforce there is a culture, which promotes innovation. However many SMEs stressed, especially traditional ones, that they are lacking management capacities to implement new ideas and innovative projects.

With respect to external knowledge the top two external sources of knowledge for SMEs in South-Eastern Bulgaria are customers and suppliers. This result suggests that innovation and knowledge creation in the region is not supply-driven. One of the most striking finding stemming from the interviews is the extremely low importance of traditional knowledge creators such as universities and private research institutes.

The data suggest that it is the knowledge of running a business rather than developing products which is the most often obtained from external sources. R&D both in house and from external sources occupies very modest share in the total innovative activities of the SMEs.

5.3 Collaboration

This section examines data on SME collaboration focussing on the following factors: with whom they collaborate, the importance of various sources of collaboration, the changing nature of the relationships, the impact of social interaction on collaboration and membership of business organisations such as chambers of commerce.

Table 5.10 presents data on collaboration and the importance of various partners to the firms. The most striking result appearing several times in responses is the lack of interaction between knowledge creators (higher education institutions and private organisations) and private sector, in particular SMEs. The quality of science and higher education has been improving in recent years but it seems that the actors are not able to commercialise the results of these efforts. Only 7% of the respondents found universities the most valuable partner in knowledge creation and absorption. Customers and suppliers are rated as the most important, mirroring the result obtained for sources of external knowledge.

Table 5.10– Importance of Collaborators

Collaborators	Share of respondents that found this partner the most valuable
Other firms within the group	47.5
Suppliers	43.8
Customers or clients	51.8
Consultants, commercial labs or private R&D institutes	24.8
Universities or other higher education institutes	7.0
Private research institutes	5.1

Overall, the sample firms appear to be well connected. Over three quarters report membership of a trade or business association. Over half of the firms report membership of local chambers of commerce.

Table 5.11 – Percentage of firms in membership organisations

Organisations	Member	Non-member
Chamber of Commerce	54.2	45.8
Trade or Business Association	69.0	31.0
Business Incubators	7.0	93.0
Other professional networks	29.3	71.7

Table 5.12 shows that obtaining and sharing knowledge are the most important factors with respect to the membership of networks. While these advantages do not score highly, i.e. scores of 5.0 and 5.2 suggest that they are only rated as fairly important; they do suggest that the transfer of knowledge may be the most important factor influencing involvement and membership of network organisations. This finding needs further exploration because the differences in the scores are very small. For example developing trust within the industry and representing views are almost equally rated with the effect of obtaining and sharing knowledge (see Table 5.12).

Effects	Importance
Developing customer contacts	4.2
Developing supplier contacts	3.6
Obtaining knowledge from other parties	5.0
Creating solidarity within your industry	4.2
A means of representing views	4.8
Sharing knowledge with member	5.2
Developing trust within the industry	4.5

5.3.1 Summary

The data in this section has highlighted evidence that the most important partners for collaboration are customers and suppliers. The lack of co-operation between academia and SMEs suggests that public intervention should be aimed at removing the barriers between the two sectors. Currently universities lack incentives and legal mechanisms to cooperate with private sector. Changes in the legal framework in which universities and other research institutions operate, for example towards their third mission, would address the knowledge and innovation needs of SMEs better. Despite the fact that the firms are well connected in terms of membership of networking organisations, appropriate measures are necessary in order to set up and developed the intermediary system to close the gap between the knowledge creators and SMEs.

5.4 Barriers and Business Support

This section examines data on the barriers to innovation faced by the firms and the policy actions the firms would like to see implemented across the region. Also, awareness of the regional business support network is examined along with the interaction between the SMEs and the support organisations.

Table 5.13 suggests that the major factor hampering SMEs in carrying out R&D and innovation is the lack of financial resources. It has to be stressed here that when the respondents are asked about the role of finance in the innovative activities they predominantly think about internal resources. This is due to the very low public financial support to the SMEs in this region, and there is still large room for improvement and finding the appropriate mechanisms. When committing resources to innovation, SMEs spend more as a proportion of their turnover than larger firms and

face higher risks. Most SMEs pointed out the lack of well-functioning venture capital or seed finance market to support their research and development efforts, or their investments in innovations.

It is interesting that uncertain demand for innovation products and services is rated quite high as factor hampering innovative activities in SMEs. This finding suggests that the general economic environment in the region and Bulgaria as a whole does not stimulate the production of innovative products and services. Hence, one of the avenues for promoting innovation is to convince SMEs that they will benefit from the results of their research efforts. Surprisingly the inability to recruit skilled labour, access relevant networks and information on technologies are not rated as so important barriers to innovation as lack of finance and uncertain demand.

Table 5.13 – Barriers to knowledge creation

Barriers	Importance
Unable to access relevant co-operation and collaborators	6.1
Unable to access information on technologies and equipment	5.7
Uncertain demand for innovative products and services	6.6
Unable to access information on markets	5.8
Unable to access suitable finance in the firm	7.6
Unable to access suitable finance outside the firm	7.1
Unable to access skilled labour	6.1
Innovation costs too high	7.5

The major priority for future policy according to the firm managers is to make finance available for firms to expand R&D and knowledge related activities, which 76.5% of respondents suggested should form the core of policy. The fact that the interviewees placed the improving of system of business support and advice and improving the physical infrastructure and allowing companies to locate in better equipped premises on the second place in terms of share of suggestions to form the core of the policy, indicates that SMEs sector in Bulgaria still needs support for its further expansion and sustainable growth. 51% of the respondents suggested that creating more access to training and workforce development opportunities should form the core policy, thus supporting the view that SMEs still need a serious support to improve their capacity to innovate.

Table 5.14 – Future policy directions

	Does not need to be addressed further	Needs addressing but is not the core issue	Should form the core policy
Creating an improved system of business support and advice	12.6	25.4	62.0
Making more finance available to companies enabling them to become involved further in R&D and knowledge related activities	0.0	23.5	76.5
Creating more access to training and workforce development opportunities	13.0	36.0	51.0
Support companies in entering and accessing new markets	11.0	40.0	49.0
Create better networks that link companies with universities and other R&D performing organisations	15.0	38.0	47.0
Make improvements to the physical infrastructure allowing companies to locate in better equipped premises	12.0	26.0	62.0
Provide more support to companies to improve their supply-chains and logistical needs	23.0	39.0	38.0
Stimulate better supply and demand for knowledge through the attraction of high value foreign investment	13.0	48.0	39.0
Stimulate the creation of new start-up companies	11.0	62.0	27.0

5.4.1 Summary

The data in this section suggests the following areas where SMEs need specific support:

- making finance available for firms to expand R&D and knowledge related activities;
- supporting companies in general to expand and to increase their competitiveness; and
- to improve innovative capacity.

5.5 Conclusions

The survey among SMEs allows us to draw some conclusions and to put forward issues for discussion during the coming round table on the development and Regional

R&D Investment Strategy that is planned within the framework of the MIRIAD project.

Based on the work so far we argue that the emphasis on SMEs in knowledge and innovation policy should continue without neglecting the policy concern for larger firms. On the one hand, SMEs form increasingly important component of both national and regional economic structure, being responsible for rising shares of output and employment. On the other hand, SMEs face particular difficulties in innovation (mainly due to the economies of scale factors) that require different SME-tailored approach. In this line the following specific issues for discussion emerge from the survey results:

- lack of innovative capacity in traditional SMEs, including both managerial capacity to implement new ideas and innovative projects and worker capacity to create and implement knowledge and innovations;
- lack of financial resources and finding the appropriate policy mix to support SMEs innovation and R&D investment;
- lack of relationship between knowledge creators and SMEs and the inefficient role of intermediary organisations in this process;
- need for a more-coordinated and integrated approach to the delivery of services to SMEs that combine support and advising services at all stages of innovation process; and
- need to discuss a more-sector specific support policy that will focus SMEs innovation policy on the infrastructural needs of regional SMEs clusters.

All these issues will be suggested for discussion during round table that is planned for April 2007 with the active participation of policy makers and representatives.

6.0 Conclusions

The purpose of this section is to provide some brief comparisons across the four regions in order to highlight the similarities and differences among the SMEs.

Common in all four regions was the fact that most of the factors affecting competitiveness were rated as being of higher importance than effectiveness. Thus across the four regions SMEs are not utilising their assets efficiently. Therefore, there may be a case for promoting efficiency within the SMEs in order to improve their competitiveness.

Interestingly, there are different patterns of knowledge transfer across the four regions. The evidence from Yorkshire and Humberside showed that the only sources of knowledge rated as important were customers and suppliers located outside the region. Thus, no local sources of knowledge were rated as important. In Central Macedonia and East Macedonia-Thrace (Greece) these sources were also important, but it was customers and suppliers inside and outside the region which were rated as important. In Thrace (Turkey) this pattern was also observed with the addition of rival firms and public sector organisations from the region, which were rated as important sources of knowledge. In South and East Bulgaria it was also customers and suppliers who were rated as important sources of knowledge, although no data on whether these were inside or outside the region was obtained.

Therefore, in the three South East European regions, SMEs report that there are important sources of knowledge within the region suggesting that they utilise local knowledge, something which does not appear to occur in Yorkshire and Humberside. Only in the Turkish region of Thrace was a source other customers and suppliers were rated as important - these were rival firms and public sectors support organisations. In this region there are more external sources of knowledge, and may be more organisations willing to share knowledge.

In terms of collaboration, the same pattern is observed. In Yorkshire and Humberside the important partners in collaboration are located outside the region, where as in Central Macedonia and East Macedonia-Thrace (Greece) and Thrace (Turkey) partners in the region are rated as more important. In Central Macedonia and East Macedonia-Thrace (Greece) rival firms within the region were also rated as important partners in collaboration. In South and East Bulgaria customers and suppliers were also rated as important for collaboration.

Data on the social interaction with individuals from firms that were either sources of knowledge or a partner in collaboration show that this type of interaction occurs in the UK, Greek and Turkish regions, whereas in Bulgaria social interaction is seen as being culturally intertwined with the logic of undertaking business to such an extent that this interaction forms an implicit feature of business environment. It was also shown that in the UK and Greece this interaction is highly dependent on whether knowledge or collaboration is involved, as only a small proportion of respondents declared that they would still socialise if these actions ended. In Turkey, a significant number responded that interaction would still continue - 35% of those who socialise

with firms that are sources of knowledge and 29% of those who socialise with collaborators.

In the UK and Greek regions, the data showed that the SMEs are generally aware of the business support organisations in the region, but do not tend to interact with them frequently. In Turkey, there is a higher level of awareness of the institutions and a good level of interaction with them. Significantly there are also fewer organisations in the region, which may be concentrating interaction on a smaller number of players.

These results suggest that policy initiatives may be best aimed at increasing the efficiency of the firms in order to increase their competitiveness. In Greece and Turkey, there appears to be more of a milieu effect in the regions as local customers and suppliers are rated as important sources of knowledge. In this case, it would be sensible for policy initiatives to build on this and encourage the sharing of knowledge. In the UK, there is scope to encourage sharing of knowledge at the local level in order to enhance competitiveness. There is also scope to encourage interaction between the SMEs and the business support organisations in all regions in order to facilitate access to the region's knowledge assets. In Bulgaria, there is a clear emphasis to match the requirements of SMEs with those of larger firms that are the drivers of the regional and national economy.