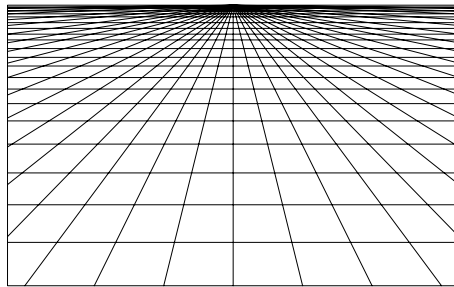




UNIVERSITY OF OSLO
FACULTY OF SOCIAL SCIENCES

TIK

**Centre for technology,
innovation and culture**
P.O. BOX 1108 Blindern
0317 OSLO
Norway
<http://www.tik.uio.no>



ESST

The European Inter-University
Association on Society, Science and
Technology
<http://www.esst.uio.no>

The ESST MA

Digital Distribution of Music:

The role of networks and knowledge in the Norwegian recorded music industry

Håkon Normann
hakon@normann.biz
University of Oslo
Globalisation, Innovation and Policy
2005

Word count: 19517

Håkon Normann
E-mail: hakon@normann.biz
University of Oslo
Globalisation, Innovation and Policy
Supervisor: Trond Einar Pedersen, NIFU STEP

ACKNOWLEDGEMENTS

I would first and foremost like to thank my supervisor, Trond Einar Pedersen at NIFU STEP, for helping me present my material and ideas, as well as for providing invaluable advice and motivation along the way. In addition, gratitude goes to the people at TIK, and in particular Tommy Clausen, Martin Srholec, and Fulvio Castellacci.

However, this thesis would not have been possible without the responses from the many record companies participating in the survey. Finally, I would like to thank the industry representatives that I was fortunate enough to interview for their willingness to share some of their extensive knowledge about the Norwegian recorded music industry and digital distribution of music.

ABSTRACT

The impact of technologies facilitating digital distribution of music on the recorded music industry has in the last few years received much attention in the popular press, and to some extent in the scholarly literature. However, there have been few attempts to explore the underlying factors explaining differences in innovative capabilities among record companies.

This thesis proposes that social networks and specific knowledge areas are important factors that can explain these differences among Norwegian record companies. The study therefore investigates the role of social networks and knowledge and their systemic properties related to innovation within digital distribution in the Norwegian recorded music industry.

The most important factors are identified using data from a questionnaire surveying the Norwegian record companies' social network activity, knowledge levels, and innovation activities. This dataset is complemented by interviews with industry representatives.

Using both quantitative and qualitative analysis, a set of factors are recognized as important drivers for innovation within digital distribution in the Norwegian recorded music industry. These are the relationship between record companies, relations between record companies and foreign firms, record companies' knowledge about digital distribution opportunities, and record companies' affiliation with Phonofile, with the latter emerging as the most significant of these factors. The study also reveals that the geographical clustering of Norwegian record companies does not appear to have a direct effect, but rather an indirect effect, on the record companies' knowledge levels or innovation related to digital distribution. In the final argument it is proposed that this may have some theoretical and policy implications with regards to the application of a cluster model as other factors may at times deserve equal attention from both analysts and policy makers.

TABLE OF CONTENTS

v	<i>Abstract</i>	
vii	<i>Table of contents</i>	
viii	<i>List of figures, tables and boxes</i>	
viii	<i>List abbreviations</i>	
1	Introduction	1
2	Background: From products to services	4
2.1	Traditional music value chain	4
2.2	Online music value chain	6
2.3	Music as a service	8
3	Research questions	11
3.1	The systemic properties of digital distribution of music in Norway	12
3.2	Dependency on knowledge, competence and capabilities	13
3.3	The influence of networks and social interaction	14
4	Theoretical framework and methods	16
4.1	Conceptual framework	17
4.1.1	Innovation within digital distribution of music	17
4.1.2	The systemic properties of innovation	18
4.1.3	Learning and different knowledge types	20
4.1.4	Networks, clustering and social interaction	22
4.2	Previous research	24
4.2.1	The Norwegian music industry	24
4.2.2	Social networks and clusters in the music industry	25
4.2.3	Knowledge, competence and innovation in the music industry	25
4.3	Data collection	26
4.3.1	Survey	27
4.3.2	Less structured interviews	28
5	An overview of the Norwegian recorded music industry	30
6	Findings and analysis	33
6.1	Quantitative data	33
6.1.1	Social relations in the Norwegian music industry	34
6.1.2	Knowledge levels in the Norwegian recorded music industry	35
6.1.3	Innovative activity in the Norwegian recorded music industry	36
6.2	Qualitative data	37
6.2.1	Social networks and central actors	37
6.2.2	Sources of knowledge in the Norwegian music industry	39
6.2.3	How some engage in innovative activities and why some don't	40
7	Variance in the nature of networks, knowledge levels, and innovation	42
7.1	The (in)significance of clustering	42
7.2	The systemic relationship between networks, knowledge, and innovation	44
7.3	Underlying factors explaining differences in innovative activity	47
7.3.1	Knowledge about digital distribution opportunities	49
7.3.2	Homogeneous relations	49
7.3.3	Heterogeneous relations	50
7.3.4	The role of Phonofile	51
7.3.5	Summing up the functions of the four underlying factors	52
7.4	The overall structure	53
7.5	Conclusions and further research	53
	References	57
	Appendix 1: List of interview representatives	61
	Appendix 2: Tables presenting variables correlating with innovative output	62

LIST OF FIGURES, TABLES AND BOXES

Figure 1	Traditional music value chain for physical products	5
Figure 2	Online distribution value chain	8
Figure 3	Norwegian record companies' activity online	45
Table 1	Information about companies participating in survey	40
Table 2	Frequency of contact between record companies and other actors	42
Table 3	Record companies' level of knowledge about digital distribution	43
Table 4	Pearson correlation between urban location and inter-firm relations	53
Table 5	Pearson correlation between inter-firm relations and levels of knowledge in different areas	56
Table 6	Pearson correlation between affiliation with Phonofile and knowledge levels	59
Box 1	Digital distribution of music explained	2
Box 2	Playlouder Music Service Provider	12
Box 3	Phonofile	39
Box 4	Formalisation of informal relations	47

LIST OF ABBREVIATIONS

AAC	Advanced Audio Coding
CD	Compact Disc
DRM	Digital Rights Management
FONO	The Association of Norwegian Record Companies
IFPI	International Federation of the Phonographic Industry
ISP	Internet Service Provider
ITMS	iTunes Music Store
MIC	Music Information Centre Norway
MP3	MPEG Audio Layer-3
NCB	Nordic Copyright Bureau
NOPA	Norwegian Society of Composers and Lyricists
P2P	Peer-to-Peer
TONO	The Norwegian Performing Rights Society
WMA	Windows Media Audio

1 Introduction

Research in economic geography and innovation studies has largely neglected the recorded music industry (Hallencreutz, et al. 2002). However, recent years have seen a growing focus on creative industries as a contributor to economic growth (Scott 1999a, 1999b, Hallencreutz 2002, Power 2003, Bugge 2003) and a facilitator for nurturing creativity and innovation on a wider level (Florida 2002). In addition to this increased (albeit still narrow) interest in the recorded music industry, a significant academic attention to the impact of internet and wireless technology on content driven industries such as the music and movie industries has emerged. This is evident not only in the scholarly literature, but is reflected in a range of EU-funded initiatives¹ and a recently published OECD report on digital distribution of music (OECD 2005a).

An important motive for cultural and economic policy is to aid the creation of new and innovative musical output. Further, in order to maximise the amount of innovative and new output, variety in activities is a prerequisite. This idea benefits society as a collective unit on an aggregate level. However, it does not necessarily benefit individual actors that have to bear the risk of uncertainty. This is because coping with variety means coping with risk (Carlson and Stankiewicz 1995). Further, Carlson and Stankiewicz (1995) argue that although this risk can be dealt with on an aggregate level, individual actors may not be able to deal with this uncertainty. Therefore, it is necessary to have instruments that enable society to absorb some of this risk. These instruments are often of a financial character and are very important for maintaining this variety in cultural output so necessary to the overall societal welfare. However, perhaps equally important is the production and distribution of relevant economic and technological information and knowledge (Carlson and Stankiewicz 1995). This thesis will use the changing business structures in which the music is currently facing as a point of departure. It will be argued that Norwegian record companies have to be able to innovate or adopt innovations within digital distribution of music (see box 1 for an explanation of the concept of digital distribution of music) in order to remain competitive. This leads to a proposition stating that certain network properties and specific knowledge areas are important for record companies adapting to a changing environment. Through an analysis of extensive data on the behaviour of Norwegian record companies, this study will

¹ See for instance <http://www.interactivemusicnetwork.org> or http://ica.cordis.lu/search/index.cfm?fuseaction=result.simpledocument&RS_RCN=7541793&CFID=4121430&CFTOKEN=84515132 for examples of EU funded projects treating issues related to digital distribution of music.

show that both homogeneous relations (such as inter-label relations) and heterogeneous relations (such as relations between record companies and foreign firms) positively correlate with innovation within digital distribution of music. Moreover, and perhaps more importantly, this thesis will show that Phonofile, a Norwegian content aggregator, plays a prominent role for the diffusion of knowledge as well as for innovation within the Norwegian recorded music industry. Finally, the effect of clustering will be discussed, revealing that geographic proximity is perhaps less important in relation to digital distribution in Norway than previous studies of such phenomena would suggest.

Box 1 Digital distribution of music explained

Digital distribution refers to the delivery of content through digital channels such as the internet and mobile networks and involves a range of components and processes. Content has to be stored in a digital format, such as mp3, though a range of other digital formats are also suitable. In its most basic design, digital distribution requires a sender (e.g. data server, personal computer) and a receiver (e.g. consumer, professional user). However, as chapter 2.2 will outline, digital distribution systems (for music) are often complex.

The costs involved in the development of systems for digital distribution can vary greatly and it is possible to engage with this technology at some level without much expenditure. Nevertheless, a system that meets common technical and commercial standards will often require significant efforts and be too costly for an individual content owner to develop.

The following chapter will sketch out some of the most prominent changes that the recorded music industry is facing as a result of internet and wireless technology. Current and emerging value chains will be presented along with some of the new and important actors that have emerged. Finally, chapter 2 will argue that the music industry is in fact morphing from a product based industry towards a more service orientated industry. On the basis of this, chapter 3 will propose some research questions concerning how record companies depend on different network and knowledge properties in this changing business environment. Chapter 4 will consider the relevant literature treating concepts such as networks, clusters, knowledge, and the systemic properties of innovation. Further, existing literature and findings of such concepts in the music industry will be discussed. Finally, the chapter will introduce the methods employed related to data collection. Prior to a presentation and analysis of findings, chapter 5 will give a brief outline of some of the key actors in the Norwegian recorded music industry that are also relevant to this study. Chapter 6 will give a

detailed presentation of the empirical findings before these are analysed and discussed in chapter 7. This final chapter will be organised in such a way that the relevant topics will be treated separately. These topics will include the effect of clustering, homogeneous and heterogeneous relations, and the role of Phonofile. The chapter will conclude with some final thoughts and recommendations for further research.

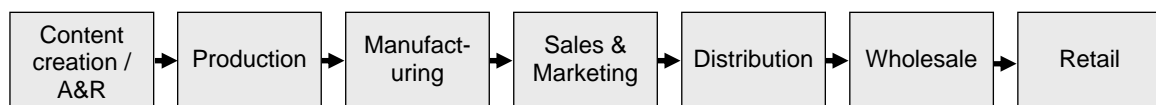
2 Background: From products to services

The vast majority of the value generated within the music industry comes from the development and sale of products. The traditional business model is very much geared towards the sale of physical sound carriers such as the CD. To a certain extent, this model can be transferred to an online environment, where the CD is replaced by a digital music file. However, the new internet and wireless technologies enable the development of a wide variety of revenue models, some of which are less driven by the sale of music products and more driven by other activities. Needless to say, such developments are changing the music business and introduce an alternative value chain and new business models. Nevertheless, prior to the investigation of the new online music industry value chain that has been developing over the last few years, it is necessary to understand the traditional value chain for musical products¹.

2.1 Traditional music value chain

The most dominant actors in the traditional music value chain are the record companies. These companies provide artists with the financial and infrastructural resources to record their music and they can normally be found at the start of the value chain. Moreover, record companies play an active role in either undertaking or overseeing processes such as manufacturing, sales and marketing, distribution, wholesale and retail. Record companies therefore play a role throughout the value chain.

Figure 1. Traditional music value chain for physical products



Source: adapted from OECD 2005a.

Most record companies make nearly all their profits from sale of physical sound carriers. After its commercial introduction in 1982, the CD powered a growth in both employment and in revenues for a global music industry throughout the '90s (Power 2003). However, after a peak in 1999, sales have decreased every year with the exception of 2004 which saw a small upturn in total revenue (IFPI 2005a, Recording Industry Association of America 2005).

¹ In addition to references provided, some of the content presented in this chapter is based on the author's own brief experience from working in the British and Norwegian music industry.

These trends are also reflected in the Norwegian market (IFPI 2005b). This decrease in music industry revenue is a complex problem, and is probably a result of several factors.

The first, and also the activity most often referred to in the popular press, is related to illegal file sharing through peer-to-peer (P2P) networks. With increased broadband penetration, file sharing activity has risen dramatically over the last few years. Although accurate numbers of active file sharers are impossible to calculate, various studies indicate that just under one third of Internet users in OECD countries have downloaded files from P2P networks (OECD 2005a). There is, to my knowledge, no available data on file sharing activity in Norway. However, recent statistics from the Swedish broadband market, considered to be relatively similar to the Norwegian market, show that 42% of broadband users have downloaded music through P2P networks (Digi 2005). An accurate measurement of the effect of file sharing is impossible to provide. The music industry has repeatedly argued that file sharing has a negative impact on industry revenue (IFPI 2005a), whilst other studies have shown the opposite (Tanaka 2004). The OECD report on digital distribution of music (OECD 2005a) found similar results where both consumer surveys and empirical studies showed different effects of file sharing, underlining the difficulty of these types of studies. The discussion on the effect of file sharing on industry revenues is therefore to this date somewhat inconclusive.

The second factor, and arguably the more damaging of the three, is CD piracy. This is a problem that the music industry has struggled with since the introduction of the tape as a music format. However, innovations such as home scanners and CD-copiers have made it relatively easy to produce large volumes of high quality copies of CDs. Having doubled since 2000, disc piracy only grew by 2% in 2004. Disc piracy still represents a big global problem for the music industry with 1 in 3 CDs sold being an illegal copy (IFPI 2005b). This problem is less evident in Norway with music piracy making up less than 10% of the music market.

A third factor that has made an impact on the music business is related to increased competition from other entertainment formats such as DVDs and video games (Kusek and Leonhard 2005). Having been a significantly smaller industry than the music industry, projections indicate that turnover of the computer and video games industry will surpass the recorded music industry within 5 years (OECD 2005b). Moreover, the total turnover for sales

of video and DVD movies in Norway grew from EUR 36.6 million to EUR 89.5 million¹ between 1999 and 2003 (MedieNorge 2005).

In summary, CD-sales represent a decreasing proportion of the revenue for record companies and artists, and content owners may have to look at alternative sources to make up for this loss in revenue.

2.2 Online music value chain

When the first legitimate online retailers entered the market, the major record companies were somewhat reluctant to license their music to these services. However, with the rapid growth of illegal file sharing, record companies realised that they had to offer file sharers an alternative to illegal downloading in order to limit the damage file sharing was causing. This led to an increasing willingness amongst the record companies to license content to online music services.

The first legal service selling music online was eMusic, launched in the US in 1998. This was followed by Wippit (UK) in 2000 and Pressplay, MusicNet and OD2 in 2001. Many smaller, independent companies did license content to these services. However, these companies failed to acquire content from the major record companies with many of the most popular artists and consequently did not attract massive appeal in the consumer market. It was only with the introduction of the iTunes Music Store (iTMS) in the US in 2003 that the online music market started to gain some momentum. Soon after, other major companies such as Yahoo, Microsoft, Napster, Real, and Sony launched online music services, creating a multitude of different types of music services available to the consumers. However, most of these were at first only available in the US, and only in the larger European countries (UK, Germany, and France) soon after. I will touch upon the development of the Norwegian online music market in later chapters.

The most dominant business model for online distribution of music is the single track download model, often referred to as the à la carte download model. This model is used by market leading iTunes Music Store and other major players such as Microsoft's MSN Music and Sony's Connect service. The single track download is also the model that most resembles the traditional physical retail model, where the consumer purchases a product gaining a sense of ownership, similar to the experience of purchasing a CD.

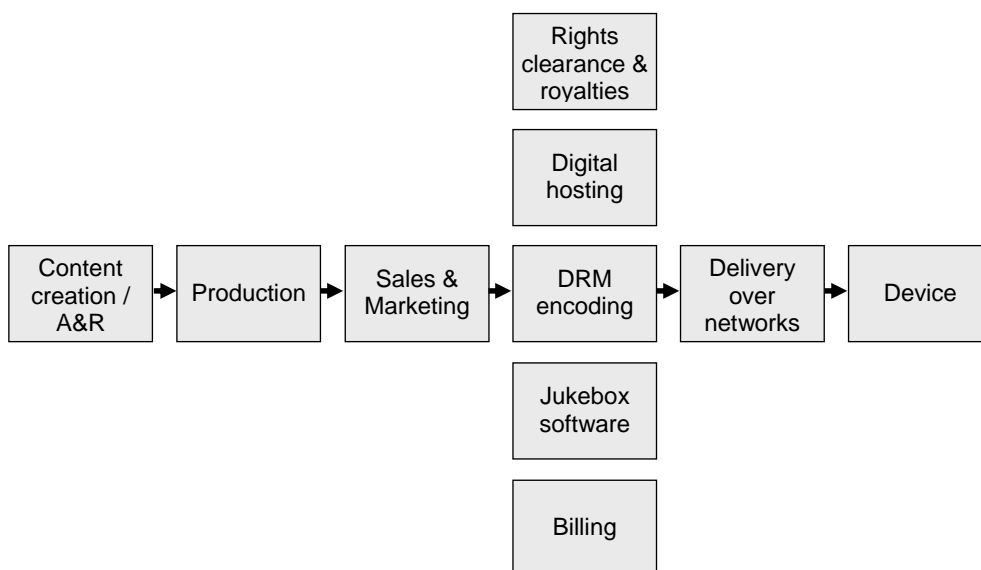
¹ Converted from NOK at the prevailing exchange rate on 26.08.05

A second dominant business model is the subscription model. The most common variant of this model allows customers unlimited access to a large catalogue of music for a monthly fee. Users will then either be able to download or stream music. The nature of this model is significantly different to other models previously discussed as users do not claim ownership of any music. Subscription users are actually renting rather than owning music, and this business model represents a significant watershed in the nature of music distribution and consumer behaviour. Big players in the online distribution business favouring this model are Napster and Rhapsody. There are also several examples of companies giving the customer the option of either purchasing tracks out right, or subscribing to a music service.

Other related models currently emerging are streaming audio and video services, and portable subscription services, which enable the consumer to rent a large catalogue of music and play it on portable devices.

The lack of costs related to manufacturing and traditional distribution in the online music value chain is a much favoured argument used by those arguing that the total costs of selling music online will be lower. Thus, those involved should be able to achieve better margins or retail value for music should be lower than the current prices. To some extent this is true. Selling digital copies bypasses manufacturing in the value chain. However, elements such as manufacturing and physical distribution found in the traditional value chain are replaced by new elements in the online music value chain.

Figure 2. Online distribution value chain



Source: adapted from OECD 2005a.

Online distribution can be a complex matter, which requires advanced technical knowledge and resources. For record companies, it has been a challenge to establish working relationships with the companies developing rights clearance systems, DRM systems, billing services and delivery networks. When the online music business started to develop it was possible for smaller record companies to deal directly with some of the online music services. However, the online music market has developed rapidly with more than 200 licensed online offerings in OECD countries (OECD 2005a), with each of them having to negotiate with an increasing amount of record companies. This has led to the rise of online distributors, or content aggregators. These companies aggregate content from record companies and artists, negotiate deals with online retailers on the behalf of the content owners, and distribute the content to the online retailers.

Other new players or traditional players with new roles in the online music value chain are hardware manufacturers, internet service providers (ISPs), content portals, and mobile operators. Hardware manufacturers are not new to the music industry, but they are arguably the most active in the online music business. The portable digital music player more than doubled its sales from 2003 to 2004 and the forecasts predict further growth in 2005 (OECD 2005a). ISPs and content portals are new to the music value chain, offering various types of music services. Finally, with wireless technology, music is now also distributed across mobile networks, facilitated by mobile operators.

2.3 Music as a service

CD sales will probably remain as the dominant revenue source for record companies and artists for some time. However, with decreasing CD sales and recent drop in CD prices, content owners must increasingly look at alternative revenue sources in order to retain their current total income. One such source that is emerging is the sale of digital products through various types of music download stores discussed in this chapter. Simultaneously, the industry is now seeing examples of music being used more and more as a service to drive the sale of other products or services.

With the exception of a downturn in 2002, *Advertising* spending on the internet has been rising significantly over the last few years (Newspaper Association of America 2005) and some of the largest internet companies, such as Google and Yahoo generate most of their revenues from advertising. These companies rely on big user bases in order to increase the

value of advertising on their portals, and one of their methods for attracting users is to offer interesting content such as music. Yahoo offers a service called LAUNCHcast, where users get access to streaming music in exchange for exposure to advertising¹. AOL offers a similar service, and many other content portals use content to drive advertising revenues. Similar trends can be found in the gaming industry, where increasingly computer games drive revenues from advertising (Technology Review 2005). Kusek and Leonhard (2005) believe that music could in fact be consumed in much the same way as commercial television is today, where access to a range of channels is free in exchange for the exposure to advertising.

Having taken a large chunk of the marked share for *portable music players* from Sony, Apple and the iPod now dominate the marked for portable devices that play digital audio files - so called mp3 players (CNN 2005). Apple's iPod is not only the most popular hard disc music player around, but Apple's iTunes is the most popular place to buy music files online. By mid July 2005, 500 million songs had been sold worldwide through the iTunes (CNET News.com 2005). However, currently digital downloads only make up about 1-2% of the total marked for recorded music (OECD 2005a). Running an online music store is a costly operation and Steve Jobs, CEO of Apple Computers, has repeatedly said that the iTunes is losing money and is in fact only there to drive iPod sales. Thus, music in this instance is less of a product itself, but a driver for the sale of another product that generates larger revenues. It is on the other hand worth noting that when the online music market matures, the iTunes will be in a great position to generate revenues from the sale of digital music files.

With technological improvements on both networks and mobile handsets, many *Mobile phones* are now capable of storing up to 250 songs and playing them back with an acceptable sound quality. This has in turn led to services selling music files directly to mobile phones, as well as streaming radio and music video services. A large part of the revenue generated from these types of services goes to the technological facilitators. In this sense, music drives the sale of certain types of mobile phones and also some of the services offered to these handsets.

One final actor using music to add value to the end product or service is the *Internet Service Providers (ISPs)*. In an attempt to become triple play providers (voice, broadband, and TV/content), ISPs increasingly offer interesting content to their customers. One example of this type of service is offered by UK based Playluder MSP.

¹ Yahoo also offers a premium service where users can pay a subscription fee for an add-free service.

Box 2 Playlounder Music Service Provider

Playlounder MSP is a joint effort between Playlounder, an online music service provider for alternative music and State51, an interactive music consultancy. Playlounder MSP will offer a broadband package, optimised for music delivery. For a fixed monthly fee, users will get high-speed access to the internet and access to a large catalogue of high-quality, licensed music files. The music will be distributed on a closed network using peer-to-peer technology, and by using “fingerprint” technology individual track usage will be easy to identify. Thus, record companies and artists can be remunerated according to actual usage. Playlounder MSP is the first direct legal alternative to file-sharing and represents a new and emerging music consumption model.

As this chapter has shown, the way in which music is accessed and consumed is changing. This leads to a general change in the business paradigms from “owning” to “sharing” (content) – from product to service (Kusek and Leonhard 2005). As control over access to music becomes more important in favour of control over ownership of music, the actors in the recorded music business will be forced to adapt to this change (Kusek and Leonhard 2005). To what extent key actors such as record companies are capable of this adaptation is therefore a very interesting issue that will be further explored in the following chapters.

3 Research questions

The concept of innovation is not a simple one. Innovation is not one event but rather a process made up of a range of interrelated activities (Fagerberg 2004). Identifying the relevance of different activities for various innovation processes is one of the more difficult tasks in innovation studies. Such an exercise will often be context dependent, meaning that various properties or activities will not play the same role in different innovation processes, in different industries (Malerba 2004, Djellal and Gallouj 2001), or in different countries (Lundvall 1992, Porter 2000). Fagerberg (2004) stresses the difference between innovation and invention, arguing that an invention has to be commercialised in order to be classed as an innovation. Within digital distribution of music, there are a range of new business models, services, and activities that are only in the process of being commercialised. Thus, this study will focus on activities affecting the availability of content on already established digital music services. Measurements for innovation output will therefore be limited to the number of digital services that record companies have licensed their catalogue to, and record companies' access to their catalogue encoded in digital format and related metadata. The concept of innovation, in general and in the context of digital distribution in the Norwegian recorded music industry, will be further discussed in chapter 4.

The previous chapter argued that the music business is turning into an industry where less money will be made from the sale of sound carriers and more money will be made from the provision of access to music through other methods. These methods may be streaming internet services, video services on stationary or portable devices, and controlled file-sharing networks.

In this transformation from a product-based to a service-based industry, Norwegian record companies will have to innovate within digital distribution in order to stay in business and be competitive. In order to understand the factors affecting this type of innovation, the following key issues have to be addressed:

- How do the record companies, and other actors in the music industry, depend on different types of knowledge and capabilities for innovation in digital distribution?
- How do networks and social interaction influence innovation in digital distribution, both on a collective and individual level?

Prior to discussing these two research questions, it is important to understand innovation in digital distribution and its systemic properties in a Norwegian music industry perspective.

3.1 The systemic properties of digital distribution of music in Norway

The most significant change to date that internet and wireless technology has brought upon the music industry is new opportunities for digital distribution and consumption. Thus, this thesis will focus on how record labels can better adapt to and exploit these opportunities. By doing so, this study will attempt to explore the systemic properties of digital distribution of music in Norway.

The systemic nature of innovation has been much addressed in innovation studies. The different bodies of literature treating innovation systems have much in common and there are also some differences. One such difference lies in the way different scholars chose to define a system of innovation, which leads to different perspectives on innovation systems. Edquist (2004) argues that in order to understand the systemic nature of innovation, the system itself has to be identified. It is therefore necessary to recognise what is outside the system in order to identify what is inside the system (Edquist 2004). This distinction between what is inside and outside is made by the boundaries of the innovation system. These boundaries can be technological (Carlson & Stankiewicz 1995), geographical (Asheim and Gertler 2004), or sectoral (Malerba 2004).

However, it is not easy to define a Norwegian system for digital distribution of music nor is it particularly useful. The many different types of technologies involved, with both new distribution technologies and more traditional technologies associated with the music industry, makes it hard to define a technological boundary. This is particularly true as many of the new actors in the online music value chain are involved in other industries. This last point means that it will be equally difficult to identify sectoral boundaries, as the music industry of today encompasses many different sectors, ranging from high-tech to low-tech. A geographical boundary should be somewhat easier to identify as this study focuses on the Norwegian music industry. However, the digital market place is dominated by multinationals operated from outside the borders of Norway and online trading and consumption is very much a cross-border activity. Identifying the geographical boundaries by the borders of Norway should therefore be done with some caution.

This paper will not assume that there exists one fixed system for the digital distribution of music, but will take a rather open approach to the boundaries of innovation systems whilst discussing the systemic properties of digital distribution. However, it is clear that there are a range of components (Edquist 2004) that are either central in the Norwegian music industry or important for the digital distribution of music in or from Norway. These components relate to each other in a more or less systemic manner. Once these components have been identified, it will be possible to investigate the relationships between these components, and better understand the systemic properties of digital distribution.

3.2 Dependency on knowledge, competence and capabilities

With overall music consumption being at an all time high, the music business should see a growth in the total revenue generated from music products and services. However, as the music industry is moving from a product-based towards a service-based industry, so must the music companies change in order to remain competitive (Kusek and Leonhard 2005). Firms' ability to reinvent themselves and to innovate depends on a range of factors. These factors can be financial resources, geographical location, and industry differences. Carlson and Stankiewicz (1995) argue that firms have different levels of economic competence, meaning that firms differ in the knowledge they have and how they use it. Further, they define a firm's economic competence as the *sum total of its abilities to take advantage of business opportunities* (Carlson and Stankiewicz 1995). Based on this argument, the acquisition and use of knowledge, competence, and capabilities will be essential for firms adapting to a changing music business environment.

The basic assumption is therefore that specific types of knowledge about digital distribution opportunities and technologies are driving factors for innovation in the music industry. This innovation will in turn lead to growth for individual firms as well as the industry as a whole.

The first part of this assumption leads to a few questions. How do the Norwegian record companies, and other actors in the Norwegian music industry, depend on different types of knowledge and capabilities for innovation in digital distribution of music? What is the relationship between knowledge about digital distribution of music and innovation in the Norwegian music industry? In order to answer these questions, this thesis will examine how record companies, and other actors, gather different types of information and how this information is translated into various kinds of knowledge. Further, the research will try to

understand how the actors make decisions regarding digital distribution of music. It will also be interesting to investigate the levels of various knowledge areas collectively within the industry, and among individual record companies.

The second part of the assumption above referring to the effect of innovation is difficult to examine using evidence from the Norwegian music industry. This is because the commercial effects of digital distribution technologies in Norway, and even in leading edge countries such as the US and the UK, have so far been minuscule. This will therefore be treated more on a conceptual level, drawing upon evidence from other industries and technologies.

3.3 The influence of networks and social interaction

Innovation studies in general show that users and producers of technology represent the most important actors for a firm's innovative life (Lundvall 1988). The individual firm's networks are therefore important resources, in particular for firms adapting to radical change. Previous studies have shown that the nature and intensity of individual actors' networks play a significant role for activities such as patenting (Ahuja 2000b), R&D (Powell and Grodal 2004), job hunting (Granovetter 1973) to name a few. Moreover, general network characteristics may influence an industry's collective innovative capabilities (Verspagen and Duysters 2004). It is therefore reasonable to believe that networks influence Norwegian record companies' ability to adapt to a changing industry that is becoming more service orientated. The assumption is that record companies in the periphery of the music industry network will be less innovative and will struggle to adapt to innovation in digital distribution, compared to the record companies in the centre of the network. Moreover, a scarce network may be a factor hindering widespread innovation in digital distribution, leading to a lack of growth in the Norwegian music industry.

These hypotheses lead to the following questions. How do networks and social interaction influence firms' innovation in digital distribution, both on a collective and individual level? How do networks and social interaction influence innovation in digital distribution in the Norwegian music industry as a whole? In order to answer these questions, the way in which record companies interact with each other and with other companies will be studied. Further, both the intensity and nature of individual firms' relations will be measured. Finally, the characteristics of the collective network of Norwegian record companies and other actors in the music industry will be identified.

In addition to the above, the study will attempt to investigate any relationship between the nature of record companies' networks and their levels of knowledge about digital distribution of music.

4 Theoretical framework and methods

Previous papers studying the impact of networks and knowledge on innovation have often chosen to study industries that feature characteristics that make these studies easier to conduct. Typical industries have been those with high propensity for patenting such as the chemicals industry (Ahuja 2000a, Ahuja 2000b). These studies are likely to give accurate results as the number of patents is relatively easy to identify. This approach may give some broader insights into how the structure of networks affects the innovative activities of individual firms. However, as the majority of such studies concentrate on certain types of industries, the knowledge generated from these studies may project a skewed picture of the role of networks and knowledge. Consequently, there is a demand for studies of industries with lower propensity for patenting industries such as low-tech industries, often found among the services industries.

This paper studies the Norwegian recorded music industry for a number of reasons. First, the recorded music industry is an industry in the process of adapting to radical changes and companies are forced to reinvent themselves and develop new methods for both new and old processes. In short, the companies in the music industry have to innovate or be part of an innovation process. Secondly, the music industry has characteristics that make it different to other studies previously done on the role of networks and knowledge in the innovation process. The industry has very low propensity for patenting and citation, and is relatively heterogeneous. Moreover, there exists little formal knowledge on the role of networks in the music industry and data on the Norwegian system for digital distribution of music is scarce. Finally, the Norwegian government has repeatedly expressed a desire to promote the Norwegian music industry as not only a cultural good but as an industry capable of generating revenues (Ministry of Culture and Church Affairs 2005). Hence, increased knowledge about how growth in this industry can be stimulated is needed.

It should be noted that knowledge about the music industry and technologies related to digital distribution of music previously gained by the author will have influenced the research methods. Firstly, some of the background information about industry structures and emerging trends will inevitably draw upon my existing knowledge. Moreover, interviews conducted with industry representatives may at times have been flavoured by the existing knowledge of the interviewer. However, I see this more as an advantage than as a

disadvantage as it provides better access to some of the more complex information and it has also provided a useful foundation for the research project.

4.1 Conceptual framework

4.1.1 Innovation within digital distribution of music

Innovation can be a fuzzy concept, used in many different ways even within the same academic disciplines. It is therefore important to explain what is referred to when using the term innovation. An obvious, but nevertheless important, distinction must be made between invention and innovation (Fagerberg 2004). Fagerberg (2004) sees an invention as the first occurrence of the idea for a product or process, whereas an innovation happens when the invention is carried out into practice. This distinction opens up for different interpretations with regards to when an invention is carried out into practice. However, it is clear that innovation entails more than one single event. Innovation is a process with many events. It may therefore take considerable time for an invention to lead to an innovation. Moreover, innovation is a continuous process (Fagerberg 2004), with a range of interrelated developments changing the innovation. Thus, the first time an innovation is introduced to society may not be the time when it makes the largest impact as later modifications to the innovation may be of greater socio-economic importance. The nature of innovation as combinations of events and processes often leads to a systemic understanding of innovation, an understanding that will also be applied to innovation in this context.

Innovations may be classified in different ways. Schumpeter defined innovation in a very broad sense, distinguishing between five different types: new products, new processes, new sources of supply, the creation of new markets, and new ways of organising (Fagerberg 2004: 6). Furthermore, he defined innovation as a “new combination” of existing resources (Fagerberg 2004: 6). Evidently, innovation goes beyond the introduction of new products or processes as it also includes various forms of organisational innovation such as the formation of new relationships. Moreover, any changes to the product value chain can be classified as an innovation.

Another distinction can be made between radical and incremental innovations (Freeman and Soete 1997). Moderate improvements on innovations are considered to be incremental whereas a radical innovation is the introduction of a completely new innovation. For instance, whilst digital distribution of music can be considered to be a radical innovation,

a new digital distribution model such as an online subscription service should perhaps be considered as an incremental innovation.

Finally, a distinction can be made between a universal and local innovation. From a Schumpeterian perspective, a novel combination of existing resources is only an innovation if this is new to the world. An innovation later introduced in a different context, is referred to by Schumpeter as an imitation (Fagerberg 2004). However, when an innovation is brought in to a new context, the innovation itself is likely to change in order to adapt to new surroundings. This in itself is innovation. This understanding of innovation draws upon the approach of Nelson and Rosenberg (1993), interpreting innovation “to encompass the processes that are new to the firm, if not to the universe or even to the nation” (Nelson and Rosenberg 1993: 4). Innovation is often represented as incremental improvements on existing products and processes or by the introduction of new, radical products and processes. By contrast, in the culture industries innovation is often more about the development of cognitive content (Scott 1999a). Thus, the creation of new knowledge about digital distribution of music could be considered as innovation.

Arguably, one of the most significant recent innovations affecting the music industry is digital distribution of music. There are a range of incremental innovation activities connected to digital distribution of music that occur inside record companies, between different record companies, or between record companies and other actors affiliated with the music industry. These innovations may be the establishment of new ways of storing music files and related data, the establishment of new relations, new digital distribution outlets, new methods of digital marketing, and new methods of communicating with consumers online.

Based on the discussion in this chapter, innovation within digital distribution of music will in this study refer to new outlets for the sale of music. Innovation output will therefore be measured through the number of digital services that record companies have made their catalogue (content) available on. In addition, innovation output will also be measured through the level of access record companies have to their digital assets (catalogue encoded in digital format as well as metadata).

4.1.2 The systemic properties of innovation

The previous section of this chapter argued that innovation is not a single event but a set of activities and processes. Moreover, Edquist (2004) argues that innovations emerge in systems

of innovation. In order to avoid ‘black-boxing’ the innovation process, an understanding of such innovation systems is proposed. A system of innovation encompasses “all important economic, social, political, organizational, institutional, and other factors that influence the development, diffusion, and use of innovation” (Edquist 2004: 182). This is a rather broad definition indicating a fairly comprehensive system. There are, however, several specifications of systems of innovation narrowing down the approach.

Edquist (2004) argues that in order to study a specific system, it is necessary to discriminate between the system and the rest of the world. Thus, it must be possible to identify barriers of the system. This is perhaps important when comparing different systems, which is not the objective of this study. However, one of the strengths of the systems of innovations approach is that it focuses on the non-linear nature of innovation. Innovation occurs through the interaction between different actors. This interaction is characterised by two way communication and feedback-loops (Klein and Rosenberg 1986). Thus, identifying the different elements and features of the innovation system is important in order to study the relations between these elements. On the other hand, innovation systems continuously evolve. This is particularly true in the case of an industry currently influenced by radical innovations, where new dominant actors appear and the influence of existing actors diminishes. Bearing in mind that this is not a comparative study, a loose definition of system boundaries will therefore be applied.

The main components of a system of innovation are organisations and institutions (Edquist 2004). *Organisations* are actors that have a purposeful role within the system. Typical organisations are firms, universities, and public agencies. It is, however, unlikely that organisations such as universities play a significant role for the digital distribution of music. Moreover, it is likely that content creators (artists) should be included in this group of components. *Institutions*, on the other hand, “are sets of common habits, norms, routines, established practices, rules, or laws that regulate the relations and interactions between individuals, groups, and organisations” (Edquist and Johnson in Edquist 2004). Thus, typical institutions are patent laws and other laws and norms affecting the relations between different actors in the system. As innovation is inherently uncertain (Fagerberg 2003), institutions are important due to their stability over time and are seen as guideposts for organisations in a changing environment (Lundvall 1992). This framework provides a set of tools that will be used to identify the main components affecting the digital distribution of music in the Norwegian music industry.

Edquist (2004) argues that the functionality of an innovation system depends on a range of activities within this system. These activities are "those factors that influence the development, diffusion, and use of innovation" (Edquist 2004: 190). Examples of such activities are Research and Development (R&D), Networking, and Financing of innovation processes. It is, however, important to remember that an innovation system is not a static, but a dynamic entity. Moreover, the systemic properties for digital distribution in the music industry will differ significantly from other technological domains and other industries. It is thus necessary to examine these properties in order to identify the relevant activities and the functionality of these.

Perhaps the most important aspect of the systemic properties of innovation is the relationship between the components and institutions, and between the components themselves. Previous empirical findings highlight the importance of interactive learning among organisations for innovation (Edquist 2004). The nature of this interaction is interesting as it can reveal systemic relations between different types of activities, such as between networking activity and innovative activity.

The properties that will be explored are therefore the systemic relations between actors in the Norwegian recorded music industry, and their reliance on knowledge and networks for innovation as defined in chapter 4.1.1.

4.1.3 Learning and different knowledge types

Knowledge is considered to be one of the most important resources contributing to the innovation process. However, the concept of knowledge is rather broad. It is therefore necessary to clarify what knowledge is and to differentiate between knowledge and related concepts such as information and competence. Moreover, different types of knowledge may have different roles and characteristics, thus influencing the innovation processes differently. Lundvall and Johnson (1994) suggest that economically relevant knowledge can be grouped into four categories. These are know-what, know-why, know-how (when and where) and know-how. *Know-what* refers to knowledge about facts and is similar to what is often called information. *Know-why* refers to scientific knowledge. These two groups of knowledge are both explicit. Explicit knowledge is formal and systematic (Nonaka 1991), and can be shared with relative ease using a wide range of communication methods. The third group of knowledge presented by Lundvall and Johnson (1994) is *know-who*, which refers to social relations and knowledge about who knows what and can do what. Further, the interactive

nature of innovation makes know-when and know-where important groups of knowledge (Lundvall and Johnson 1994). Finally, *know-how* refers to skills and practical knowledge. For the most part, *know-who* and *know-how* is tacit and cannot be removed from their human and social context. With relatively easy access to codified knowledge facilitated via the internet and improved communication methods, tacit knowledge is believed to be increasingly important (Asheim and Gertler 2004). Further, tacit knowledge is harder to transfer from one agent to another as transfer of this type of knowledge often requires face-to-face interaction between similar types of organisations (Asheim and Gertler 2004). Moreover, different language, culture, and norms are often considered to act as barriers for the transfusion of tacit knowledge (Lundvall 1988).

Asheim and Gertler (2004) make a further distinction between analytical and synthetic knowledge bases. Analytical knowledge bases rely predominantly on scientific knowledge generated through extensive R&D. By contrast, synthetic knowledge bases are often present in settings where innovation occurs through new combinations of existing knowledge. In these settings, knowledge is created less through formal R&D and university-firm relations and more as results of experimentation and learning by doing, using, and interacting. Moreover, tacit knowledge is believed to be more important in synthetic knowledge bases as it is often generated through experience at the workplace (Asheim and Gertler 2004).

An important aspect of knowledge creation is the process of learning. Learning can either occur through experimentation or improved understanding (Pavitt 2004). Many firms will therefore actively engage in experimentation activities in order to increase their knowledge base. Lundvall and Johnson (1994) highlight the importance of learning-by-interacting, arguing that the mutual flow of tacit knowledge between producers and users of new technology is one of the most important processes in the overall innovation process.

The argument thus far is that innovation relies on the transfer of certain types of knowledge and knowledge bases. The role of these different types of knowledge and knowledge bases will vary across industries and regions or nations. For instance, tacit knowledge and synthetic knowledge bases may be more prominent in low-tech industries that rely less on formal R&D. Learning-by-interacting may be particularly important for organisations in such industries. Hence, the structures and roles of industry networks and ego-networks are of great interest.

4.1.4 Networks, clustering and social interaction

The nature of industry networks influence the innovation processes on an industry level as well as on the firm level. Many scholars have tried to identify the optimal network structure, suggesting densely interconnected networks or networks characterised by many structural holes as the best social structures for knowledge diffusion, growth, and innovation. There is much disagreement, and as Ahuja (2000a) argues, different structures will have both positive and negative effects. Moreover, the effect of different social structures will depend on the type of actors and activities the network is facilitating (Ahuja 2000a). Measuring the collective effect of a network structure requires either the possibility of comparing two similar networks or the possibility of comparing one specific network through a given time period. The effect of network structures on an individual level is on the other hand somewhat easier to evaluate.

The cluster model employed by Porter (2000) tries to include spatial proximity as the most important dimension in a systemic perspective. This approach argues that even in a world of increased globalisation geographical co-location in clusters is important for productivity, knowledge spill-over, and innovation. Clusters can include more than just a single industry but an array of linked industries, and can also include governmental institutions and trade unions (Porter 2000). Put differently, a cluster is a system of actors within a certain area or based around a certain product or technology that in total create more value than the sum of the value created by individual firms (Hallencreutz 2002). In this context, it should be possible to identify a cluster based around digital distribution or the production of recorded music. One of the principal effects of a cluster is to increase the innovative ability of the participating firms (Porter 2000). This effect relies on personal relationships, face-to-face interaction, and networks of actors that interact. Although clusters are likely to increase the amount of such interaction, this does not occur automatically (Porter 2000). Thus, it is not given that firms in a specific cluster will have higher knowledge levels or be more innovative (although this is likely).

Important activities for the development, diffusion, and use of innovations are those related to networking and interactive learning (Edquist 2004). Moreover, individual companies possess a certain level of networking capabilities. Ahuja (2000b) refers to these networking resources as social capital. Social capital can be measured by the number and types of ties a firm has to other firms. Moreover, increased social capital will often be positively proportional with a firm's ability to make new connections (Ahuja 2000b). This

may in turn enable firms with many ties to form an even greater number of connections, strengthening a centralised position in the network. Companies with many connections are often large firms as these often find themselves close to the centre of their social network. Thus, network lock-in or path-dependency (Cohen and Levinthal 1990, Fagerberg 2003) may also contribute to a wider technological lock-in (Callon 2002, Powel and Grodal 2004). Consequently, in an industry subject to technological change, many ties may in fact decrease a firms' ability to adapt to industrial change.

Collaboration between firms is considered to be especially important for individual firms operating in industries subject to radical changes as few companies possess the resources required to stay on top of all technological developments (Powell and Grodal 2004). This is perhaps particularly relevant for small companies and individuals with less resources. The number of ties a firm maintains can positively influence a firm's growth and innovative activity as ties enable knowledge sharing (Ahuja 2000a). For instance, in a study of technological collaborations in the chemicals industry, Ahuja (2000a) found that direct ties, in particular, were positively related to innovation output.

The nature of the inter-firm relations is also important for the type of knowledge that is shared between companies. Granovetter (1973), in an influential contribution to the literature on social networks, differentiates between strong and weak ties arguing that weak ties are more important for the distribution of novel information as weak ties often connect different parts of a network. However, stronger ties are often required for the successful diffusion of complex information and knowledge (Powell and Grodal 2004).

Inspired by the theory of strength-of-weak-ties, Everett Rogers (2003) enhances the understanding of the nature of interaction by introducing concepts of homogeneity and heterogeneity. Rogers (2003) argues that communication between actors of a similar nature and with similar opinions and beliefs is likely to be more efficient. Thus, homogeneous relations are likely to diffuse particularly complex information more effectively. Moreover, the more two actors interact with each other, the more likely they are to become homogeneous (DiMaggio & Powell 1983). Communication between heterogeneous actors, on the other hand, can often be more difficult as the differences between the actors may cause confusion and inefficient interaction. However, heterogeneous interpersonal links can bridge different sub-networks and better diffuse novel information and ideas. Moreover, the interdisciplinary nature of innovation means that clusters of heterogeneous actors are

important for innovation (Carlson and Stankiewicz 1995, Pavitt 2004). Finally, interpersonal diffusion networks are mostly homogeneous and can act as invisible barriers for diffusion as similar people interact in socially horizontal patterns (Rogers 2003). A company's ego-network should therefore consist of both homogeneous and heterogeneous relations in order to have access to information most relevant to the firm as well as access to novel information.

In conclusion, a range of different variables can be measured and analysed in comparison to knowledge levels and innovation activity in an attempt to understand how networks and social interaction influence innovation in digital distribution of music. Moreover, as industrial and national characteristics can differ greatly, it is difficult to predict these effects in a given context. Thus, empirical studies of social networks within specific industries are required.

4.2 Previous research

Although there is little evidence of previous research on the role of networks in the Norwegian system for digital distribution of music, the Norwegian music industry as well as the role of networks and clusters in the music industry in more general terms has been subject to previous academic studies. These have in different ways provided inspiration to this study.

4.2.1 The Norwegian music industry

The Norwegian music industry amounts to around 9000 employees spread over about 1200 companies (Bugge 2003). These figures indicate that the industry is made up of many small companies, and in fact, 90% of the record companies have less than 10 employees (Bugge 2003). There are, however, some larger companies and these are organised in IFPI (International Federation of the Phonographic Industry). The Norwegian branch of IFPI consists of Norwegian subsidiaries of multinational companies and some larger Norwegian record companies. Although the IFPI members are few in numbers, they represent 91% of the total record sales in Norway (Bugge 2003). The smaller, independent record companies are organised in FONONO (The Association of Norwegian Record Companies), which in 2005 included around 130 record companies. The total number of record companies in Norway is estimated to be close to 200. One of the trends identified in previous studies is an increased concentration in the market through both horizontal and vertical integration

(Østlandsforskning 2004), also seen in the global market. Simultaneously, there is a growing underground of smaller independent actors in the recorded music industry (Bugge 2003). Unsurprisingly, the Norwegian music industry appears to be concentrated in the bigger cities and most notably in Oslo with 40% of all employees and 30% of all firms located in Oslo (Bugge 2003). However, these figures are made up of all music industry firms and employees in Norway, and may not be representative for the recorded music industry.

4.2.2 Social networks and clusters in the music industry

As identified in chapter 4.1.3, networks and face-to-face interaction is particularly important for low-tech industries. Moreover, the cultural economy is typically a site of dense inter-firm transactions. These transactions are often unstable, frequent, and mediated through face-to-face interaction. This type of contact is often very time consuming, and close proximity is therefore of high value (Scott 1999a). In his study of the US recorded music industry, Scott (1999b) takes this argument one step further. Scott (1999b) shows that the US recorded music industry is highly concentrated in three large cities. This concentration is a result of similar types of companies locating to the same areas as well as an agglomeration of different actors within the music and entertainment industries (Scott 1999b). This feature has also been identified within the Norwegian (Bugge 2003) and Danish music industries (Lorenzen and Frederiksen 2003). Scott (1999b) argues that innovation occurs when these different types of actors interact, bringing contrasting perspectives into conjunction. Further, Scott concludes that the agglomeration identified in the three US cities is the ideal environment for the experimentation that Pavitt (2004) recognises as necessary for innovation. The study does not attempt to measure innovation activity or output, nor the creation and diffusion of knowledge, in these clusters. However, the study does find that the record companies located in these cities are significantly more successful in terms of generating hit records than those companies located outside these clusters.

4.2.3 Knowledge, competence and innovation in the music industry

The recorded music industry is a competence and knowledge driven industry that relies upon the interaction between different actors with different competences (Bugge 2003). However, measuring knowledge and competence levels within this industry is a difficult task. Many record companies rely on strong personal networks (Bugge 2003, Scott 1999a) or know-who. In addition, know-how is an important part of individual record companies' economic competence (see Carlson and Stankiewicz 1995 for a complete definition of economic

competence). This type of knowledge is difficult to transfer to others as tacit knowledge cannot easily be codified. It is therefore also difficult to measure this type of competence.

Although explicit knowledge such as know-what and know-why may rarely be considered as important resources in the recorded music industry, Lundvall and Johnson (1994) suggest that this type of knowledge is slightly more important in industries subject to paradigmatic change, such as the music industry in the present environment. Technical competence within digital distribution of music may, in addition to know-who and know-how, be necessary for record companies wanting to remain competitive. The information available on record companies knowledge levels with regards to digital distribution of music suggest that this type of knowledge has diffused slowly in the recorded music industry (Virtanen 2003, Adalsteinsson and Ragnarsdottir 2003). In particular, a study of the development of digital distribution of music in Finland explores this last point. Virtanen (2003) found that a lack of knowledge about consumer needs has been a problem, as well as uncertainty about the roles of the different actors and the cooperation between different sectors. Moreover, the heterogeneity within the industry was evident from the type of challenges that different record companies were faced with. The first attempts to deliver music digitally were initiated by the smaller independent labels. However, the lack of financial resources made it difficult for individual firms to establish a presence in the online market. Moreover, it has been difficult for independent record companies to license their catalogue individually to the larger online retailers (Virtanen 2003). In addition, Virtanen (2003) found that the subsidiaries of the larger multinationals were less flexible to adopt the new business models suited for digital distribution of music. This was explained by a lack of independence from the parent companies and a larger financial risk associated with the engagement with digital distribution for companies with a large and broad catalogue.

However, studies on such a rapidly developing technology and industry quickly become dated. Thus, studies from other countries can at best provide an indication as to the state of the Norwegian recorded music industry.

4.3 Data collection

Cognitive exercises and results from previous studies are useful for developing hypotheses and for developing an approach for the investigation of innovation within digital distribution in the Norwegian recorded music industry. However, innovation activities are often context specific and empirical data related to digital distribution of music in Norway is required.

This data was collected using both semi-structured interviews and a questionnaire.

4.3.1 Survey

The sample for the questionnaire consisted of all record companies located in Norway, including Norwegian subsidiaries of foreign owned companies. The list of companies was created by merging lists from databases available on the web-pages of MIC (Music Information Centre Norway), FONONO and Phonofile. In addition, record companies listed by the respondents were added to the database during the time of conducting the survey. An online survey was constructed in order to overcome some common problems related to written questionnaires, such as low response rates, lack of accuracy and completeness, lack of control over order of questions, and not being able to correct misunderstandings (Judd et. al. 1991). This method made it possible to control the order that the questions were displayed to the respondent and it was also possible to guide (to some extent) the respondents throughout the questionnaire.

The survey covered four categories, in addition to capturing basic demographics. The first group of questions, related to *networks*, asked the record companies to indicate how often they communicated with various types of firms and organisations in or related to the music industry. The second category included a self-assessment of the respondents' levels of *knowledge* concerning different areas of digital distribution of music. The survey then identified different types of *innovative activities* that the firm had explored and engaged with. The activities measured were those affecting the record companies' ability to adopt innovations related to digital distribution of music and exploit the opportunities provided by these innovations.

In addition, the survey tried to get a better insight into the composition of the networks within the Norwegian recorded music industry. Inspired by a social network study done by Verspagen and Werker (2004), the survey asked the record companies to list five other record companies with whom they communicated regularly. Moreover, the respondents were asked to list five other types of firms or organisations (not record companies) that they communicated with regularly. Using this method, it would be possible to identify central actors in the overall social network in the Norwegian recorded music industry.

An initial compilation of the data provided useful descriptive information such as averages and frequencies. Further, important relations between variables in the dataset were

identified using a number of correlation analyses. Finally, a factor analysis was employed in order to provide a better understanding of any underlying structures and factors in the dataset.

4.3.2 Less structured interviews

In order to obtain further information about the role of networks and knowledge in the Norwegian music industry, a number of record company representatives were interviewed. In addition, representatives from key firms involved in digital distribution of music were also interviewed (see appendix 1 for a complete list of representatives). Other studies on the role of networks in the innovation process have used leading firms in their sample (Ahuja 2000a). This would not be the optimal approach when studying the Norwegian music industry as this is a relatively heterogeneous industry. Most Norwegian record companies are organised in two different industry bodies sometimes representing different approaches to industry issues. Moreover, Norwegian record companies are structured differently and are therefore likely to approach issues related to digital distribution in a number of ways. Thus, based on Virtanen's (2003) findings from the Finish music industry, the smaller record companies in Norway are likely to have chosen a somewhat different new media strategy than the larger, multinational record companies.

Interview subjects were chosen on the basis of several criteria. Firstly, I attempted to find a variety of firms. This included firms of different size, operating within different genres, and holding memberships in different trade organisations. Location of the interview subjects was largely restricted to the Oslo region for practical and financial reasons. However, one interview was conducted via telephone with an organisation in a different part of Norway. This had some methodological implications. It can for instance be more difficult to probe for further information about certain issues on the telephone and there is an increased risk of misunderstanding some of the questions (Judd et. al. 1991). The selection of interview subjects was also restricted by availability as some of the companies approached could not make themselves available for interviews.

The actual representatives within the selected firms were sometimes given as several of the firms had only one employee. Otherwise, the representatives that the firm reasoned to be most knowledgeable about the firm's activities and knowledge levels concerning digital distribution were selected. This would in most cases be the managing director and in some cases the head of the most relevant department.

The purpose of the interviews was to explore the subjects' opinions and use of their surrounding networks. Moreover, the intention was to find out more about how the respondents acquired new information and knowledge about digital distribution and how this knowledge was used in the decision making process. It was important to let the respondents elaborate freely within the context of the general framework. The most appropriate method was therefore to conduct relatively unstructured interviews (Judd et. al. 1991). The questions were to a large extent open ended and the respondents could focus on areas that they viewed as important. The interviews could therefore capture how the respondents viewed the relevance of different topics. Further, responses obtained using less structured interviews were likely to be spontaneous rather than forced and provide more detailed information than structured surveys (Judd et. al. 1991).

5 An overview of the Norwegian recorded music industry

The following chapter will give a brief overview over some of the key actors in the Norwegian recorded music industry. The overview will be limited to those types of firms and organisations that will be treated in the analysis or are otherwise relevant to this study. In addition, the chapter will discuss the role of some of the actors that has emerged following the introduction of technology related to digital distribution of music.

It seems natural to start such an overview with the *content creators*. This group arguably make up the most important part of the recorded music industry. They create the assets that drives the whole industry and without content, the other actors would have very little to base their business on. The content creators are most often referred to as artists and the content is music as either live performances or as recorded sound. The recorded sound can be stored on physical mediums such as cassettes, CD's, CDR's. These may be referred to as sound carriers. In addition, recorded sound can be stored in digital formats such as MP3, WMA, AAC and a range of other formats.

Record companies can be very different from each other and consequently follow different business models. The most widespread model is based upon a structure where record companies enter an agreement with the artist that stipulates that the record company give financial support for the recording and manufacturing of the recorded music. In exchange, the record company acquires the exclusive rights to the recording. The artist is then paid a royalty off each sale of the recording. As it is in the record companies' financial interest to sell records, they also engage in activities related to marketing and sales. There is an alternative model adopted by some smaller independent record companies. Instead of paying for the recording, the record company funds the manufacturing and facilitates distribution. Revenue is then somehow split between artist and record company and the artist will then retain the rights to the recording. These types of agreements will often be quite flexible and sometimes not even formalised.

Moving records from manufacturing plants into the retailers requires a vast network beyond most record companies. They therefore use *distributors* for this task. These can be either affiliated with the major labels or act as independent distributors. Moreover, some of the larger independent record companies utilise their own distribution networks to distribute releases by smaller labels.

Retailers appear at the end of the product cycle. Traditionally, these have been physical shops selling physical sound carriers (cassettes, vinyl, CD's). However, these days, retailers also include online shops selling digital copies of music files. At the current state, the most significant online retailers that have established themselves in the Norwegian market are iTunes Music Store, MSN Music, and CDON.com. However, this is just the tip of the iceberg as there is a wide range of services about to enter the Norwegian market. In addition, there are companies offering services that belong somewhere between retail and service.

Closely related to these new types of retailers and digital services are a range of *technology providers, consultants and aggregators*. Although this group includes different firms, their main role is to act as mediators between content owners (i.e. record companies and artists) and the digital retailers or directly with the consumers. This can be done in a number of ways. Examples of these types of technology providers and consultants are telecommunication firms such as Telenor that facilitate the delivery of digital files across wireless networks and software developers that provide the back-end technology for delivery of files to the consumers. Aggregators take up a slightly different role. These types of firms sign distribution agreements with at the one end content owners and digital retailers at the other end. They then deliver large pools of content to these retailers on behalf of record companies and artists, much in the same way as the operations of traditional distributors. A large portion of the Norwegian content owners are distributed by Phonofile, a Norwegian aggregator established by TV2 Invest, NOPA and FONO in 1999 (see box 3 for details). Other examples of aggregators or digital distributors operating in Norway are InProdicon, Paragallo, and Artspages, who all have agreements with Phonofile.

Box 3 Phonofile

Phonofile was established in 1999, and is today owned by TV2 Invest, NOPA, FONO and NRK Aktivum. The company's primary function was originally to deliver musical content to professional users. However, Phonofile now also deliver music to a range of digital music services geared towards regular consumers. Phonofile has for many years been quite unique in the way that it manages Norwegian record companies' digital rights (although similar organisations have started to appear in other countries). This means that there has been less room for learning from other places and through imitation. Therefore, the main source for learning is through experimentation and learning by doing.

Industry bodies play an important role in the recorded music industry in Norway in many ways. IFPI and FONONO are the two main bodies representing the Norwegian record companies. Their main function is to provide a collective voice for the record companies they represent. Some of the main activities undertaken by these industry bodies include lobbying towards governmental organisations and educating their members as well as the media and the general public.

The *collection societies*, such as TONO, GRAMO, and NORWACO are closely linked to IFPI and FONONO. They fulfil an important role in collecting secondary income from public broadcasts. In addition, TONO collect mechanical royalties on behalf of NCB.

6 Findings and analysis

The research questions put forward in chapter 3 aim at exploring the role of networks and knowledge in the Norwegian recorded music industry in relation to digital distribution of music. In order to shed some necessary light on these issues, this chapter will present some findings related to Norwegian record companies' networks, knowledge levels, and activity within digital distribution of music. This will be followed by an analysis of these findings.

6.1 Quantitative data

Out of 190 recipients, 85 record companies completed the survey, giving a response rate of just under 45%. Given that it is likely that some of the 190 recipients are no longer active, the actual response rate may even be somewhat higher. The sample is also representative of the Norwegian recorded music industry as it is distributed fairly evenly across the industry. The total sample includes 4 IFPI members, two of which are major label subsidiaries, 45 FONO members, and 36 record companies not affiliated with any of the large industry bodies. The survey was carried out in June and July 2005.

Table 1. Information about companies participating in survey (n=85)

Industry body affiliation	IFPI	FONO	No affiliation
Number of companies	4	45	36
Number of employees	1	2-4	> 4
Number of companies	56	23	6
Location	Oslo	Other large city	Outside major cities
Number of companies	48	13*	24**

* Companies located in either Bergen, Trondheim, Stavanger or Kristiansand

** Companies located outside the five largest cities

The vast majority of the Norwegian record companies are very small operations. Of the surveyed companies, two thirds (66%) of the record companies have only one employee, which in many instances only run the company part time. Further, only 18% of the surveyed companies employ 3 or more people. The record companies are predominantly based in the bigger Norwegian cities with 72% located in one of the five largest cities in Norway. These companies employ, on average, more people compared to the record companies located outside the major cities. 64% of the surveyed companies are based in the greater Oslo region.

Thus, compared to the findings of Bugge (2003), the record companies are even more clustered in urban areas than the music industry as a whole. In addition, the majority of industry bodies and governmental organisations related to the recorded music industry, as well as many of the important technology firms, are located in Oslo. Thus, there is a significant cluster in Oslo based around the production and distribution of recorded music.

6.1.1 Social relations in the Norwegian music industry

One of the aims of this study is to find out how networks and social interaction influence the Norwegian record companies' ability and propensity to innovate within digital distribution of music. The following section will therefore describe the nature of the social network within the recorded music industry. Further, the record companies' role within these networks and with whom different companies communicate will be investigated.

Half (49%) of the surveyed record companies communicate with other record companies at least once a week. 31% of the companies communicate with other record companies less than once a month with as many as 8% having no relations with other record companies at all. The relationship between record companies and distributors is slightly stronger, with only 3.6% reporting no communication with distributors. 46% of the record companies communicate with distributors at least once a week.

The record companies interact significantly less with industry bodies such as IFPI and FONO with nearly two thirds (65.5%) of the record companies communicating with industry bodies less than once a month. It is worth noting that more than 20% of the record companies never communicate with industry bodies. Only 5 companies (6%) communicate with industry bodies at least once a week. Four of these companies have formal relations with an industry body.

The relationship between record companies and technology providers can be classified as moderate. Around one third of the record companies are in touch with technology providers at least once a month with 13% communicating at least once a week. 28% of the surveyed record companies never communicate with technology providers.

Norwegian record companies' relationships with foreign companies are more diverse than the relations mentioned above. 20% of the record companies never communicate with foreign companies whereas 37% communicate at least once a week with foreign companies.

Table 2. Frequency of contact between record companies and other actors (n=85)

	LABEL	DISTRO	IND BOD	TECH	FOREIGN
Frequency of contact					
Never	8 %	4 %	21 %	28 %	20 %
Less than once a month	22 %	22 %	47 %	37 %	23 %
1-2 times a month	20 %	27 %	26 %	22 %	19 %
At least once a week	50 %	47 %	6 %	13 %	38 %
<i>Total</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>

1 = in 1 of the 5 largest cities. LABEL = other record companies, DISTRO = distributors, IND BOD = industry bodies, TECH =technology providers and consultants, FOREIGN = foreign companies.

In addition to questions regarding frequency of communication between record companies and other actors in or related to the Norwegian recorded music industry, the respondents were asked to list up to 5 record companies that they had relations to. The firms that were listed often were the larger record companies that also distribute releases by the smaller independent labels. However, some of the very small record companies were also listed by several others, perhaps indicating the presence of social networks among the smaller independent record companies. The respondents also listed 5 other types of actors (not record companies) related to the recorded music industry that they had relations to. The types of organisations most frequently listed were industry bodies, collection societies, and distributors. A final observation is that some of the respondents had relations more or less exclusively to foreign firms.

6.1.2 Knowledge levels in the Norwegian recorded music industry

In order to measure individual and collective knowledge levels among Norwegian record companies, the companies were asked to self-asses their own knowledge levels about different areas of digital distribution in the music industry. A simple rating system was used, where 1 equals poor knowledge and 5 indicates good knowledge about a particular area. When comparing the different knowledge areas, the results show that the record companies have best knowledge about digital distribution opportunities and poorest knowledge about digital formats and file sharing networks (P2P-networks).

Table 3. Record companies' level of knowledge about digital distribution (n=85)

Knowledge area	Average
Digital distribution opportunities	3,75
Intellectual property rights online	3,23
Legal issues and artists contracts in relation to digital distribution	3,14
Online or wireless direct marketing	3,02
Digital Formats	2,68
File sharing technologies (P2P-networks)	2,60

Levels measured on a scale from 1 to 5 where 1 equals poor knowledge and 5 equals good knowledge.

6.1.3 Innovative activity in the Norwegian recorded music industry

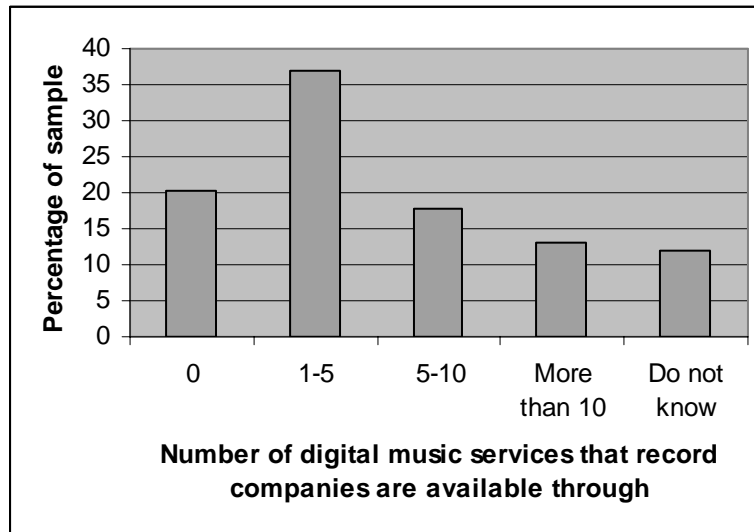
It is possible for Norwegian record companies to exploit the potential that lies in digital distribution without much actual involvement. This is because aggregators like Phonofile often take care of most of the activities that are required for this exploitation. However, access to certain resources such as a digital library of the catalogue and related metadata certainly make it easier for record companies to engage in novel activities online. The level of access record companies have to these resources can therefore provide a useful indication to their ability to innovate within digital distribution of music. Further, the number of digital services that the companies have licensed content to is a direct measure of their innovative activity.

More than every other record company (52%) have access to their entire catalogue in digital format, whereas 18% report that they do not have access to this at all. 6% do not know if they have access to their catalogue in digital format. When asked a similar question about access to metadata¹, the record companies reported less of an overview over this asset. Only one in three record companies (33%) have access to metadata for their entire catalogue, with 37% not having an overview of their meta-data. 14% do not know if they have access to the metadata for their own catalogue.

One in five record companies (20%) have not licensed their catalogue to any digital music services. 37% have their catalogue available through somewhere between 1 and 5 digital music services. 31% of the record companies have licensed to more than 5 digital music services. It is also worth noting that 12% of the record companies have little overview over the number of music services they have licensed their catalogue to.

¹ Metadata is the data that holds relevant information about individual tracks and releases. This will typically be the name of the artist(s), release, track, and record company. It will in addition contain catalogue number, territory available, ISRC number, genre, and publishing info. This data will often be stored in a database.

Figure 3. Norwegian record companies' activity online (n=85)



Finally, 49% of the record companies give away free mp3 samples of their music from the company website or from their artists' websites. Moreover, 47% of the companies collect email addresses from the record company or artist website.

6.2 Qualitative data

Between June and August 2005, interviews were done with 5 record companies and 6 other firms or organisations affiliated with the Norwegian recorded music industry (see appendix 1 for details). Some of these firms have a particular interest in and competence on digital distribution of music. In the following sections, some general findings from these interviews will be presented.

6.2.1 Social networks and central actors

When asked about any networks in which they were part of, many of the respondents seemed to view themselves as having a complex set of relations with different actors rather than participating in fixed networks. These sets of relations are continuously evolving as many of the relations are established through collaborative projects. Some of the respondents therefore gave the impression that they belonged to several larger networks, perhaps spanning several industries, and they would have relations with a dynamic selection of the members of these networks. These sets of relations may also be interpreted as the record companies' informal networks.

The industry's reliance on informal relationships and ad hoc collaborations has been much documented (Hallencreutz 2002, Bugge 2003, Scott 1999a). However, the interviews

revealed that different types of record companies viewed these informal networks or sets of relations differently. For instance, the smaller record companies stressed that large parts of their informal networks were made up of friends who happened to also be part of the broader industry network. The informal networks of the larger, more established, record companies were to a greater extent shaped by business or creative needs, though these relations could of course also be or become friends.

It was also revealed that it is generally easier to establish networks and relationships (with other industry actors and consumers) within more specific genres such as metal than within mainstream music.

Most record companies, and also the other actors interviewed, appeared to be aware of the formal networks that they belonged to and the function of these networks. The networks fixed around the industry bodies (IFPI and FONO) are perhaps the most important of these formal networks. With specific attention to digital distribution, Phonofile is naturally an essential part of the network based around FONO. This was also evident from the survey, where these organisations were frequently listed by record companies as points of contact. Other organisations that appear to be central in the network within the recorded music industry are the collection societies, TONO/NCB and GRAMO, though the latter was rarely mentioned in the interviews with record companies. It is worth noting that companies with no affiliation with industry bodies or with extensive relations with foreign firms seemed to have different types of relations within the Norwegian recorded music industry. For instance, some of the record companies did not see themselves as part of any formal networks.

A majority of the interviewed representatives also identified themselves as part of a network based around their distributors. Moreover, it was pointed out that they often had a considerable amount of contact with these different distributors. The make-up of individual labels' distribution agreements differs significantly depending on label size, genre, personal relationships and a range of other factors. For instance, some of the interviewed record companies had more regular communication with foreign distributors than with domestic distributors. This observation could also be found in the results from the survey.

The formal networks discussed above are based around a few dominant organisations or firms, where most of the communication travels through these actors. Therefore, these networks remain rather static and the type of information that flows through the network depends much upon the few central actors. However, a majority of the respondents pointed

out the significance of decentralised networking arenas such as international trade fairs (Midem and Popkomm), as well as the Norwegian industry event “by:Larm”. These events offer the opportunity for industry professionals to meet in both formal (i.e. conferences and stands) and informal surroundings in order to strengthen their social networks and exchange information and ideas. In addition, conferences and seminars are arranged at these events with an aim to increase the collective knowledge base in the industry. These forums are particularly useful as they give record companies the opportunity to interact with actors that are not part of their usual set of relations.

Box 4 Formalisation of informal relations

A group of people in the area around Oslo are in the process of establishing an organisation for independent artists and labels that are not affiliated with any other organisations (such as FONO or IFPI). The purpose is to work as an umbrella for all the small actors that are not fully established. Moreover, the new organisation will facilitate collective sales, PR, and distribution. The organisation will be branded and try to achieve better deals for the artists and labels. In essence, the organisation will be a formalisation of an existing milieu of friends that in total make up an informal network. This network consists of a core of 15-20 people, with more people loosely connected outside this core.

6.2.2 Sources of knowledge in the Norwegian music industry

The different knowledge levels among record companies identified in the results of the survey coincide well with different routines for searching for knowledge. The interviews show that few of the record companies actively seek new knowledge about digital distribution of music purely for the sake of developing the internal knowledge base. Thus, most of the knowledge about digital distribution is acquired through learning by doing or learning by interacting when the company is participating in activities related to digital distribution. However, many of the other actors connected to digital distribution in the Norwegian recorded music industry engage in more traditional research and development. For instance, one of the technology providers pointed out that many of their projects and services have been instigated mainly for the purpose of learning. This does not only involve the development of technical knowledge, but also learning about markets and establishing contacts within various parts of the industry. Phonofile is, in addition to its close affiliation with FONO, mainly a technology provider. It is therefore not surprising that Phonofile is an important source of knowledge about digital distribution for many of the record companies with whom they have licensing agreements with. The company has extensive knowledge

about digital distribution of music, rights management, and commercial opportunities and regularly communicate information about new agreements to the record companies. However, more explicit types of knowledge concerning technological developments are also often acquired through the use of the internet and print publications.

Though most of the record companies do not engage in R&D activities related to digital distribution, they do have routines for acquiring new information and knowledge about this area. One pattern that emerged from the interviews is the link to foreign sources. Some of the record companies and other actors report that they in the search for knowledge about new methods, products and developments often have to use foreign sources. The main reason for this is that the recorded music industry in Norway is small and many companies are relatively unique and at the forefront in Norway either within their genre, market, product type, business model, or through a combination of these. Thus, new knowledge important for their business will often reside outside Norway.

Some of the representatives interviewed argued that several of the larger firms in the recorded music industry have below average levels of knowledge about digital distribution of music. Further, according to several sources there seem to be a general lack of explicit types of knowledge about digital formats and artist contracts in the Norwegian recorded music industry. Some also claim that the knowledge about direct sales and marketing with regards to digital distribution is lacking among the record companies. However, other respondents dispute this, perhaps underlining not only the diverse nature of the recorded music industry, but also the many contradictory views within the industry.

Finally, there seems to be a lack of knowledge about secondary rights, such as those related to broadcasting, and the commercial exploitation of these. These rights account for only a small proportion of total revenue for the recorded music industry and this might explain the relatively modest interest for this area among the record companies. However, several industry representatives believe that in the new online music value chain, secondary rights will account for an increasing proportion of the industry total revenue.

6.2.3 How some engage in innovative activities and why some don't

A majority of the record companies affiliated with Phonofile have entered into exclusive agreements with Phonofile. This means that Phonofile handle all of their digital distribution and they do not license their content to any other digital aggregators or online services. There

are several reasons behind this. Firstly, the Norwegian recorded music industry may benefit from a collective effort in this area. Phonofile will have more bargaining power when negotiating deals with digital music services if they can guarantee the delivery of a large Norwegian catalogue. Further, the revenues from online music services are currently very small. Thus, record companies will often find it more effective to divert their resources to other areas. This has enabled a large amount of artists and labels to make their content available on digital music services without requiring much resources or know-how from the individual actors. However, some record companies have expressed slight concerns over the potential of Phonofile becoming too big to be able to equally attend to all the rights owners.

The companies interviewed that have not entered into an agreement with Phonofile have not used other methods to make their content available on digital music services¹. There can be several explanations for this and the following reasons were given in the interviews. The rights to some (or all) of the releases may not be controlled by the record company. There is therefore less incentive for the record company to engage in digital distribution. A second reason is that the current available solutions for digital distribution are not acceptable for the record company or artist. The only option left to the label or artist is then to develop the technology for digital distribution themselves. This requires resources often not available to individual firms. Further, some record companies may not be all that interested in any form of digital distribution of music. Finally, some record companies wish to make their content available online, but do not know who to contact or what to do in order to part-take in digital distribution of music activities (outside Phonofile). This problem is particularly relevant with regards to content delivery to mobile phones. Thus, a general lack of know-who or know-how may act as a barrier to innovation within digital distribution of music.

¹ There are, however, examples in the Norwegian recorded music industry of companies finding alternatives to Phonofile, such as using other digital distributors, delivering directly to online retailers, or developing digital sales tools themselves.

7 Variance in the nature of networks, knowledge levels, and innovation

The data from the survey indicate that Norwegian record companies' propensity for communication with other actors differs significantly across the industry. Some record companies interact more than others with firms and organisations in the recorded music industry. The interviews and the survey reveal a pattern where certain types of firms and organisations such as industry bodies and distributors are central in the industry network. However, both the survey and the interviews showed that the frequency of contact as well as the type of actors with whom Norwegian record companies communicate varies among the record companies. Finally, the desire to engage in digital distribution of music, as well as the actual involvement in these activities varied among the surveyed and interviewed record companies.

7.1 The (in)significance of clustering

From the outset, one of the objectives of this study has been to investigate how network structures influence knowledge flows and innovation within the Norwegian recorded music industry. As record companies seemingly interact in very different manners, it is interesting to see if there are any underlying explanations for these variances. Chapters 4.1.4 and 4.2.2 propose the significance of clustering on inter-firm relations, arguing that firms located in clusters interact more with one another, and therefore learn more. Increased interaction and learning may therefore lead to increased innovation within the firm.

The findings from the survey show that the Norwegian recorded music industry is heavily clustered in and around Oslo. This is not very surprising. Studies of clustering in the Danish (Lorenzen and Frederiksen 2003) and Swedish (Halléncreutz 2002, Halléncreutz and Lundequist 2002) music industries show that a large proportion of the record companies are located in the capital cities. Though these studies only study the actual effect of this clustering to a limited extent, the general argument is that record companies located in clustered areas increase their knowledge base and enhance their competitiveness. Further, Asheim and Gertler (2004) argue that “[regions] can become more innovative and competitive by promoting stronger systemic relationships between firms and the region’s knowledge infrastructure” (Asheim and Gertler 2004: 299). However, the correlation analysis presented in table 4 shows that companies located in Oslo are no more likely to have a higher frequency of contact with other record companies, distributors, industry bodies, technology

providers, or foreign firms. Further, the correlation between companies located in one of the five largest cities in Norway and inter-firm relations showed similar results. Thus, the location of record companies does not explain the variance in inter-firm relations within the recorded music industry in Norway.

Table 4. Pearson correlation between urban location and inter-firm relations (n=85)

Variable	Relations to different types of actors in the recorded music industry				
	Record companies	Distributors	Industry bodies	Technology providers	Foreign firms
Firms located in Oslo	,138	,120	-,055	-,014	,111
Firms located in one of 5 largest cities	,040	,123	-,192	,021	,153

Correlation is insignificant at the 0.05 level (2-tailed) for all connections.

Further analysis showed that record companies located in Oslo (and other larger cities in Norway) do not report higher levels of knowledge about digital distribution of music, nor do these companies seem to engage in digital distribution any more than the record companies located outside the major cities.

Interaction between actors is one of the key drivers for learning (Lundvall and Johnson 1994). The initial explanation for the apparent insignificance of clustering may therefore lay in the fact that the survey reveals that record companies located in the larger cities do not interact more with other firms and organisations, hence they do not part-take any more in activities such as learning by interacting. However, the interviews indicate that localisation is important. Much of the interaction occurs in informal surroundings such as in bars and at concerts. With a large proportion of the industry located in the cities, this type of interaction seems to take place more in the larger cities. Thus, although the survey does not show any more inter-firm relations in the larger cities than outside these cities, the interviews imply that the cities do act as better facilitators for interaction with other actors in the music industry. However, this does not explain the fact that companies located in cities have no higher levels of knowledge about digital distribution of music. Further, though clustering in the Norwegian music industry may have a positive effect on other types of knowledge and activities, the effect of clustering and localised learning does not appear to be as significant for digital distribution of music.

A factor that might explain the relative insignificance of clustering for the distribution of knowledge and innovative activity in this particular study may be related to the type of knowledge and innovation investigated. Based on his studies of the US recorded music industry, Scott (1999b) argues that the effect of clustering is more significant in low-tech industries such as the music industry. However, the introduction of digital distribution is resulting in a permeation of high-technology in the music industry, a trend identified in many other low- and medium-tech industries (Tunzelmann and Acha 2004). Thus, in this particular case, the music industry should perhaps not be treated as a low-tech industry. In fact, the common view of the music industry (or culture industries in general) as a low-tech industry may be a result of a misconception in the literature (Lash and Urry 1994). The resources spent on product development in the music industry is often classified as production, though these activities are in reality research and product design (Lash and Urry 1994). The recorded music industry may therefore in some ways be seen as both a R&D intensive and high-tech industry. Still, this does not explain the lack of correlation between clustering and knowledge or clustering and innovation in the Norwegian recorded music industry.

Finally, the fact that many companies are located in the same city does not necessarily mean that they interact. As some of the interviewees revealed, there can be several more or less disconnected networks within one area. The effect of co-location should therefore be investigated in greater detail before assuming that synergies automatically occur in regions with many actors in the same or similar industries.

So far, clustering of companies in the larger cities appears to have no direct effect on the frequency of interaction between record companies. Further, the level of diffusion of knowledge and innovation within digital distribution of music amongst record companies does not seem to be directly linked to this co-location. However, the study does identify that firms situated in the larger cities and therefore in close proximity to other record companies benefit from a strengthening of existing ties as a result of this location. Thus, the effect of the clustering identified in the Norwegian recorded music industry seems to be a strengthening of strong ties and homogeneous relations.

7.2 The systemic relationship between networks, knowledge, and innovation

Chapter 4.1.3 argues that learning-by-interacting is an important activity for the successful accumulation of knowledge for firms in industries such as the recorded music industry.

Drawing upon this argument, an analysis of the correlation between inter-firm relations and different knowledge levels related to digital distribution of music was done.

Table 5. Pearson correlation between inter-firm relations and levels of knowledge in different areas (n=85)

Variable	Knowledge areas					
	MORE TACIT			MORE EXPLICIT		
	Digital distribution opportunities	Direct marketing	Legal and contractual issues online	IPR online	Digital formats	File sharing technology
Label	,117	,062	,275*	,162	,240*	,250*
Distributor	,128	-,014	,161	,039	,190	,002
Industry bodies	,300**	,132	,366**	,232*	,336**	-,012
Technology providers	,403**	,146	,339**	,251*	,242*	,065
Foreign firms	,161	-,020	,286**	,272*	,329**	,249*

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Table 5 shows that there is in general a positive relationship between inter-firm relations and record company knowledge levels. A more detailed study of the results of the analysis reveals that increased communication with other record companies positively correlates with an increased explicit knowledge base. Relations with industry bodies and technology companies are strongly correlated with increased knowledge levels. Further, these two different types of relations seem to correlate with the same knowledge areas (digital distribution opportunities, IPR online, legal and contractual issues online, and digital formats). Finally, frequent relations with foreign firms have a significantly positive relationship with the explicit knowledge base. There does not seem to be any relationship between inter-firm relations and knowledge about direct marketing online. Moreover, contact with distributors does not correlate with any of the types of knowledge related to digital distribution of music.

Thus far, the data shows that there is a clear relationship between inter-firm relations and different knowledge levels related to digital distribution. However, the data in table 5 is inconclusive as to whether there is an actual cause and effect relationship between

connections and knowledge. The argument so far has proposed networking and interactive learning as important activities for the accumulation of knowledge. Based on this framework and the correlation between networking and knowledge presented in table 5, one possible assumption is that increased relations with other firms enhance the individual firm's knowledge base. This relationship may however be more complex than that, as the knowledge base of a firm may also have a positive effect on the firm's networking capabilities. Ahuja (2000b) shows that a firm's technical capital (or technological competence) increases the firm's attractiveness as a collaborating partner to other firms. Firms with high technological competence are therefore more likely to interact with other firms. Similar results have been found in a study of the Swedish machine industry (NUTEK 1996). This study found that firms with highly educated staff and presumably larger formal knowledge bases were more likely to interact with other actors with large pools of formal knowledge such as universities and research institutes. Moreover, the study shows that other variables such as export activity and firm size also influence university-firm relations. This is also in line with the findings from the interviews. Several respondents revealed that although relations to other actors often provide access to information, a solid internal knowledge base may also better facilitate the formation of new linkages to other firms and organisations. The relationship between inter-firm relations and knowledge may therefore be of a reflexive character. This study will therefore not make any further conclusions regarding the causal relationship between inter-firm relations and record companies' knowledge levels. However, the interviews with label representatives, as well as with representatives from other firms and organisations, identified three sources for novel information and knowledge about digital distribution. These were foreign sources¹, internet and print publications, and Phonofile. When comparing the results from the survey and the interview thus far, several interesting issues arise. Both the interviews and the survey confirm that communication with foreign firms seems to be important for the acquisition of certain types of knowledge about digital distribution. Secondly, the survey identified a correlation between inter-label relations and various types of knowledge, whilst the interviews did not reveal this correlation. Finally, Phonofile is in fact a technology provider and closely related to an industry body (FONO). Hence, affiliation with Phonofile may in fact be the underlying reason for the relationship between links with industry bodies and knowledge as well as the connection between links with technology providers and knowledge. In order to explore this final point, the correlation

¹ For the purpose of analytical simplicity, foreign sources include firms and organisations, as well as trade fairs and conferences.

between affiliation with Phonofile and the different knowledge levels was tested. As Table 6 shows, record companies that have agreements with Phonofile have above average knowledge about legal and contractual issues online and in particular intellectual property rights online.

Table 6. Pearson correlation between affiliation with Phonofile and knowledge levels (n=85)

Variable	Knowledge areas					
	Digital distribution opportunities	Direct marketing	Legal and contractual issues online	IPR online	Digital formats	File sharing technology
Affiliation with Phonofile	,167	,018	,264*	,363**	,042	-,184

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

7.3 Underlying factors explaining differences in innovative activity

The main objective of this study is to investigate how record companies rely on networks and knowledge in the process of innovation within digital distribution of music. The three variables used in the survey as means for measuring innovative activity show significant differences in innovative activity among the record companies. However, these differences were less clear in the interviews as many of the representatives did not actively engage in digital distribution of music beyond the affiliation with Phonofile. The first variable, *number of digital services* in which the record label is available on is used as a direct measure of innovation within digital distribution of music. Having done a correlation analysis, resources related to the number of digital services was identified (see appendix 2 for details). These included both network resources and knowledge resources. Moreover, affiliation with Phonofile correlated strongly with the number of services that the record companies were available on. Evidently, the relationship between these resources and innovation appears to be somewhat complex. Therefore, in an attempt at identifying the most important resources and activities explaining the variation in innovative activities among the sampled record companies, a factor analysis was employed. A process of data reduction showed that 3 components or factors explain 62% of the variability represented by the network frequency, knowledge levels, and affiliation with Phonofile. Further, the factor analysis identified contact with (1) *other record companies*, knowledge about (2) *digital distribution opportunities*, and (3) *affiliation with Phonofile* as the underlying activities and resources

explaining the variance among the sampled record companies. In addition, contact with (4) *foreign firms* was also identified as an underlying activity, though less prominent than those listed above.

The factor analysis showed that affiliation with Phonofile was not only one of a few underlying factors explaining this variance, but it also seemed to be the most significant factor. It was therefore natural to analyse the correlation between inter-firm relations, knowledge levels, and innovative activity among firms not affiliated with Phonofile. The analysis identified the same resources and activities as important, but with contact with *industry bodies* replacing affiliation with Phonofile as a third explanatory factor. However, the analysis also showed that these resources do not explain the difference in innovative activity among the companies not affiliated with Phonofile. A correlation analysis (see appendix 2 for details) shows that neither inter-firm relations nor knowledge levels explain different levels of innovation activities at any significant level¹. It therefore appears to be a difficult task to understand why some record companies are more active in digital distribution of music than other, among the companies not affiliated with Phonofile. Nevertheless, this seems to underline the role of Phonofile as an important actor within a system for digital distribution of music in Norway.

Thus far, it has been established that geographical location and clustering does not appear to play an important role for the diffusion of knowledge and innovations related to digital distribution. Moreover, distributors seem to be equally insignificant actors affecting a system for digital distribution of music. These actors and systemic properties are perhaps more important for other areas of the Norwegian recorded music industry. However, the analysis presented in this chapter does find that record companies and other actors in the Norwegian recorded music industry do rely on certain types of knowledge for innovation in digital distribution of music. Moreover, certain network characteristics play a prominent role in the innovation processes within digital distribution. These activities, properties, characteristics or resources can, and will from now on, be referred to as factors.

¹ The analysis found weak correlations between contact with technology providers and access to digital catalogue, as well as correlations between knowledge about digital formats and file-sharing technologies and availability online.

7.3.1 Knowledge about digital distribution opportunities

This has identified that there is an unequal distribution of relevance between the different knowledge areas explored in the survey. The single most important knowledge area for innovation in the Norwegian recorded music industry is knowledge about digital distribution opportunities. This is perhaps the area that is most dynamic and the hardest to codify, and is thus often embedded in personnel and firms. This type of tacit knowledge is often difficult to transfer, particularly between heterogeneous agents separated by large distances or different languages (Asheim and Gertler 2004, Lundvall 1988). Perhaps this underlines the complexity of the issue of identifying the role of various knowledge areas and network properties for the processes of innovation within digital distribution. This may also suggest that there are certain peculiarities about the Norwegian recorded music industry and the technology related to digital distribution of music.

7.3.2 Homogeneous relations

The second of the identified factors is the activity that is *relations to other labels*. Relations between the same types of firms will in most cases result in homogeneous interaction. However, as the interviews and survey have identified, the make up of the Norwegian record companies is quite heterogeneous. It is therefore easy to assume that some proportion of the interaction between Norwegian record companies occurs between heterogeneous actors. Nevertheless, the interviews also revealed that most record companies interact with other record companies similar to themselves, within the same part of the industry network. Contrary to the findings from the analysis of the survey data, the interviews did not indicate that interaction between record companies was important for the accumulation of knowledge about digital distribution of music, nor for innovation within digital distribution in general. It is therefore difficult to establish the actual relevance of the relations between labels within the context of digital distribution of music in the Norwegian recorded music industry.

The survey showed that record companies communicate more often with distributors than with any of other types of actors in the recorded music industry. Moreover, most record companies are connected to formal networks based around traditional distributors. Based on Lundvall and Johnson's (1994) concept of learning by interacting, it is interesting to see that different levels of communication with these traditional distributors explain none of the variance in knowledge levels or innovative activity among the Norwegian record companies. There may, however, be a reason for this. Very few, if any, of the larger traditional

Norwegian distributors have entered the market for digital distribution. It is therefore not surprising that interaction with these types of firms have little or no influence on the distribution of knowledge related to digital distribution of music. Further, distributors are often relatively similar to record companies (many distributors are in fact record companies). Interaction between record companies and distributors can therefore be seen as interaction between homogeneous actors.

So far, interaction between record companies and firms of a similar nature seem to be activities of little importance for the systemic development of knowledge about digital distribution of music within the Norwegian recorded music industry. Moreover, homogeneous interactivity does not appear to be a primary driver for record companies' innovative activity within digital distribution of music. Does this mean that the relations between record companies are irrelevant? Probably not. Several of the record company representatives pointed out that close, informal relationships with industry people of a similar nature to themselves was important for networking in itself. For instance, friends and close acquaintances often act as introducers to new actors. Homogeneous connections therefore act as facilitators for the further establishment of heterogeneous relations. This may also explain why the first underlying factor explaining differences in innovation, *relations to other labels*, does not correlate directly with innovative activity. Another way of formulating this is that this activity is an indirect driver for innovation within digital distribution among Norwegian record companies.

7.3.3 Heterogeneous relations

The second underlying factor, identified in the statistical analysis, explaining the variance in record companies' innovative output is *relations to foreign firms*. Many of the interviewed representatives confirmed these relations as well as the *affiliation with Phonofile* as important activities for the acquisition of *knowledge about digital distribution opportunities*, the final underlying factor explaining the variance in innovation within digital distribution among Norwegian record companies. In line with Roger's (2003) attention to heterogeneous relations and Granovetter's (1973) belief in the strength of weak ties, record companies seem to rely significantly on relations to dissimilar actors for novel information relevant to digital distribution of music. However, it may not be that simple as access to new pools of information is not necessarily sufficient to develop knowledge and competence about digital distribution. In order to improve labels' digital distribution competences, feeding them

information is not enough. They will have to increase their own competence, either through acquiring personnel or learning-by-doing in order to develop know-how and know-who (Callon 2002). One of the interviewed label representatives believed that although relations to foreign firms and technology providers such as Phonofile provide access to new information and methods about digital distribution, without a solid knowledge base within the company, these relations are less useful. This is because a firm's ability to acquire knowledge depends on its existing absorptive capacity (Cohen and Levinthal 1990).

Both the literature and empirical findings presented in this study shows that clustering, strong ties, and homogeneous relations do not necessarily have a direct relationship with knowledge or innovation. Nevertheless, it is evident that these forms of interaction do influence innovation on some level. From a systemic perspective, where all relevant actors and activities are viewed in their systemic relationship to each other, strong ties and homogeneous relations seem to positively influence the formation of heterogeneous relations. In addition, although inter-firm relations such as those between record companies influence knowledge areas that are not directly related to innovation within digital distribution of music, these knowledge areas may increase the firms' absorptive capacity, thus enabling the firm to better acquire relevant knowledge from other sources. These other sources identified in the data analysis were in particular foreign firms and technology providers (most notably Phonofile).

7.3.4 The role of Phonofile

The seemingly lack of direct relationship between geographical location and innovation implies that there are certain peculiarities about the Norwegian recorded music industry and the technology related to digital distribution of music. The nature of the systemic properties in the Norwegian recorded music industry may in fact differ significantly from the equivalent industries in Sweden and the USA. This rings particularly true when discussing the systemic properties related to digital distribution of music. In this respect, Phonofile holds a unique role in the way that it provides access to new technology and knowledge about new technology, irrelevant of geographical location of the participating firms. Further, the factor analysis in this chapter shows that affiliation with Phonofile is one of a few underlying factors explaining the variances in knowledge levels and innovative activity in the Norwegian recorded music industry. The function of Phonofile may therefore counterbalance the effect of clusters by distributing know-what (and to some extent know-who) to the

industry and providing access to technology that would otherwise be hard to come by. This provides great possibilities, but also an element of risk. The possibilities are related to the way in which the position of Phonofile can be used to actively further educate the recorded music industry in areas where knowledge is lacking. Moreover, Phonofile can be used to distribute knowledge types such as know-who (sales contacts and technology contacts) and know-how. The risk associated with the systemic relationship between the different actors and activities and the role of Phonofile has to do with the centralised character of the system for distribution of knowledge. Currently, record companies affiliated with Phonofile have higher knowledge levels than those not affiliated with Phonofile. However, as much of the knowledge is created centrally, and the individual record companies engage in little learning by doing or learning by interacting (with digital services), the record companies affiliated with Phonofile may develop their knowledge bases more slowly than the rest of the industry. Innovation occurs through interaction and experimentation. The more companies that experiment the more the collective industry learns. Further, the more heterogeneous interaction between record companies and organisations like Phonofile, the more the collective industry learns. It is therefore important that the system facilitates active involvement of individual record companies in the various processes related to digital distribution. Moreover, stimulating the flow of information and knowledge *from* record companies to the central actors (such as Phonofile) is important in order to strengthen the interactivity within the system for digital distribution of music in Norway.

7.3.5 Summing up the functions of the four underlying factors

Heterogeneous communication has been identified in the survey, interviews, and in the literature as one of the most important activities for knowledge diffusion and innovation within digital distribution of music. However, clustering and homogeneous relations are both important in facilitating the establishment of heterogeneous contacts. Thus there seems to be a dependency between homogeneous and heterogeneous relations. In fact, there is a systemic relationship between the four underlying factors that explain the differences in knowledge levels and innovation within digital distribution among Norwegian record companies. Relations to actors of a similar nature (*relations to other labels*) are necessary for the establishment of effective network resources. Further, relations to different types of firms and organisations (*relations to foreign actors*) provide access to new types of information. Without *relations to Phonofile*, a second type of heterogeneous connections, record companies are less likely to engage in innovative activity. Moreover, relations to foreign

firms, relations to other labels, and knowledge about digital distribution opportunities have little effect on labels not affiliated with Phonofile. Finally, even with these different types of relations, *knowledge about digital distribution* is also important in order to exploit the potential in these relations, based on the concept of absorptive capacity (Cohen and Levinthal 1990).

In this respect, it is apparent that Phonofile plays an important role. On the one hand, Phonofile is important for innovation and as a source for knowledge about digital distribution. Its presence is a benefit to the industry on a collective level as it increases the total knowledge base. However, with many companies not actively engaging in experimentation and learning-by-doing as a result of their affiliation with Phonofile, individual firms' knowledge bases may in the future suffer as a result. Thus, firms may in the future lack one of the four underlying factors for innovation. This may lead to a creative destruction where firms with no prior knowledge may find it difficult to adapt to an industry where the technological foundation changes, as the firm will lack the absorptive capacity.

7.4 The overall structure

In addition to a firm's knowledge base, the national framework is also important for a company's ability to absorb information from foreign sources (Narula 2003). Thus, the structure in which knowledge about digital distribution flows within the Norwegian recorded music industry will influence the effect of individual record company's heterogeneous relations. Interviews with industry representatives reveal that a large part of the information regarding digital distribution flows from the central nodes (such as Phonofile or industry bodies) to the peripheral actors (record companies), with little information travelling in the opposite direction. Further, companies providing solutions for distribution to mobile phones, online retailers, and other technology firms rarely interact directly with record companies. Aggregators such as Phonofile (and other similar operations) then act as mediators, and become very important for the diffusion process.

7.5 Conclusions and further research

This thesis proposed that certain network properties, specific types of knowledge, and selected actors are important factors for record companies adapting to a changing business environment. The most important factors have been identified and their role has been discussed in a systemic context.

In summary, it is interesting to see that geographical clustering within the Norwegian recorded music industry does not appear to have a direct effect on the diffusion of knowledge or innovation related to digital distribution of music. This implies that the cluster model may not always be a suitable approach to understanding the drivers for innovation. This is not to say that geographical location is not relevant when considering the Norwegian recorded music industry as a whole. It certainly is. However, in terms of understanding activities driving innovation within digital distribution of music in Norway, other factors seem to be more important.

The most important factors are (1) the relationship between record companies, (2) relations between record companies and foreign firms, (3) record companies' knowledge about digital distribution opportunities, and (4) record companies' affiliation with Phonofile. The role of Phonofile deserves extra attention as this is the component that has the greatest influence on the diffusion of knowledge (and innovations) related to digital distribution. This is perhaps one of the aspects of the systemic properties of digital distribution of music in Norway that sets it apart related industries in other countries. However, this requires further attention in order to be established.

Looking at the industry as a collective, it is evident that the nature of the general social structures is reflected in the structures facilitating the movement of information and communication related to digital distribution, though not represented by the same actors. These information and communication structures are characterised by the fact that the majority of the transactions (information) occur between small, independent firms (record companies) and the centralised organisations (Phonofile), and not between separate small firms. This is not unlike what Scott and Lash (1994) found when analysing the British culture industries, prior to the development of digital distribution networks. This may not be the ideal structure for an efficient flow of information and knowledge throughout the industry. It may therefore be worth examining how more reflexive communication flows can be stimulated in order to increase the involvement of peripheral actors in the network and encourage interaction between actors beyond the central nodes in the network within the Norwegian recorded music industry.

The results presented in this thesis are not only interesting in the context of the Norwegian recorded music industry, but may have some theoretical implications. The evidence presented seems to indicate that geographical co-location of (similar and dissimilar)

firms not necessarily acts as a direct driver for all knowledge diffusion and innovation as the nature of such activities will often be very context dependent. Other factors can be more important and may at times even balance out the effect that clustering would otherwise provide. Thus, it may be recommendable to complement a cluster analysis approach with other tools that may reveal other and perhaps more important factors. Though the effect of clustering will often still be evident, the actual role of clusters and the processes within may change using such a complimentary method. This final argument should perhaps also be considered by policy makers. While the nurturing of clusters is often a very useful method of supporting regions as well as selected industries, in the case of digital distribution of music, influencing specific actors as well as stimulating interaction between actors irrelevant of location could perhaps yield greater results. However, this final argument remains on a purely speculative level without further research into existing and potential policy instruments directed towards the recorded music industry in Norway with specific attention to digital distribution.

This study has explored how specific network characteristics and knowledge areas influence Norwegian record companies' ability to innovate within digital distribution of music. One particular feature of the recorded music industry recognised in this study as well as in other studies is the heterogeneity among record companies. It would therefore be interesting to explore the role networks and different types of inter-firm relations, as well as different knowledge areas, within different genres. Such a comparative study, based upon the general findings from this study, could provide useful insights into the various segments of the music industry. In addition, such a study could identify common features across genres, adding to the existing knowledge base on the Norwegian music industry.

Phonofile has been identified as an influential actor with regards to digital distribution of music in Norway. The study has shown that the company is an important contributor to the diffusion of both knowledge and innovation. However, in order to further the understanding of the role of Phonofile in the Norwegian music industry, a comparative study among the Scandinavian music industries could be carried out. As Phonofile is relatively unique in Scandinavian terms, such a study could provide further evidence of the effect of Phonofile on innovation within digital distribution. Moreover, various studies of the Swedish music industry (Hallencreutz 2002, Power and Jansson 2003) have found that the clustering of culture industries in the larger cities is one of the underlying factors explaining many years of

success in the Swedish music industry. It would therefore be interesting to explore whether this clustering plays an equally important role for innovation within digital distribution of music in Sweden. Such a study could then investigate any similarities and differences between the effect of clustering in the Norwegian and Swedish music industries.

Finally, it is important to recognise that it is difficult to establish any causal relations between social networks, knowledge and innovation without considering development through time. It would therefore be useful to perform a similar study, conducting a similar survey, of the Norwegian record companies in order to measure the variables over time. Not only could this provide interesting insights into the dynamics of knowledge about digital distribution of music, but it could also to a better extent show the effect of certain types of relations and activities in the Norwegian record industry.

References

- Adalsteinsson, G. D. and Ragnarsdottir, H. B. (2003) "Technological and economic competence within the Icelandic music industry: The Icelandic music industry" in Power, D. (ed.), *Behind The Music: Profitting from sound: A systems Approach to the Dynamics of the Nordic Music Industry*, STEP/Nordic Innovation Centre.
- Ahuja, G. (2000a) "The Duality of Collaboration: Inducements and Opportunities In the Formation of Interfirm Linkages," *Strategic Management Journal* 21: 317-43.
- Ahuja, G. (2000b) "Collaboration Networks, Structural Holes, and Innovation: A Longitudinal Study," *Administrative Science Quarterly* 45: 425-55.
- Asheim, B., and Gertler, M. S. (2004) "The Geography of Innovation: Regional Innovation Systems" in J. Fagerberg, D. C. Mowery, and R. R. Nelson (eds.), *The Oxford Handbook of Innovation*, London: Oxford University Press, 291-317.
- Bugge, M. M. (2003) "Independent Dependency & the Resonance of Buzz: Creation & Coordination of Competencies in the Norwegian Pop Music Industry" in Power, D. (ed.), *Behind The Music: Profitting from sound: A systems Approach to the Dynamics of the Nordic Music Industry*, STEP/Nordic Innovation Centre.
- Callon, M. (2002) "From Science as an Economic Activity to Socioeconomics of Scientific Research: The Dynamics of Emergent and Consolidated Techno-economic Networks" in Mirowsky, P. and Sent, E-M. (eds.) *Science bought and sold: essays in the economics of science*, Chicago: The University of Chicago Press, 277-317.
- Cohen, W., and Levinthal, D. (1990) "Absorptive Capacity: A New Perspective on Learning and Innovation," *Administrative Science Quarterly* 35: 128-152.
- Di Maggio, P., Powell, W. (1983). "The iron cage revisited: Institutional isomorphism and collective rationality in organisational fields," *American Sociological Review*, Vol. 48, pp 147-160.
- Djellal, F. and Gallouj, F. (2001) "Innovation surveys for Service Industries: A Review" in Thurieaux, B., Arnold, E. and Couchot, C. (eds.) *Innovation and Enterprise Creation: Statistics and Indicators*, Luxembourg: European Commission (EUR 17038).
- Edquist, C. (2004) "Systems of Innovation: Perspectives and Challenges" in J. Fagerberg, D. C. Mowery, and R. R. Nelson (eds.), *The Oxford Handbook of Innovation*, London: Oxford University Press, 181-208.
- Fagerberg, J. (2003) "Schumpeter and the Revival of Evolutionary Economics: An appraisal of the Literature," *Journal of Evolutionary Economics* 13: 125-59.

- Fagerberg, J. (2004) "Innovation: A Guide to the Literature" in J. Fagerberg, D. C. Mowery, and R. R. Nelson (eds.), *The Oxford Handbook of Innovation*, London: Oxford University Press, 1-26.
- Florida, R. (2002) *The Rise of the Creative Class: And How It's Transforming Work, Leisure, Community and Everyday Life*, New York: Basic Books.
- Granovetter, M. S. (1973) "The Strength of Weak Ties," *The American Journal of Sociology* 78: 1360-1380.
- Hallencreutz, D. (2002) "Populärmusik, kluster och industriell konkurrenskraft", Unpublished Ph.D. dissertation, University of Uppsala.
- Hallencreutz, D. and Lundequist, P. (2002): "Making knowledge funky: localised learning and SME competitiveness in the Swedish music cluster", Working paper.
- Hughes, T. (1984). "Large Technological Systems" in Bijker et al. (Eds.), *The Social Construction of Technological Systems: New Directions in the Sociology and history of Technology* (pp. 51-82). Michigan: MIT Press.
- IFPI (2005a) *Digital Music Report 2005* available from:
<http://www.ifpi.com/site-content/press/20050119.html>
- IFPI (2005b) *The Recording Industry 2005 Commercial Piracy Report* available from:
<http://www.ifpi.com/site-content/library/piracy2005.pdf>
- Judd, C. M., Smith, E. R., and Kidder, L. H. (1991) *Research Methods in Social Relations*, Orlando, FL: Harcourt Brace College Publishers.
- Kline, S. J., and Rosenberg, N. (1986) "An Overview of Innovation" in R. Landau and N. Rosenberg (eds.), *The Positive Sum Strategy: Harnessing Technology for Economic Growth*, Washington, DC: National Academy Press, 275-304.
- Kusek, D. and Leonhard, G. (2005) *The Future of Music*, Boston: Berklee Press.
- Lash, S. and Urry, J. (1994) *Economies of Signs & Space*, London: Sage Publications.
- Lorenzen, M. and Frederiksen, L. (2003) "Here, There, but Not Everywhere: Networks, Clustering, and Policies in the Danish Music Industry" in Power, D. (ed.), *Behind The Music: Profitting from sound: A systems Approach to the Dynamics of the Nordic Music Industry*, STEP/Nordic Innovation Centre.
- Lundvall B.-A.(1988) "Innovation as an Interactive Process: From User-Producer Interaction to the National System of Innovation" in Giovanni Dosi, Christopher Freeman, Richard Nelson, Gerald Silverberg and Luc Soete (eds.), *Technical change and Economic Theory*, London: Pinter Publishers, 349-369.

- Lundvall, B.-Å. (ed.) (1992) *National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning*, London: Pinter.
- Lundvall, B.-Å. and Johnson, B. (1994): The Learning Economy. *Journal of Industry Studies*, 1: 23–42.
- Ministry of Culture and Church Affairs. (2005). Whitepaper No. 22 (2004-2005). *Kultur og næring*.
- Narula, R. (2003) *Globalization & technology: Interdependence, Innovation Systems and Industrial Policy*, Cambridge: Polity Press.
- NUTEK (1996), *Maskinindustrin i Sverige: Teknologuutveckling, konkurrens och tillväxt*, NUTEK, Stockholm.
- OECD (2005a), *Working Party on the Information Economy, Digital Broadband Content: Music*, (OECD JT00185905).
- OECD (2005b), *Working Party on the Information Economy, Digital Broadband Content: The online computer and video game industry*, (OECD JT00184075).
- Powell, W.W. and Grodal, S. (2004) “Networks of Innovators” in J. Fagerberg, D. C. Mowery, and R. R. Nelson (eds.), *The Oxford Handbook of Innovation*, London: Oxford University Press, 56-85.
- Power, D. (2003) (ed.), *Behind The Music: Profitting from sound: A systems Approach to the Dynamics of the Nordic Music Industry*, STEP/Nordic Innovation Centre.
- Power, D. and Jansson, J (2003) “The emergence of a post-industrial music economy? Music and ICT synergies in Stockholm, Sweden”, Industrial Fund, Sweden.
- Rogers, E. (2003) *Diffusion of Innovations*, New York: Free Press.
- Scott, A. J. (1999a) ”The cultural economy: geography and the creative field,” *Media, Culture & Society*, 21: 807 – 817.
- Scott, A. J. (1999b) ”The US recorded music industry: on the relations between organization, location and creativity in the cultural economy,” *Environment and Planning A*, 31: 1965 – 1984.
- Tanaka, T. (2004) ”Does file sharing reduce music CD sales?: A case of Japan”, Working paper, Institute of Innovation Research, Hitotsubashi University.
- Technology Review (2005) “Advertisers: Game On”, Vol. 108, No. 5: 15.
- Tunzelmann, N. V. and Acha, V. (2004) “Innovation in ‘Low-Tech’ Industries” in J. Fagerberg, D. C. Mowery, and R. R. Nelson (eds.), *The Oxford Handbook of Innovation*, London: Oxford University Press, 407-432.

Verspagen, B. and Duysters, G. (2004) "The small worlds of strategic technology alliances," *Technovation*, 24: 563-571.

Verspagen, B. and Werler, C. (2004) "Keith Pavitt and the Invisible College of the Economics of Technology and Innovation," *Research Policy*, 33: 1419-1431.

Virtanen, H. (2003) "Digital Delivery of Popular Music: The Case of Finland" in Power, D. (ed.), *Behind The Music: Profitting from sound: A systems Approach to the Dynamics of the Nordic Music Industry*, STEP/Nordic Innovation Centre.

Østlandsforskning (2004), Kartlegging av Kulturnæringene i Norge.

List of Internet sites:

CNET News.com, 05.09.05, [online] URL:
http://news.com.com/iTunes+downloads+top+500+million+mark/2110-1027_3-5792960.html

CNN, 24.08.05, [online] URL:
<http://www.cnn.com/2005/TECH/ptech/08/22/music.apple.reut/>

Digi, 05.07.05 [online] URL:
<http://www.digi.no/php/art.php?id=212227>

MedieNorge, 26.08.05, [online] URL:
<http://www.medienorge.uib.no/main.cfm?ID=118&Medium=Video>

Newspaper Association of America, 26.08.05, [online] URL:
<http://www.naa.org/artpage.cfm?AID=1573&SID=1022>

Recording Industry Association of America, 24.04.05, [online] URL:
<http://www.riaa.com/news/marketingdata/default.asp>

Appendix 1: List of interview representatives

Brataas, Erik, Phonofile, 13 May 2005, Oslo.

Dalchow, Jørn, daWorks, 12 July 2005, Oslo.

Flaten Eilertsen, Petter, Synesthetic Recordings, 3 August 2005, Oslo.

Grøndahl, Klaus, GRAMO, 1 July 2005, Oslo.

Handeland, Helge, Tuba Records, 28 June 2005, Oslo.

Lindberg, Morten, 2L, 14 June 2005, Oslo.

Olsen, Claes, Racing Junior, 18 August 2005, Oslo.

Paulsen, Jan, FONO, 25 June 2005, Toten (telephone).

Suhrke, Bjørn and Næss, Erik, NRK Aktivum, 20 July 2005, Oslo.

Sørland, Klaus, Telenor Nordic Mobile, 4 July 2005, Oslo.

Tornes, Trond, Artspages Operations, 17 June 2005, Kristiansand.

Appendix 2: Tables presenting variables correlating with innovative output

Variables correlating with innovative output (complete sample)

Table 1. Pearson correlation between inter-firm relations and innovative activity in digital distribution

Variable	Relations to different types of actors in the recorded music industry				
	Record companies	Distributors	Industry bodies	Technology providers	Foreign firms
Available on number of digital services (n=75)	,112	,298**	,398**	,285*	,242*
Access to digital catalogue (n=80)	,060	,205	,148	,277*	,107
Access to metadata (n=73)	-,017	,075	,175	,041	-,163

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Table 2. Pearson correlation between levels of knowledge and innovative activity in digital distribution

Variable	Knowledge areas					
	Digital distribution opportunities	Direct marketing	Legal and contractual issues online	IPR online	Digital formats	File sharing technology
Available on number of digital services (n=75)	,307**	,150	,248*	,358**	,272*	,137
Access to digital catalogue (n=80)	,281*	,218	,183	,274*	,126	,134
Access to metadata (n=73)	,319**	,284*	,149	,118	,332**	,221

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Table 3. Pearson correlation between affiliation with Phonofile and innovative activity in digital distribution

Variable	Innovative activity within digital distribution		
	Available on number of digital services (n=75)	Access to digital catalogue (=80)	Access to metadata (n=73)
Affiliation with Phonofile	,486**	,454**	,202

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Appendix 2 (cont.): Tables presenting variables correlating with innovative output (sample of companies not affiliated with Phonofile)

Table 4. Pearson correlation between inter-firm relations and innovative activity in digital distribution

Variable	Relations to different types of actors in the recorded music industry				
	Record companies	Distributors	Industry bodies	Technology providers	Foreign firms
Available on number of digital services (n=34)	,093	,199	-,085	,152	,078
Access to digital catalogue (n=37)	-,006	,087	-,300	,346*	,049
Access to metadata (n=35)	-,069	,076	-,031	-,089	-,206

* Correlation is significant at the 0.05 level (2-tailed).

Table 5. Pearson correlation between levels of knowledge and innovative activity in digital distribution

Variable	Knowledge areas					
	Digital distribution opportunities	Direct marketing	Legal and contractual issues online	IPR online	Digital formats	File sharing technology
Available on number of digital services (n=34)	,332	,258	,220	,288	,352*	,415*
Access to digital catalogue (n=37)	,307	,292	,123	,147	,091	,292
Access to metadata (n=35)	,138	,081	,058	,073	,266	,256

* Correlation is significant at the 0.05 level (2-tailed).